11th International Conference on Nuclear Sciences and Applications

ESNSA–11

and

Second IRPA–EGYPT Radiation Protection Workshop

المؤتمر الدولي الحادي عشر للعلوم النووية وتطبيقاتها

ESNSA

20-24 February 2016

Book of abstract

Organized by

The Egyptian Society of Nuclear Sciences and Applications

(ESNSA)

Held at

Hurgada – Egypt
Sonesta Pharaoh Beach Resort

20–24 February 2016

The Egyptian Society of Nuclear Sciences and Applications
http://www.esnsa-eg.com
e-mail: esnsa_group@yahoo.com
ملخصات البحوث
المؤتمر الدولي الحادي عشر
للعلوم النووية وتطبيقاتها
20 - 24 فبراير
الغردقة - مصر - 2016

تنظيمه
الجمعية المصرية للعلوم النووية
وتطبيقاتها

المنعقد بفندق سونسنا الفرعون - الغردقة
البحر الأحمر - مصر

The Egyptian Society of Nuclear Sciences and Applications
http://www.esnsa-eg.com
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11th INTERNATIONAL CONFERENCE ON
NUCLEAR

SCIENCES AND APPLICATIONS

and
Second IRPA-EGYPT Radiation Protection Workshop

Book of abstract

Organized by

The Egyptian Society of Nuclear Sciences and Applications (ESNSA)

Member of the International Nuclear Societies Council (INSC)

The Egyptian Atomic Energy Authority (EAEA)

February (20-24), 2016

Hurghada, Red Sea, Egypt, Sonesta Pharaoh Beach Resort 5*
Preamble

The Egyptian Society of Nuclear Sciences and Applications (ESNSA)

Organizes an international conference every four years that deals with the current activities in nuclear sciences and applications. It aims at providing a forum for exchange of knowledge in the interdisciplinary fields on nuclear sciences and their applications.

The conference scientific activities will include invited talks and keynote presentations by international and national recognized scientists to highlight recent progress in nuclear sciences, as well as contributed papers dealing with ongoing research.

CONFERENCE STEERING COMMITTEE

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Acknowledgement

The conference organizing committee expresses gratitude for the financial support of the following organizations:

Sinai University
Satco (Scientific and Technical Consultation Office)

ESNSA Conference Awards

The ESNSA Conference board is pleased to inform junior scientists that several awards are offered by senior Professors in different disciplines of the Conference.

These awards will be given for the best presentation in the different sections.

The ESNSA conference Board invites all the junior scientists to make their affords to get the honorable awards. The prizes are awarded by:

Prof. Hisham F. Aly           Prof. Ibrahim Yassin Moustafa
Prof. Abdel Fattah Helal     Prof. Abdelwahab Elsayed
Prof. Abdel Shafy Ragab      Prof. Sofia Yahia Afifi
Prof. Farid Abou El-Nour     Prof. Mohamed A. Gomaa
Prof. El-Sayed Hegazy        Prof. Ahmed Ashour
Prof. Azza Shahin
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The Egyptian Society of Nuclear Sciences and Applications

http://www.esnsa-eg.com  
e-mail: esnsa_group@yahoo.com
## Time Table

### Saturday 20/2/2016 (Hall A)

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<td>11:00 – 1:00</td>
<td>WWT</td>
<td>Workshop (IRPA-Eg)</td>
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<td>1:00 – 3:00</td>
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<td>3:00 – 5:00</td>
<td>Mat. Sci.</td>
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<td>11:00 – 1:00</td>
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Saturday

20/2/2016

Opening Ceremony
Saturday 20/2/2016

5.00 : 6.00 PM
Sunday

21/2/2016
Invited Talks

Hall (A)

Sunday 21/2/2016
Invited Talk 9.00 - 10.00:

Chairmen:
Prof. Dr. H. F. Aly
Prof. Dr. Ibrahim Y. Moustafa

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<td>Review of Some Treatment Technologies for Radioactive Solid and Liquid Wastes James D. Navertil</td>
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<td>IT 2</td>
<td>UNSCEAR’s Global Survey of Medical Exposure Ferid Shannoun</td>
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A.د/ هشام فؤاد علي
A.د/ ابراهيم يس مصطفى
IT 1. Review of Some Treatment Technologies for Radioactive Solid and Liquid Wastes

James D. Navratil

Professor Emeritus, Clemson University, Clemson SC

Author E-mail: nav@hazenresearch.com

Molten Salt Oxidation (MSO) is one method to treat radioactive solid and/or liquid waste. In the process the radioactive waste is injected with air under the surface of molten salt, usually Na₂CO₃, at 750–900°C. Flameless oxidation takes place within the salt bath converting the organic components of the waste into carbon dioxide and steam. The off-gas is filtered to remove any entrained salt particulate. Reactive species such as fluorine, chlorine, bromine, iodine, sulfur, phosphorous, and arsenic in the organic waste react with the molten salt to form the corresponding neutralized salts. After repeated use of the salt, and if needed, radioactive elements can be removed from the salt by aqueous processing, or the salt can be immobilized for final disposal. Previous work on the use of MSO for waste treatment will be briefly reviewed. Recent experiments with the destruction of radioactive waste oils and ion exchange resins will be presented along with new work on the recovery of uranium from lignite ores using MSO.

Many processes have utilized iron oxides for the treatment of radioactive wastewater. These processes have included adsorption, precipitation and other chemical and physical techniques. Some adsorption processes for water treatment have utilized ferrites and a variety of iron containing minerals, such as magnetite. Ferrite is a generic term for a class of magnetic iron oxide compounds. Ferrites posses the property of spontaneous magnetization and are crystalline materials soluble only in strong acid. Iron atoms in iron ferrite (FeO·Fe₂O₃) can be replaced by many other metal ions without seriously altering its spinel structure. Our water treatment system consists of a column of supported magnetite surrounded by a movable permanent magnet. The mineral magnetite, or synthetically prepared iron ferrite, is typically supported on various materials to permit adequate water passage through the column. In the presence of the external magnetic field, enhanced capacity was observed in using supported magnetite for removal of heavy metals from water. The enhanced capacity is primarily due to magnetic filtration of colloidal and submicron particles along with some complex and ion exchange sorption mechanisms. The loaded magnetite can easily be regenerated by the removal of the magnetic field and use of a regenerating solution. A review of previous work on the use of iron oxides for water treatment and new research on our system using magnetite and iron ferrite for mine and radioactive waste water treatment will be presented.
IT 2. UNSCEAR’s Global Survey of Medical Exposure

Dr. Ferid Shannoun
UNSCEAR secretariat, P.O. Box 500, 1400 Vienna, Austria

In 1955, the General Assembly of the United Nations has established the Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) to assess and report levels, effects and risks of exposure to ionizing radiation from all sources, including that used in medicine. Information on the use of radiation for treatment and diagnosis and the associated doses is obtained by reviewing the scientific literature and through population-based surveys. Over the past 30 years, UNSCEAR has regularly assessed the levels and trends of medical exposures globally and has carried out surveys to collect the required information from UN Member States.

It is known today that medical radiation exposure is by far the largest artificial source of radiological exposure in many countries and it continues to increase considerably. UNSCEAR’s surveys are also used to identify gaps in radiation treatment capabilities and possible unwarranted dose variations for similar examinations.

In August 2014, UNSCEAR launched a new Global Medical Exposure Survey by inviting the UN Member States to submit data on medical radiological exposure from diagnostic and interventional radiology, nuclear medicine and radiation therapy. The World Health Organization (WHO) supports the new UNSCEAR survey, considering the data on radiological exposure in medicine as public health relevant. Further, the active involvement of WHO enables contact with health authorities as important sources of information.

In recent years, UNSCEAR has developed an improvement strategy to address some existing deficiencies in data quality and collection of former surveys and to increase participation of UN Member States in its new survey. The major elements of the strategy are the:

1. introduction of UNSCEAR’s online platform\(^1\), which fosters secure submission, exchange and archiving of data. Only registered persons will have access to the online platform.
2. request for nomination of national contact persons — via official channels — to coordinate, at country level, the collection and submission of data on radiation exposure of workers, the public and patients.
3. establishment of an Expert Group on Medical Exposure, who assist the secretariat in the evaluation of the submitted data and in checking of their quality.

In the past, the data and findings provided by UNSCEAR have been used to establish frameworks for radiation protection activities in medicine such as the International Action Plan for the Radiological Protection of Patients established by the International Atomic Energy Agency (IAEA) in 2002 or WHO’s Global Initiative for Radiation Safety in Health Care Settings launched in 2008. More recently, UNSCEAR has been collaborating closely with the IAEA and WHO to implement Action 6 of the recent Bonn Call for Actions\(^2\), which urges increased availability of improved global information on medical and occupational exposures in medicine.

\(^1\) www.survey.unscear.org
\(^2\) http://www.who.int/ionizing_radiation/about/med_exposure/en/index3.html
Sunday 21/2/2016

Chairmen:

Prof. Dr. M.N. Comsan
Prof. Dr. S. U. El. Kameesy
Prof. Dr. K. Essa

Hall (A)

1) Physics (1)  11:00 -1:00 am:

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<td>Excitation of Surface Modes by Electron Beam in Semi-Bounded Quantum Plasma</td>
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<td>Studying The Sensitivity of Halo Nucleus – Nucleus Elastic Scattering to the Halo Nucleus Density Distribution</td>
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<td>Non-Gaussian Stochastic Radiation Transfer in Finite Planar Media with Rayleigh Scattering</td>
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Phys. 1-1. Theoretical Solution of the Diffusion Equation in Unstable Case
Khaled S.M. Essa, Aziz N. Mina, Hany S. Hamdy and Ayman A. Khalifa

B. F. Mohamed and N. M. Elbasha *
Plasma Physics Dept., N.R.C., Atomic Energy Authority, Cairo, Egypt
*Physics of Dept., Faculty of Science, Ain-Shams University, Cairo-Egypt
Author E-mail: mohamedbahf@yahoo.co.uk

ABSTRACT

However, there are examples where both plasma and quantum effect can coexist. In such situations, quantum effects are expected to play a significant role on the dynamics of plasma particles due to its important applications in microelectronics devices, quantum dots and quantum wire, in dense astrophysical plasma system as well as in laser-produced plasma and nonlinear optics. The quantum effects become important in plasmas when de Broglie wavelength associated with the particles is equal to or greater than the average inter-particle distance.

Fluid plasma models have been developed to introduce the quantum effects of its constituents. In these models, the equation of motion for particles has two main quantum corrections. One is a quantum force produced by density fluctuations, which has its origin in the so called Bohm potential and the other one is owing to the spin of particles.

The surface waves propagating along the interface between a vacuum and a quantum plasma has attracted much attention because of its wide applications in many areas such as laser-plasma interaction, plasma technology, plasma diagnostics, plasma heating by large amplitude waves, microwave electronics, plasma spectroscopy, nanotechnology, surface sciences etc.

Our purpose in the present paper is to investigate the excitation of the electromagnetic TM-surface waves by electron beam flow through the semi-bounded quantum plasma under external magnetic field. The generated current and the perturbed densities of the electron beam and plasma are obtained. The wave equation which describes the excited fields has been solved to obtain the dispersion relation for these modes. It is found that the quantum effects play important role for frequencies less and bigger than plasma frequencies such that the phase velocity of modes increase with increasing the quantum effects compared to the classical case.

M.A.M. Hassan¹, M.S.M. Nour El-Din², A. Ellithi³ and H. Hosny⁴
¹. Mathematics Department, Faculty of Science, Ain Shams University, Cairo, Egypt
². Physics Department, Faculty of Science, Benha University, Benha, Egypt
³. Physics Department, Faculty of Science, Cairo University, Cairo, Egypt
⁴. Mathematics Department, Faculty of Basic Science, German University in Cairo (GUC), Egypt
Corresponding author email: hisham.hussein@guc.edu.eg

ABSTRACT

In the framework of the Glauber optical limit approximation (OLA), the differential, total and elastic cross sections for halo nucleus–nucleus collision at intermediate energy (≈ 800 MeV) have been studied. The projectile nuclei are taken to be one-neutron halo (INHP) and
two-neutron halo (2NHP). The calculations are carried out for Gaussian-Gaussian (GG), Gaussian-Oscillator (GO) and Gaussian-2S (G2S) densities for each considered projectile. As a target, the stable nuclei in the range 4 – 28 of the mass number are used. An analytic expression of the phase shift function has been derived. The zero range approximation is considered in the calculations. The obtained results are analyzed and compared with the available experimental data.

Phys. 1-4. Differential Elastic Cross Section for $K^-$ Meson with $^{12}$C and $^{40}$Ca Nuclei by Mesons Exchange Potential

Sh.M.E. Sewailem.
Math.and Theor.Phys.Dept., NRC, Atomic Energy Authority 13759, Cairo-Egypt

ABSTRACT

Differential elastic cross section of $K^-$ meson with $^{12}$C and $^{40}$Ca nuclei at incident kaon momenta in the range 800 MeV/c is studied over an angular range from 10 to 30 degree. Kaon-Nuclei Scattering are calculated in the frame of a semi-relativistic optical potential constructed on the One-Body-Exchange (OBE) form and the JÄülerich group parameterization was using where the applied optical potential has based on four exchanged mesons. The single particle energy dependant (SPED) meson function used in the calculations.

Phys. 1-5. Non-Gaussian Stochastic Radiation Transfer in Finite Planar Media with Rayleigh Scattering

M. Sallah
Theoretical Physics Research Group, Physics Department, Faculty of Science, Mansoura University, Mansoura P. O. Box. 35516, EGYPT

Author E-mail: msallahd@mans.edu.eg

ABSTRACT

The stochastic radiation transfer is considered in a participating planar finite continuously fluctuating medium characterized by non-Gaussian probability. The problem is considered for specular-reflecting boundaries with Rayleigh scattering. Random variable transformation (RVT) technique is used to get the complete average for the solution functions that are represented by the probability-density function (PDF) of the solution process. In the RVT algorithm, a simple integral transformation to the input stochastic process (the extinction function of the medium) is applied. This linear transformation enables us to rewrite the stochastic transport equations in terms of the optical random variable ($x$) and the optical random thickness ($L$). Then the radiation transfer equation is solved deterministically to get a closed form for the solution as a function of $x$ and $L$. So, the solution is used to obtain the PDF of the solution functions applying the RVT technique among the input random variable ($L$) and the output process (the solution functions). The obtained averages of the solution functions are used to get the complete analytical averages for some interesting physical quantities, namely, reflectivity and transmissivity at the medium boundaries.
Sunday 21/2/2016

Chairmen:
Prof. Dr. A. H. Zahran
Prof. Dr. El-Sayed Hegazy
Prof. Dr. Nabila A. Maziad

Hall(B)

2) Radiation Chemistry  11:00 -1:00 pm:

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<td>Nabila Ahmed Maziad</td>
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<td>Radiocarbon Dating and Paleoclimatic Reconstruction</td>
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<td>Effect of Ilmenite on the Attenuation Coefficient of Gamma Ray Shielding Cementious Matrix</td>
<td>Khaled Sakr</td>
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Rad. Chem. 1. Gamma-Radiation Induced Copolymerization of Sodium Alginate / Acrylamide for Application in Water Decontamination of Some Heavy Metals

1 Nabila Ahmed Maziad1, Mona mohsen 2, Ehsan gomaa2, Reem Mohamed 2
1 Polymer chemistry department - national centre for radiation research and technology, atomic energy authority, Egypt .
2Faculty of Science, physics Department Ain shams University

ABSTRACT

The polymeric network of sodium alginate–co-acrylamide (NaAlg-co-AAm) is prepared by γ-irradiations induced copolymerization. The polymeric network of NaAlg-co-AAm has been interlinked by covalent and hydrogen bonds which also strength the gel network. The gel fraction and swelling percent of hydrogel with different AAm concentration, NaAlg amount absorbed dose are compared. It is found that the suitable gel fraction and swelling of hydrogel with 20 % AAm and 30 ml NaAlg at dose 20 kGy are 86% and 4869% respectively. The hydrogel show high sensitive to the change in pH and time. The structure and successful crosslinking have been confirmed by Fourier transformed infrared spectroscopy (FTIR), and the free volume characterized by positron annihilation life time spectroscopy. The hydrogel was tested for their ability to be used for heavy metal ion removal. The factors affecting the removal of heavy metal ions, such as treatment time with the solution, initial metal ions concentration, pH and temperature of the metal solutions were also investigated. It is found that the maximum uptake for Cu$^{2+}$ and Co$^{2+}$ at pH 5 and 7 for Ni$^{2+}$ at 100 ppm after 24h. The morphology of hydrogel and that loaded with metals has been studied with scanning electron microscope (SEM).

Rad. Chem. 2. Colloidal Copper Nanoparticles: Synthesis, Characterization and Catalytic Behavior

Z. I. Ali1, O.A. Ghazy1, G. Meligi2, H. H. Saleh1 and M. Bekhit1
1National Center for Radiation Research and Technology (NCRRT),Egyptian Atomic Energy Authority, 3 Ahmed El-zomor St., Nasr City, P.O. Box 29, Cairo, Egypt.
2Chemistry Department, Faculty of Science, Ain Shams University, Cairo, Egypt.

ABSTRACT

Copper nanoparticles (CuNPs) were prepared by two methods, chemical reduction using ascorbic acid and radiation-induced process. The TEM images and UV-visible spectra indicated that the average size of Cu nanoparticles obtained by gamma radiolysis method was smaller than those prepared by chemical reduction method. The radiolytic method provides copper nanoparticles in fully reduced and highly pure state as a function of irradiation doses compared to chemical reduction method. X-ray diffraction analysis confirmed the face centered cubic structure of CuNPs .The catalytic activity of the as-prepared CuNPs was evaluated on the reduction of p-nitrophenol (p-NP) to the corresponding amine (p-aminophenol, p-AMP) by sodium borohydride (NaBH₄). The reaction was monitored by UV–VIS spectroscopy at 400 nm. The prepared CuNPs by gamma radiolysis method were found to exhibit higher activity than that of convential chemical reduction reaction.
Rad. Chem. 3. Radiocarbon Dating and Paleoclimatic Reconstruction

M.A.Sadek
Nuclear and Radiological Regulatory Authority

ABSTRACT

The radiocarbon continually produced in upper atmosphere is oxidized and participates in natural carbon cycle (from atmosphere to hydrosphere, lithosphere and biosphere). Any carbonaceous material in direct contact with atmosphere or any organism that is living, carries a radiocarbon level reflecting the equilibrium between production and decay. The loss of this contact (e.g. when living organisms die) stops the atmospheric supply and renders the exponential decay only exists. The fraction of original radiocarbon remaining in the sample reflects the radiocarbon date since atmospheric equilibrium is lost. Radiocarbon dating has some complications due to non constancy of atmospheric production and the reservoir radiocarbon of other sources. Calibration is performed to compensate the effects of these complications. The abundance of stable isotopes (e.g. O18, D, C13) in environmental materials (water, ice, corals, tree rings, …etc) and co-existing phases helps as climatic indicators and paleoclimate reconstruction proxies. This is attributed to the dependence of isotopic fractionation on climatic and environmental parameters such as temperature, humidity…..etc.

Rad. Chem. 4. Effect of Ilmenite on the Attenuation Coefficient of Gamma Ray Shielding Cementious Matrix


a Hot Laboratories Centre, Atomic Energy Authority, Cairo, 13759, Egypt.
b Faculty of Science, Ain Shams University, Abbassia, Cairo, 11566, Egypt.

ABSTRACT

This work investigated the effect of the Portland cement mixed with different % of water and various percentages % ilmenite ore to obtain suitable shield block for gamma radiation. The properties of the studied samples depend on the quality of aggregate and the bond between cement and composites. Different concentrations of ilmenite (5-20%) of different grain size were mixed with cement. Compressive strength, wet and dry density, absorption % and porosity % were studied for samples cement and the different ilmenite percentage. Measurements of thermal expansion coefficient of the studied samples were fitted over a specific temperature up to 200°C. The thermal stability of the studied samples was examined through Thermogravimetry analysis (TGA). The characterizations of samples were carried out using X-ray diffraction (XRD).

The attenuation coefficient of studies samples were performed using multi channel analyzer gamma spectrometer using radioactive 60Co source at photon energies of 1.17 and 1.33 MeV of activity (40 Bq/sec). The results showed that, the maximum linear attenuation coefficient (µ) and minimum transmission fraction were attained for cement mixed with 10% of ilmenite size (106-250) µm.
Sunday 21/2/2016

Chairmen:
Prof. Dr. R. Yossri
Prof. Dr. Samir Abd Elazziz
Prof. Dr. A. I. Hammad

Hall (C)

3) Biology: 11:00 - 1:00 pm:

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<td>Bio. 1 Horizontal gene transfer of trxB in new selenite reducing</td>
<td>A.E.Zakaria</td>
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<td>bacteria Zobbellella denitrificans.</td>
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<td>Saeed, A.M.1, El-Baghdady, K.Z.1, Zakaria, A.E.2, El Shatoury, E.H.1, Magdi, M.3 and Osman, A.M.4</td>
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<td>Bio. 2 Identification of Polycyclic Aromatic Hydrocarbon</td>
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<td>Degrading Bacterial Strain and its Ability to Degrade Phenanthrene</td>
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<td>and its Pathway</td>
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<td>Abo-State ,M.A.M. Saleh, Y. and Partila,A.M.</td>
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Bio. 1. Horizontal gene transfer of \( \text{trxB} \) in new selenite reducing bacteria 
*Zobellella denitrificans.*

Saeed, A.M.\(^1\), El-Baghdady, K.Z.\(^1\), Zakaria, A.E.\(^2\), El Shatoury, E.H.\(^1\), Magdi, M.\(^3\) and 
Osman, A.M.\(^4\)

\(^1\)Department of Microbiology, Faculty of Science, Ain Shams University, Cairo, 11566, Egypt. 
\(^2\)Department of Microbiology, National Center of Radiation Research and Technology (NCRRT), Cairo, Egypt. 
\(^3\)Department of Genetic, Faculty of Agriculture, Ain Shams University, Cairo, Egypt. 
\(^4\)Department of Geology, Faculty of Science, Ain Shams University, Cairo, 11566, Egypt.

**ABSTRACT**

A novel selenite reducing bacteria exhibited high capability to remediate selenite and production of selenium was isolated from Ismailia canal in Egypt. Phylogenetic analysis of the 16S rRNA genes of this novel isolate indicated that the strain is most closely related to *Zobellella denitrificans.* Several physicochemical factors were studied and accordingly optimum conditions were determined with maximum \( \text{Se}^0 \) production reached 3.72 ± 0.08 \( \mu \) moles/20 ml culture medium. Thioredoxin reductase B (\( \text{trxB} \)) gene that belongs to Selenite reduction pathway was successfully genotyped using newly designed primers. The phylogenetic analysis showed that the isolated \( \text{trxB} \) was grouped with *Pseudomonas stutzeri* \( \text{trxB} \) sequence (Egyptian isolate) and scored a single point missense mutation 89 G > T (A30L). However, within *P. stutzeri* \( \text{trxB} \) sequences a higher genetic distance was scored. The current result spotlight on the possibility of a horizontal \( \text{trxB} \) gene transfer occurred from *Pseudomonas stutzeri* to the isolated *Zobellella denitrificans* strain.

Bio. 2. Identification of Polycyclic Aromatic Hydrocarbon Degrading Bacterial Strain and its Ability to Degrade Phenanthrene and its Pathway

Abo-State, M.A.M. ;\(^{(1)}\) Saleh, Y. ;\(^{(2)}\) Partila, A.M. ;\(^{(4)}\)

\(^{(1)}\) National Center for Radiation Research and Technology (NCRRT), Nasr City, Cairo, Egypt. 
\(^{(2)}\) Faculty of Science, Cairo University, Giza, Egypt.

**ABSTRACT**

Five bacterial isolates were previously isolated from soil polluted with petroleum oil from Cairo Refining Company, Qalyubia, Egypt. These isolates (MAM-26, 43, 62, 68 and 78) were grown on five concentrations of phenanthrene (Phen.) as a sole carbon and energy source. The abilities of these isolates to degrade Phen. have been investigated. The growth (O.D) and extracellular protein secretion were determined after 1, 2, 3, 4, 5, 6, 7, 14 and 21 days incubation for each strain. Degradation of Phen. was quantified by High Performance Liquid Chromatography (HPLC). The results revealed that isolate MAM-62 degrade 98.0%, of the concentration 1500 mg/L of Phen. This best Phen degrader bacterial isolate was identified by 16S-rRNA. The 16S-rRNA of isolate MAM-62 showed a similarity of 99% to *Bacillus amyloliquefaciens* with accession No. FJ009402, so the isolate MAM-62 was identified in a previous work as *Bacillus amyloliquefaciens* with accession No. JN038054. The most promising bacterial strain *Bacillus amyloliquefaciens* has been exposed to different doses of gamma radiation. As the dose of - radiation increased, the viable count of MAM-62 decreased. Dose of 15 KGy reduced the viable count by 7.25 log cycles.

Phenanthrene degradation by *B. amyloliquefaciens* produced 5 intermediate compounds after 24 h. incubation while its mutant *B. amyloliquefaciens* MAM-62(4) produced 7 intermediate compounds. The only compound which found in both parent strain (*B. amyloliquefaciens* MAM-62) and its mutant (*B. amyloliquefaciens* MAM-62(4)) was Hexanoic acid. However, oxidation of phenanthrene by mutant *B. amyloliquefaciens* MAM-62(4) produced 6 different intermediates. 243 mot
Bio. 3. Monitoring Growth and Lipid Production of Some Egyptian Microalgae

1Department of Microbiology, Faculty of Science, Ain Shams University, Cairo, 11566, Egypt.
2Department of Radiation Microbiology, National Center of Radiation Research and Technology (NCRRT), Egyptian Atomic Energy Authority (EAEA), Cairo, Egypt.
3Department of Botany, Faculty of Science, Ain Shams University, Cairo, 11566, Egypt.

Correspondence Author e-mail: abeer.mercy@yahoo.com

ABSTRACT

This study aims to examine growth and lipid production by various isolates of microalgae. Ten microalgae isolates were isolated from different fresh water samples collected from the Egypt. The purified isolates were identified microscopically as: (Lyngbya confervoides, Phormidium bohneri, Oscillatoria pseudogeminata, Amorphonostoc sp., Nostoc paludosum, Anabaena Sphaerica) Cyanobacteria or blue green algae, (Chlorella Vulgaris, Scenedesmus acutus, Chlorella ellipsoidea, Chlamydomonas globosa) Green algae. These organisms were cultivated on two media: Bold's Basal Medium (BBM medium) and BlueGreen Medium (BG-11 medium) to examine the favorite medium which supports the growth of each isolate. In order to examine lipid production potentials by cyanobacterial isolates and microalgae, two solvent systems were applied for lipid extraction, the first was (Chloroform-methanol 1:1 and the second was Hexane-ethanol 1:1). Chlorella vulgaris was selected as a model of green microalgae while Anabaena sphaerica was selected as a model of cyanobacteria. Hexane-ethanol solvent system revealed higher lipid extraction capacity from the most commonly used Chloroform-methanol system. A comparison between ten organisms for lipid production was carried out by the selected solvent mixture.

Bio. 4. The Possible Protective Role of Amygdaline Against 99m Tc - Phytate Induce Certain Biochemical and Cytogenetic Changes in Albino Mice

I.F. Alwan, F. M. Abid
Ministry of Science and Technology, Iraq, Baghdad, box, 765
Author e-mail: ekbalfadhel@yahoo.com

ABSTRACT

99m Tc-Phytate induced Biochemical and cytogenic change in male mice .The productive amygdaline extracted from apricot kernels was orally administrated at dose level of 250mg/kg bodywt/day for 21days before injected with (600 µci / 0.1ml) doses of labeling 99m Tc- phytate, amygdaline compound was analyzed by High-performance liquid chromatography technique HPLC .Albino mice exposed to ionizing radiation exhibited a potential elevation of serum GammaGlutamylTransferase - GGT and Alkaline phosphatase-ALP activities , bilirubin , urea and creatinine level , lipid abnormalities and serum total protein and albumin levels were recorded. The significant increase(p<0.001)at the level of biochemical for mice injected with 99mTc-Phytate, it was observed that there was a significantly lower(p <0.01) plasma antioxidant enzyme Glutathione-S- Transferase GST activity in mice treated with amygdalin compared to control. There was a significantly higher erythrocyte Manoldia aldehyde MDA activity supports the decreased detoxification capacity in radiation liver disease, and also the results showed induced chromosomal aberration was insignificant compared to the control (p< 0.001). These were reflected on the types of aberrations studied such as chromosomal breaks , chromatid breaks, ring chromosome and dicentric chromosomes . The data obtained from mice treated with amygdaline before injected 999m Tc –phytate revealed no significant modulation in the biochemical and the chromosomal aberration tasted were similar to natural state ( control) . Over all it could be concluded that
amygdaline exerts beneﬁciale protective role against ionizing radiation induce deleterious biochemical effects related to many organ function and deteriorated antioxidant defense system.

Bio. 5. Thermal Treatment and Gamma Irradiation Induced Alterations in Certain Biological Aspects of the Cotton Leaf Worm *Spodoptera littoralis* (Boisd)

Abd El-Rahman, H.A.¹; Ibrahim, S.M.² and Hazaa, M.A.M. ²

¹Entomology Department, Faculty of Science, Ain Shams University
²Biological Application Department, Nuclear Research Center, Atomic Energy Authority, Egypt

**ABSTRACT**

The present study dealt with the effect of exposure of full grown pupae of the cotton leaf worm *Spodoptera littoralis* (Boisd) to different high temperatures on certain biological aspects of parental (P₁) and first filial (F₁) generations. It included the effect on adult longevity and malformation, mating, insemination, fecundity and egg hatchability; beside larval survival till adult emergence and sex ratio of produced adults at different mating crosses between treated and untreated males and females.

Special attention was given to inherited sterility as well as female production among F₁ and F₂ generation resulting from treated parental pupae.

Generally, the thermal treatment increased percentage of adult malformation especially at 40 °C; while, the adult longevity was not affected in both male and female. In the treatment of female pupae, the number of spermatophores and mating percentage were clearly reduced by increasing the temperature. And also, by increasing the treatment temperature for both males and females pupae; many aspects as sperm transfer, fecundity, egg hatchability and female production significantly decreased especially for treated male among F₁ and F₂ generation.

In studying the two substerilizing gamma radiation doses 100 & 150 Gy and their effect on different mating aspects and female production especially inherited sterility, it was found that they reflect great reduction in female reproductive potential and production especially at F₂ generation.

Bio. 6. Effect of *Salvia aegyptiaca* Aqueous Extract on Some Neurohormonals Disorders Induced by Carbon Tetrachloride in Adult Male Albino Rats

Seham, M. Abdel Kader

Radio Isotopes Department, Nuclear Research Center, Atomic Energy authority

**ABSTRACT**

Daily intraperitoneal injection of carbon tetrachloride CCl₄ at a dose level 1.0 ml/kg body weight caused a gradual and a signiﬁcant decrease in tyrosine amino acid and as a result dopamine (DA) and norepinephrine (NE) monoamines were decreased in different brain areas under investigation (Cerebellum, Pons& medulla oblongata, Striatum, Cerebral cortex, Hypothalamus, Midbrain, and Hippocampus). Where, CCl₄ injection decreased serum leutenizing hormone (LH) and testosterone. Animals that received daily oral administration of *Salvia aegyptiaca* aqueous extract at a dose equivalent to 2.0g/kg body weight slightly increased brain contents of tyrosine, dopamine and norepinephrine. Moreover a significant increase was observed in LH and testosterone from the first day till the end of experiential period.However, animals that pretreated with a daily oral administration of *Salvia aegyptiaca* extract at a dose level equivalent to 2.0 g/kg body weight one hour before being intraperitoneal injected with CCl₄ showed a significant increase in DA, NE, and tyrosine as compared to those treated with CCl₄ alone; and thus Salvia extract may be attenuate CCl₄ effect through experimental period.
Bio. 7. Effect of Gamma Irradiation on Some Tissue Elements of Tribolium Confusum Adults and Some Their Diets

H. F. Mohamed, S. A. Mohamed and A. I. Attia
Biological Applications Department, Nuclear Research Center, Atomic Energy Authority, Egypt.

Key Words: Gamma Irradiation; Tribolium Confusum; Mortality; Weight; Elements

ABSTRACT

In the present study, the effects of the combined irradiation treatments IA (25Gy), IA(25Gy)XNW, IA(25Gy)XIW(1000Gy), IA(25Gy)XIW(1500Gy), IA(50Gy)XNW and IA(50Gy)XIW(50Gy) on the the effect of gamma irradiation and its relation to the percentage of the content of the body's tissues of minerals full of insects of the adult confused flour beetle, Tribolium confusum only and reared on selected three diet that feed on; wheat flour, corn flour and bran Irradiated and unirradiated.

To understand the dietary history of T. confusum, trace and macro elements were used as potential marker. Adult beetles collected were used to determine 8 different elements in their body's tissues and in the three diets. The effect of gamma irradiation on the relative percentage of elements content detects in the whole body tissues of adult insects. The total concentrations of the light metals (Mg and Fe, Ca, K, P) of adult tissues and the diets reared on it were very higher than the heavy metals (Cu and Zn) at all treatments.
Sunday 21/2/2016

Chairmen:
Prof. Dr. A. I. Helal
Prof. Dr. A. H. Ashour
Prof. Dr. M.A. Amr

Hall (A)

4) Physics (2) 3:00 - 5:00 pm:

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<td>Elemental and Isotopic Characterization of Date Palm (Phoenix Dactylifera L.) Collected from North Arabian Peninsula</td>
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<td>Ultra-Trace Determination of $^{90}$Sr, $^{137}$Cs, $^{238}$Pu, $^{239}$Pu, and $^{240}$Pu By Collision/Reaction Cell-ICP-MS/MS: Establishing a Baseline for Global Fallout in Qatari Soil and Sediments</td>
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Phys.2-1. Precise Measurements of the Natural Radioactivity Background in King Saud University, Girls Branch Using Different Nuclear Techniques
S. U. El. Kameesy, M. S. Garawi, H.A. Saudi and A. Al Qahtani

S.U. El. Kameesy*, M.S.Garawi**, H. A. Saud ** and A.Al Qahtani**

*Physics Department, Faculty of science, Ain- shams University, Cairo, Egypt
**Physics Department, College of Science, King Saud University, Riyadh, Saudi Arabia.
***Physics Department, Faculty of Science, Azhar University, Girls Branch

ABSTRACT

In the present work, gamma spectroscopy and thermoluminescence techniques have been applied to detect the gamma background radiations inside and outside King Saud University campus in Malaz (girls branch). The measurements have been performed by means of a high resolution hyper pure germanium detector of active volume 156 cm$^3$ and standard LiF: Mg, Ti (TLD100) dosimeters. The absorbed dose for each gamma line was calculated and an estimation of the total absorbed dose for the detected gamma lines were obtained and compared with previously corresponding results. Furthermore, TLD dosimeters were employed for two consecutive 60 days measuring periods. The obtained TLD results provide an estimation of outdoor and indoor average dose rates of values 62.5 and 70.5 n Gyh$^{-1}$ respectively.

Phys.2-2. Elemental and isotopic characterization of date palm (Phoenix dactylifera L.) collected from north Arabian Peninsula

M. A. Amr1,2, N. Dawood3, A. I. Helal1

1 Nuclear Physics department, NRC, Atomic Energy Authority, Cairo, Egypt.
2 Central laboratories Unit, Qatar University, Doha, Qatar
3 Taibah University, Al Madinah Al Monawarah, Saudi Arabia.

ABSTRACT

The study was conducted to characterize the date palm samples collected from north Arabian Peninsula. Characterization of dates was included: determination of the concentration of trace elements; identification of rare earth elements (REE) pattern; measurements of the isotope ratios of $^{87}$Sr/$^{86}$Sr, $^{206}$Pb/$^{204}$Pb, $^{207}$Pb/$^{204}$Pb, $^{208}$Pb/$^{204}$Pb and $^{235}$U/$^{238}$U in date palm leaves, tissues, and seeds. All the parameters were measured in soil samples collected near the roots of the date trees to linking the results of date palm and their corresponding soil. Rare earth elements (REE) pattern shows Eu anomaly.

Accuracy of the analysis was checked with reference materials. Apple leaves (SRM-1515) and peach leaves (SRM-1547) were used as quality control/assurance for trace elements in date palm leaves, tissues, and seeds. San joaquin soil (SRM-2709) and marine sediment (SRM-2703) were used as quality control/assurance for trace elements in soil samples. Certified isotopic strontium carbonate NIST SRM-983 was used for the Sr isotopic ratios correction. Certified isotopic lead ore NIST-981 was used for the Pb isotopic ratios correction. Certified isotopic natural uranium standard solution NIST-4321C was used for the $^{235}$U/$^{238}$U atom ratio correction.
Phys.2- 3. Ultra-trace Determination of $^{90}\text{Sr}$, $^{137}\text{Cs}$, $^{238}\text{Pu}$, $^{239}\text{Pu}$, and $^{240}\text{Pu}$ by Collision/Reaction Cell-ICP-MS/MS: Establishing a Baseline for Global Fallout in Qatari Soil and Sediments

M. A. Amr$^{1,2}$, S. S. Al-Rumaihi$^2$, A. I. Helal$^3$, A.T. Al-Kinani$^2$

$^1$ Central laboratories Unit, Qatar University, Doha, Qatar
$^2$ Central laboratories Department, Ministry of Environment, Doha, Qatar
$^3$ Nuclear Physics department, NRC, Atomic Energy Authority, Cairo, Egypt

ABSTRACT

This study examines the concentration of anthropogenic radionuclides in 132 soil samples collected in 10-km grids throughout the State of Qatar. An ICP-MS/MS with a collision/reaction cell was used for analyzing $^{90}\text{Sr}$, $^{137}\text{Cs}$, $^{238}\text{Pu}$, $^{239}\text{Pu}$, and $^{240}\text{Pu}$. The concentrations of $^{90}\text{Sr}$ in the collected Qatari soil samples vary from 0.18 - 0.99 fg/g (1.00 - 5.49 Bq/kg) with a mean value of 0.606 fg/g (3.364 Bq/kg) and a median value of 0.610 fg/g (3.390 Bq/kg). The concentrations of $^{137}\text{Cs}$ vary from 0.030 - 1.210 fg/g (0.098 - 3.993 Bq/kg) with a mean value of 0.619 fg/g (2.038 Bq/kg) and a median value of 0.620 fg/g (2.051 Bq/kg). The concentrations of $^{238}\text{Pu}$ vary from < 0.026 - 0.058 fg/g (< 0.016 - 0.027 Bq/kg) with a mean value of 0.034 fg/g (0.0195 Bq/kg) and a median value of 0.032 fg/g (0.0195 Bq/kg). The concentrations of $^{239}\text{Pu}$ fall in the range 18.31 – 113.85 fg/g (0.042 - 0.261 Bq/kg) with a mean value of 65.59 fg/g (0.150 Bq/kg) and a median value of 66.16 fg/g (0.152 Bq/kg). The concentrations of $^{240}\text{Pu}$ fall in the range 3.12- 30.35 fg/g (0.027 - 0.258 Bq/kg) with a mean value of 12.06 fg/g (0.103 Bq/kg) and a median value of 10.78 fg/g (0.092 Bq/kg). In general, no anomalous results were recorded. The data confirm that the source of the $^{90}\text{Sr}$, $^{137}\text{Cs}$, $^{238}\text{Pu}$, $^{239}\text{Pu}$, and $^{240}\text{Pu}$ is the global fallout.

The concentration and distribution trends of $^{90}\text{Sr}$, $^{137}\text{Cs}$, $^{238}\text{Pu}$, $^{239}\text{Pu}$, and $^{240}\text{Pu}$ were found to be similar. New thematic maps were built using the Geographic Information System (GIS) software. The results showed that residential areas, including the capital Doha, had the lowest concentrations of the radionuclides in the country, while the western part of Qatar exhibited the highest values. More importantly, due to the low concentration of organic matter (OM) in Qatari soil, the very limited P-fertilization, the alkaline nature of the soil (pH 8), and the low Fe/Mn content, the Pu concentrations in the soil are slightly low compared to those of $^{90}\text{Sr}$ and $^{137}\text{Cs}$.

Phys.2- 4. Optical and Electrical Properties of Ion Beam Effects in Ge$_{10}$Se$_{70}$Bi$_{20}$ Thin Films

A.M. Abdel Reheem, A.H. Ashour, N. E. Kassem, M.M. Abdelhamid
Phys.2- 5. Surface Modification and Metallization of Polycarbonate using Low Energy Ion Beam

A.M. Abdel Reheem, A.H. Ashour, M.I.A. Abdel Maksoud

1Accelerators & Ion Sources Department, Nuclear Research Center, Atomic Energy Authority
P.N.13759, Cairo, Egypt.

2Radiation Physics Department, National Center for Radiation Research and Technology (NCRRT), Atomic Energy Authority (AEA), Cairo, Egypt.

ABSTRACT

Low energy argon ion is used for treated polycarbonate samples using cold cathode ion source. The surface of the PC substrates is examined using SEM, UV-spectroscopy and FTIR. It was found that the energy band gap decrease by increase argon ion fluence. Copper films are deposited onto polycarbonate (PC) substrates after treated by argon ion beam. The structure, surface morphology and the optical band gap are investigated using XRD, SEM and UV spectroscopy. It can be seen that the intensity increases with deposition time and band gap decreases from 3.45eV for the pristine PC to ∼1.7 eV for copper thin film.

Phys.2- 6. Structure Study of Aluminum Coating on Magnesium Alloy by Cold Cathode Ion Source

A.M. Abdel Reheem1,2, A.H. Ashour1, M. Nabil Yasein3, M.I.A. Abdel Maksoud

1Radiation Physics Department, National Center for Radiation Research and Technology (NCRRT), Atomic Energy Authority (AEA), Cairo Egypt.

2Accelerators & Ion Sources Department, Nuclear Research Center, Atomic Energy Authority P.N.13759, Cairo, Egypt.

3Physics Department, Faculty of Science, Helwan University, Cairo, Egypt.

ABSTRACT

Cold cathode broad beam ion source was used to prepare aluminum coating layer on AZ31 magnesium alloy using Argon ion beam. SEM, EDX and XRD were used for investigate the morphology, elements composite and phase structure of samples. The XRD pattern of Aluminum deposited on AZ31 substrate compared with the XRD of AZ31, two peaks of Al coating are clearly observed, Al(111) and Al(200). Al(111) was the preferred growth orientation coating could improve the corrosion resistance. Surface roughness of the coated AZ31 sample and bare AZ31 was obtained.
Sunday 21/2/2016

Chairmen :
Prof. Dr. M. Raiehe
Prof. Dr. Sohir Elreefy
Prof. Dr. Emad H. Borai

Hall (B)

5) Radiochemistry 3:00 - 5:00 pm:

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<td>Radio. Chem. 3</td>
<td>Technical Methodology to Save the Amount of Enriched Zinc Exploited in the Production of Radiogallium</td>
<td>M. Al-Abyad</td>
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Mostafa M. Hamed, M. A. Hilal and E.H. Borai

Hot Laboratories and Waste Management Center, Atomic Energy Authority, P.O. Box 13759, Cairo, Egypt

ABSTRACT

It is very important to calculate the radioactivity concentration in low-grade monazite ore and in different others materials produced as a results of chemical processing stages to avoid the risk to workers. Chemical processing of monazite pass through different stages, washing by hydrochloric acid and digested with sulfuric acid and influence of pH on the precipitation of rare earth elements has been studied. The radioactivity concentrations of both $^{238}$U($^{226}$Ra) and $^{232}$Th as well as $^{40}$K were calculated in crude low-grade ore and different stages of processing and were found to be $103145\pm6175$ and $58\pm3.7$ Bq/kg, respectively. Wherever, the radioactivity concentration of un-reacted residue found to be $11612\pm626$ and $42155\pm2235$ Bq/kg for $^{238}$U and $^{232}$Th, respectively while the concentration of $^{40}$K is below detection limit. It is obviously about of 50 percent of radionuclides presented in the un-reacted residue.


Mohamed F. Attallah1*, J. P. Omtvedt2

1 Analytical chemistry and control department, Hot laboratories and waste management center, Egyptian Atomic Energy Authority, 13759 Abu Zaabal, Cairo, Egypt
2 Chemistry department, University of Oslo, 1033 Blindern, Oslo, Norway

ABSTRACT

A modern exciting field in nuclear chemistry and nuclear physics is the research on Super Heavy Elements (SHE), here defined as elements with $Z\geq104$. Until now, observations of the elements up to $Z=118$ are reported [1,2]. SHEs are synthesized as Evaporation Residues (EVR) of heavy- ion induced nuclear fusion reactions. The big challenges in chemical studies of SHEs are the low production rates and the short half-lives (with a less than one minute). The necessity to identify single atoms in experiments with these elements requires lowest possible background conditions. One way to isolate SHE from all the lighter elements produced in the nuclear reactions is by spatial separation in a physical separator [3]. The study of the chemical behavior of these elements is extremely fascinating. In this regards, different techniques have been established to identify and running a possible chemical experimental of new elements. ARCA, SISAK and TACSA are most successful techniques to study SHEs. SISAK is a fast chemical-separation system for liquid-liquid extraction and has been adapted for studies of the chemical behavior of the superheavy elements. Recently, the performance of the SISAK liquid–liquid extraction system applied in superheavy elements experiments has been improved with respect to the equipment itself and the way it is operated. The improvements were checked in on-line experiments, under conditions similar to those during SHEs experiments. As a result, the yield of the separation system was increased by a factor .5. The sensitivity of the SISAK apparatus, including the gas-jet and the detection system has been improved. Fast separation of homologs of Sg-106 by TOA and Hinokitiol in toluene was successfully achieved by SISAK system. Brief overview on current status and outlooks of synthesis and prospect investigate the chemical properties of superheavy elements was reported.
Radio. Chem. 3. Technical methodology to save the amount of enriched zinc exploited in the production of radiogallium

S. A. Kandil*,1, M. Al-Abyad¹, Z Szucs²

¹Cyclotron Facility, Nuclear Research Centre, Atomic Energy Authority, Cairo, Postal Code 13759, Egypt
²Institute of Nuclear Research, Hungarian Academy of Sciences (ATOMKI), Debrecen, Hungary

ABSTRACT

The Zn-target was prepared by both electro-deposition technique (classic technique) and investigated saving technique (modern technique). The substrate was selected from Cu-metal. It is designed as circular disk fitted with the irradiation chamber in cyclotron in Debrecen. The target holder was designed where the thickness of 3 mm cu-disk with central circular groove of 5 mm radius and 2.7 mm of depth. In the investigated saving technique the target material (ZnO) in the form of powder was pressed under a stress of 1 ton/cm² to 10 mm diameter pellet. It was covered with a high-purity Havar foil of 10 µm thickness. The irradiation was performed with beam current of 1, 5, 10, 12 and 15 µA. The target was held for irradiation time of one hour and at incident proton energy of 16 MeV. Each irradiated target was followed by a vision-kind.

The investigated saving technique was considered from economic view. The economic comparison study between a classic technique and a modern one for preparation of Zn-target was done. The main component in the both techniques is the Zn-metal that affecting in total cost of procedure. However in the first technique 1500 mg were used to give Zn-target of 250 mg but in the present technique (investigated saving technique), 300 mg of Zn gives same weight of Zn-target (≈ 250 mg of Zn □ 310 mg of ZnO). The saving factor for the investigated technique was found 80%.

Radio. Chem. 4. Risk Analysis and Exposure Dose to Radionuclide and other Elements Released from Porcelain Pots.

By: R. A. Hegazy., T. M. Morsi., N. H. M. Kamel
**Sunday 21/2/2016**

**Chairmen:**
- Prof. Dr. Hafez El Fouly
- Prof. Dr. Abdel Shafy I. Ragab
- Prof. Dr. Soliman M. Soliman

**Hall (C)**

### 6) Agriculture 3:00 - 5:00 pm:

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Agr. 1  K N. Contribution of Nuclear Science in Agriculture Sustainability

Soliman M. Soliman and Yehia G.M. Galal
Soil and Water Research Department, Nuclear Research Center, Atomic Energy Authority, Abo-Zaabal, 13759, Egypt
Corresponding author email: solimanreh@yahoo.com

ABSTRACT

Sustainable agricultural systems employ natural processes to achieve acceptable levels of productivity and food quality while minimizing adverse environmental impacts. Sustainable agriculture must, by definition, be ecologically sound, economically viable, and socially responsible. Sustainable agriculture must nurture healthy ecosystems and support the sustainable management of land, water and natural resources, while ensuring world food security. To be sustainable, agriculture must meet the needs of present and future generations for its products and services, while ensuring profitability, environmental health and social and economic equity. The global transition to sustainable food and agriculture will require major improvements in the efficiency of resource use, in environmental protection and in systems resilience.

In Mediterranean environments, crops are grown mainly in the semiarid and subhumid areas. In arid and semiarid areas dryland farming, techniques are of renewed interest in the view of sustainability. They are aimed to increase water accumulation in the soil, reduce runoff and soil evaporation losses, choose species and varieties able to make better use of rainwater, and rationalize fertilization plans, sowing dates, and weed and pest control.

Fertilization plans should be based on well-defined principles of plant nutrition, soil chemistry, and chemistry of the fertilizer elements. Starting from the calculation of nutrient crop uptake (based on the actually obtainable yield), dose calculation must be corrected by considering the relationship between the availability of the trace elements in soil and the main physical and chemical parameters of the soil (pH, organic matter content, mineralization rate, C/N, ratio of solubilization of phosphorus, active lime content, presence of antagonist ions, etc.).

In Egyptian Atomic Energy Authority, Soil and Water Research Department, nuclear techniques including radio and stable isotopes in addition to radiation gave the scientific staff the chance to manage and planning suitable and accurate programs for achieving the sustainable concept of agricultural sector. The recognition of profitable and proper management practices makes the integration between different agricultural issues more easily and effectiveness.

Agr. 2. Comparative study of organic and mineral nitrogen fertilizers in growth and yield of wheat (Triticum aestivum L.) using $^{15}$N tracer technique.

Ismail, M.M and Ahmed, A. Moursy
Atomic Energy Authority, Nuclear Research Center, Soil & Water Research Department, Abo-Zaabal, 13759, Egypt,

ABSTRACT

A field experiment were carried out at the Plant Nutrition and Fertilization Unit, Soils and Water Research Department, Nuclear Research Center, Atomic Energy Authority, Inshas, the aim of the study compared to organic and/or mineral nitrogen fertilizers in growth and yield of wheat grown in sandy soil using $^{15}$N tracer. The experiment was carried out in a randomized complete block design with three replicates. Results revealed that, observed a clear increase in weight of maize yield in the plot fertilized at rate of (50% MF + 50%Ca) ratio, relatively increased by 62.36% and 44.42% over control which fertilized at rat of (100% MF) for grains and straw of wheat yield, respectively.
For N-uptake, the highest N accumulated in plant tissues of grains (96.79 kg N ha\(^{-1}\)) and straw (39.88 kg N ha\(^{-1}\)) observed in the plot received rate of (50% MF + 50% Ca) ratio as compared to the control (100% MF) ratio which recorded (58.08 kg N ha\(^{-1}\)) and (25.11 kg N ha\(^{-1}\)) for grains and shoot, respectively. For %FUE, the height percent was observed in the plot received rate of (50% MF + 50% Ca) ratio compared with the control (100% MF) ratio in the same sequence.

Agr. 3. Barley Nitrogen Acquisition as Affected by Water Regime, Fertilizer Rates and Application Mode Using \(^{15}\)N Stable Isotope

Gaber\(^1\), El. I., Samak\(^1\), M. R., Galal\(^2\), Y.G.M. and Mohamed\(^2\), M.A.

\(^1\)Department of Natural Resources, Institute of African Research and Studies, Cairo University

\(^2\)Atomic Energy Authority, Nuclear Research Center, Soil and Water Research Department, Abou Zaabal, 13759 Egypt.

*Corresponding author e-mail: galalyehia@yahoo.com

ABSTRACT

A lysimeter experiment was constructed to evaluate the acquisition of nitrogen fertilizer applied in different rates and splitting doses (mode) by barley crop grown on sand soil under different irrigation water regime. Every lysimeter was backed with 90 kg of experimental sand soil. Fertilizer nitrogen as ammonium sulfate form enriched with 2% \(^{15}\)N atom excess was applied at rates of 120% (equal to 187.2 kg N ha\(^{-1}\)) or 10.51 g N lys\(^{-1}\)), 100% (equal to 156 kg N ha\(^{-1}\) or 8.76 g N lys\(^{-1}\)) and 80% (equal to 124.8 kg N ha\(^{-1}\) or 7 g N lys\(^{-1}\)) of the recommended rate (65 kg N fed\(^{-1}\)). Nitrogen fertilizer rates were splitted into three modes of application as following: 33, 33, 33%; 40%, 30%, 30% and 50%, 25%, 25%. Three irrigation regimes: 60%, 80% and 100% of crop evapotranspiration (ETc). Straw yield was enhanced by of nitrogen fertilizer at N2 rate applied with S1 or S3. Plants irrigated with W1 followed by W3 water regimes achieved the remarkable values of straw yield. Root dry weight mainly significantly positively affected by irrigation water regimes and N fertilizer rates but not by mode of application. Irrigation with W2 regime combined with either N2 or N3 fertilizer rates applied at S3 splitting doses resulted in higher grain yield than other treatments. Application of W3 (60%) regime reflected straw-N uptake higher than those recorded with W2 but nearly closed to those of W1 regime. The overall means of N uptake by roots indicated superiority of N1 rate and splitting mode S3 but gradually decreased with N2 and N3 rates. Water regime W1 interacted with either N1 or N2 achieved the best values of N uptake by grains. The grand mean of N uptake by grains as affected by application modes pointed out no big significant difference between them. Nitrogen derived from fertilizer (Ndff) by straw was fluctuated due to splitting modes but generally, percentages of Ndff don't exceed 29% from the total N uptake by straw. There are no clear cut evident between water regimes when Ndff absolute values was considered. Ndff by roots was very low and values didn't reflect any significant difference between the tested treatments. Combined treatment of W1xN2xS3 was the best where it gave the remarkable Ndff values gained by grains as indicated by overall means of the tested factors. Generally, %NUE by straw of plants fertilized with N1 (187.2 kg N ha\(^{-1}\)) rate surpass that of N2 (156 kg N ha\(^{-1}\)) and N3 (124.8 kg N ha\(^{-1}\)), rates. This holds true with different water regimes. Efficient use of N fertilizer as affected by water regime was equal in W1 and W3 (34.1%) and both were higher than W2 regime. Water regime W1 interacted with either N1 or N2 achieved the best values of N uptake by grains. The grand mean of N uptake by grains as affected by application modes pointed out no big significant difference between them. Nitrogen derived from fertilizer (Ndff) by straw was fluctuated due to splitting modes but generally, percentages of Ndff don't exceed 29% from the total N uptake by straw. There are no clear cut evident between water regimes when Ndff absolute values was considered. Ndff by roots was very low and values didn't reflect any significant difference between the tested treatments. Combined treatment of W1xN2xS3 was the best where it gave the remarkable Ndff values gained by grains as indicated by overall means of the tested factors. Generally, %NUE by straw of plants fertilized with N1 (187.2 kg N ha\(^{-1}\)) rate surpass that of N2 (156 kg N ha\(^{-1}\)) and N3 (124.8 kg N ha\(^{-1}\)), rates. This holds true with different water regimes. Efficient use of N fertilizer as affected by water regime was equal in W1 and W3 (34.1%) and both were higher than W2 regime. Splitting dose mode superiority was dependent on water regime whereas %NUE of straw enhanced by S3 under W1 and W3 regimes while it was lower with W2 regime. Similar trend, but to somewhat low extent, was noticed with %NUE by roots. It was very low comparing to %NUE by straw. The best %NUE by grains was occurred with combined treatment of W1 x N1 x S3 achieving 67%. It seems the fertilizer-N was more efficiently used by grains followed by straw while roots recorded the lowest %NUE.

In conclusion, growth and nitrogen fertilizer uptake by barley plants were, in general, enhanced by N1 (187.2 kg N ha\(^{-1}\)) rate applied in splitting doses S3 (50, 25, 25) under 100% Etc water regime (W1).
Agr. 4. Effect of Organic Fertilizer on Nitrogen Fixed by Sorghum Grown on Sandy Reclaimed Soil Using $^{15}$N Tracer Technique

Abdel Aziz$^2$, H.A., EL Hassanin$^1$, A.S., Galal$^2$, Y.G.M., Khalifa$^1$, A.M., Abdel Salam$^2$, M.F.

$^1$ Institute of African Research and Studied, Cairo University, Department of Natural Resources (Soil Resources)

$^2$ Atomic Energy Authority, Nuclear Research Center, Soil & Water Research Department

ABSTRACT

A pot experiment was carried out under greenhouse conditions to evaluate the effect of leucaena trees residues, compost and chicken manure either separately or combined with mineral fertilizer added at the rates of 100% as recommended dose and 50% nitrogen/fed., with or without inoculation by *Azotobacter chroococcum* on nitrogen fixed on sorghum plants. Organic materials were mixed with soil before packed in pots (4 kg soil/pot$^{-1}$). $^{15}$N- labeled ammonium sulfate was added after thinning of sorghum seedlings. The recommended basic supplemental doses of phosphorus and potassium fertilizers were applied to each pot. Experimental data released from this work could be summarized as following: Growth and nitrogen uptake by sorghum plants were enhanced by bacterial inoculation, high rate of mineral fertilizer and chicken manure addition. Plants were mainly dependent on Nitrogen derived from air (N$_2$-fixation) with medium rate of mineral fertilizer (50%) and significantly affected by organic sources. Use of $^{15}$N tracer technique and isotope dilution concept gave us the chance to estimate Ndfa via biological nitrogen fixation process, accurately. Data indicated that Ndfa by stalks were significantly affected by mineral nitrogen rates where it was higher in case of 50% rate than those of 100% N rate. Application of compost enhanced the percentages of N derived from air followed by chicken manure the leucaena residue. Under condition of reclaimed sand soil, %Ndfa by roots were higher in addition to superiority of compost and chicken manure over leucaena residues.

Agr. 5. Influence of Gamma Irradiation and Nitrogen Fertilization levels on growth and Yield of Maize (*Zea mays* L.) grown on sandy soil

Ismail, M.M , Mousa, E. A ,Moursy, A. A*. and Rizk, M. A.

Atomic Energy Authority, Nuclear Research Center, Soil & Water Research Department Abou-Zaabl, 13759, Egypt,

* Corresponding author: ahmad1a2m3@yahoo.com

ABSTRACT

A field experiment was conducted at the Plant Nutrition and Fertilization Unit, Soils and Water Research Department, Nuclear Research Center, Atomic Energy Authority, Inshas, Egypt, to study the effect of gamma radiation at the doses of (0.0 Gry, 20 Gry and 40 Gry) on growth and yield of maiz fertilized with (0.0, 50 and 100 N kg fed$^{-1}$) as ammonium nitrate fertilizer. Nitrogen unites was applied in split doses at sowing and other beginning flowering stages with P and K in the form of normal super-phosphate and potassium sulphate as a basal Single dose. The experiment was laid out in randomized complete block design in four replicates. Results revealed that, under non gamma rays effect, higher grains and stalks yield were 2.30 kg plot$^{-1}$ and 8.49 kg plot$^{-1}$, observed at rate of 100 kg N fed$^{-1}$ + zero dose of gamma rays, an increase of 75.57% and 28.05% over untreated. Under gamma rays effect, higher grains and stalks yield were 2.49 kg plot$^{-1}$ and 8.49 kg plot$^{-1}$ observed at rate of 100 kg fed$^{-1}$ plus dose of 40 Gry gamma rays, relatively increased by 90.08% and 28.05% over untreated, respectively. For N uptake by grains and stalks, under zero gamma rays effect, data revealed that higher N uptake by grains and stalks were 35.00 kg plot$^{-1}$ and 55.91 kg plot$^{-1}$ observed at rate of 100 kg N fed$^{-1}$ + zero gamma irradiation, an increase of 91.90% and 36.10% over untreated, whereas, under gamma rays effect, the highest values of N uptake were 45.46 kg plot$^{-1}$ and 68.44 kg plot$^{-1}$ which increased by 177.78% and 54.67% over untreated, for grains and stalks yield, respectively.
**Agr. 6. Evaluation of Some Rice Mutants Induced by Gamma Radiation for Yield and its Attributes in Two Different Locations.**

Eman M.Fahmy 1, S.E.S.Sobieh2, Nermin M.Abdel Gawad1 and M.H.Ayaad 2

1. Ain Shams University, Faculty of Agriculture, Genetic Departments, Cairo, Egypt.
2. Atomic Energy Authority, Nuclear Research Center, Plant Research Department, Cairo, Egypt.

**ABSTRACT**

The field experiments were conducted at Rice Research and Training Center, Sakha and Gemmiza station Agriculture Research Center, Egypt during The two successive seasons 2010 – 2011. The main objective of the present investigation was to evaluate different rice genotype, five Local cultivars and eight mutant rice in M5 generation in two different Locations, Gemmiza and sakha for yield and its attributes. Egy 316 (111 days) was earlier than other genotypes and recorded the highest 1000 grain weight (32.7 g) compared with the other local cultivars and mutants. While the mutant Egy 33 (28.4 cm) and Egy 24 (27.9 cm) recorded the highest panicle length than other genotypes. The mutant Egy 202 revealed the maximum number of panicles / m2 followed by Egy 22, Egy34 and Egy 24 as 923, 439, 427 and 418, respectively. The maximum grains number / panicle appeared for Egy 33 mutant followed by Egy 34 and Egy24 as 184, 180 and 179, respectively. Maximum grain yield (ton / fed) was recorded for Egy 22 followed by Egy 24 as 4.7 and 4.56 ton / fed, respectively, more than sk 101 (4.26 ton / fed). The increased percentage ware 10.33 and 7.04 for mutants Egy 22 and Egy 24, respectively.


I.M. Amer1, Mona E. Farrag1, S.S. Soliman2, and Amina A. Hassan2

2. Genetics Dept. Faculty of Agriculture, Zagazig University, Egypt

**ABSTRACT**

Canola seed lots of four varieties (Serow4, Serow6, Pactol as local cultivars and Evita as exotic variety) were treated with gamma rays at four doses (0, 100, 400 and 600 Gy). The present study aimed to evaluate useful mutations in canola possess high seed yield and oil content under new reclamation desert land at Ras-Suder-Sina (saline) and Inshas (harsh and poor fertility) in M4 and M5 generations. The results at M4 and M5 generations showed that the 13 -selected mutant lines on the bases of number of pods and seed yield/plant differed in their yield response according to environmental conditions.

Over the two locations, the highest number of pods/plant and seed yield was found at line 75 (M4) and line 11 for seed yield and line 78 for number of pods in M5 compared to the other genotypes. Moreover, the all mutant lines compared to their parents showed significant or insignificant increases for all studies traits during the two successive generations.

Over the two generations, the highest mean value compared to all genotypes was found in line 22 for plant height at Sudr and line 11 at Inshas, for fruiting zone length the highest value was noticed in line 18 at Sudr and line 75 at Inshas, for the highest number of pods (125 / plant) was found in line 63 at Sudr and (193/plant) in line 75 at Inshas which reflected the highest seed yield (8 g/plant). The highest mean value compared to all genotypes was found for 100 seed weight in line 8 at Suder and line 11 at Inshas which appeared the highest seed yield at Suder.

Over all studied conditions, the mutant line 75 derived from Evita variety was characterized by highest mean values for fruiting zone length of plant and number of pods / plant, which reflecting high seed yield (6.47 g /plant) or about 83.87% over its parent. The increase of seed yield /plant for mutant line 11 over its parent was about 68.8% followed by line 8 surpassed its parent for seed yield by about 60.2% over its parent. The oil content of canola seeds in five mutant lines (line 10, line22, line 66, line 74 and line 75) were significantly increased as compared to the oil content of their parents.

Promising mutant lines 11 and 75 had the highest mean values for seed yield and its components over all studied factors (location and generations). Meanwhile, mutant line 11 deviated to cultivate at Ras-Suder and mutant line 75 at Inshas region.
Monday

22–2–2016
Monday 22/2/2016

Chairmen :
Prof. Dr. James D. Navertil
Prof. Dr. J. Daoud
Prof. Dr. Sofia Y. Afifi

Hall (A)

7) Extraction and Separation  Chemistry 9:00 -11:00 am:

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Ex. & Sep. Chem. 1 K N. CYANEX Reagents as Potential Extractants for Valuable and Hazardous Elements from Different Aqueous media

J. A. Daoud
Hot Laboratories Centre, Atomic Energy Authority, 13759, Egypt
Author E-mail: jadaoud@yahoo.com

ABSTRACT

The possible use of the different commercial organophosphorus reagents of the CYANEX series for the extraction of valuable and hazardous elements is explored. The potential advantages of each of the CYANEX extractants over other extractants are exploited in terms of higher loading capacity, selectivity, equilibration time and reagent concentration. Rare earths, uranium, thorium, palladium, cadmium, lead, copper, zinc, cobalt, nickel and chromium are among the elements extracted by CYANEX reagents from nitrate, phosphate, sulphate, chloride, thiocyanate as well as mixed media. The use of different techniques for the extraction processes by CYANEX reagents as conventional liquid-liquid extraction, continuous counter-current extraction, Lewis cell and liquid membranes technology are presented. The efficiency of these extractants and the viability of the proposed systems for the selective extraction and separation of these elements from real and simulated waste solutions and from their ores is also discussed.


Y.A. Abdelaziz, *Y.T. Mohamed, **N. Abdelmonem, and A. Karamelden.
Reactors Department, Nuclear Research Center, Atomic Energy Authority, P.O.13759 Inshas-Cairo-Egypt - Fax. +202 44691756
*Hot Laboratories and Waste Management Center- Egyptian Atomic Energy
** Chemical Engineering Department-Faculty of Engineering-Cairo University - Egypt

ABSTRACT

The extraction of uranium from aqueous waste solution using liquid emulsion membrane with synergistic mixture of Bis (2-etylhexyl) phosphate (HDEHP) and Tri-butyl phosphate (TBP) in an aromatic hydrocarbon as a diluent has been studied. Many extraction parameters have also been studied such as, concentration of extractant and uranium and pH of the feed solution. Various parameters affecting the transport of U (VI) through membrane layer have been optimized to remove U (VI) from liquid waste solution. More than 99% uranium was removed under certain conditions. The counter transport of uranium and hydrogen ions were facilitated by the carriers. The use of hydrochloric acid as an internal aqueous phase accelerates the uranium transport through LEM. Mathematical modeling of the permeation of uranium through LEM has been studied. Different parameters are calculated such as diffusion coefficients of uranium/carrier complex, carriers and mass transfer coefficients of uranium, carriers and uranium / carrier's complex besides calculating the membrane thickness.
Ex. & Sep. Chem. 3. Optimization of Factors Affecting Leaching of Copper from Oxidized Minerals by Sulfuric acid Using Orthogonal Array Design Methodology

Z.H. Ismail and H.F. Aly
Hot Laboratories Center, Atomic Energy Authority, 13759, Egypt

ABSTRACT

Leaching of copper from Egyptian oxidized mineral using sulfuric acid media is studied and optimized. Taguchi design is applied to minimize the number of experiments and for the optimization of leaching process in order to maximize copper recovery and also minimize iron dissolution from ore. Using Taguchi orthogonal array (L25), six control factors including leaching temperature (T), H$_2$SO$_4$ concentration (C), mixing rate (R), leaching time (t), pulp density (D), and particle size (S), each in five levels are considered. Single to noise analysis and analysis of variance (ANOVA) are applied on the obtained data to determine the optimum conditions and the most significant factors affecting the overall copper and iron dissolution in leach solution. Results showed that, the optimum dissolution conditions to maximize copper dissolution and minimize iron simultaneously are T = 65 °C, C = 1 mol/l, R = 400 rpm, t = 45 min, D = 142.86 g/l, and S = 75-150 µm. In verification under optimal conditions the dissolution of copper and iron in leaching solution are 95.33% and 5.79%, respectively, giving a solution containing 7.87 g/L Cu and 0.83 g/L Fe. These results are in reasonable agreement with the results predicted by the statistical model.

Ex. & Sep. Chem. 4. Possible Mechanisms for The binding of Organic and Hybrid Organic Resin with Copper Ions in Aqueous Solutions

A. Massoud$^{(a)}$ and S.A. Abd El Aal$^{(b)}$

$^{(a)}$Chemistry unit of Cyclotron, NRC, Atomic Energy Authority, P.O. 13759, Cairo, Egypt
$^{(b)}$Central Lab. for Elemental and Isotopes Analysis, NRC, Atomic Energy Authority, P.O. 13759, Cairo, Egypt

ABSTRACT

In this work, the binding between the active groups of polymeric resin and polymeric composite resin such as Poly(acrylamide- acrylic acid –dimethylamino- ethylmethacrylate) resin and Poly (acrylic acid-dimethylaminoethyl methacrylate) –Fe$_2$O$_3$ hybrid resin, with copper ions as a test ion has been studied. The batch technique was used to complexation of copper ions with prepared resins. The spectroscopic studies showed that the mechanism of interaction between polymeric and polymeric composite resins with copper ions is a bond formation between the active groups of polymeric chains. The bond formation depends on nature of polymeric chains and active groups. It was found that the amine groups form complexes with hydrated cations, while carboxylate group interact by ion exchange mechanism through complex formation. Ferrous oxide in the composite resin is interacting with metal ions by chelating mechanism.


Khaleal F. M.
Monday 22/2/2016

Chairmen:
Prof. Dr. M. A. Gomaa
Prof. Dr. E. H. Amin
Prof. Dr. A.Z. Hussein

Hall (B)

8) Radiation Protection Workshop:
Session (I): Invited Talks 9:00-11:00 am

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<td>From Radiation Shielding to Security Screening Dr. Mohamed Gomaa</td>
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<td>Rad. Prot. 2</td>
<td>Radioactive Materials Transport, Experience Gained Over 50 Years In Egypt Rifaat Mohamed Kamel El-Shinawy.</td>
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<td>Shielding Of Nuclear Power Plants E.H.Amin</td>
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Rad. Prot. 1. From Radiation Shielding to Security Screening

Dr. Mohamed Gomaa

National Network of Radiation Physics, Atomic Energy Authority, Cairo, Egypt

ABSTRACT

History of Radiation Protection in Egypt goes back to 1957. In the present work attention is paid to the period from 1962 till 2015. In the sixties, attention was in the area of radiation shielding and recently attention is related to translation of International publications into Arabic. The last translated document was ICRP-125, it deals with radiation protection at security screening.

Several radiation protection topics shall be discussed to cover the period from the sixties till 2015.

Rad. Prot. 2. Radioactive Materials Transport, Experience Gained Over 50 Years In Egypt.

Rifaat Mohamed Kamel El-Shinawy

Environmental Radioactive Pollution Rad. Prot. Dept, Ncr, Aea, Cairo, Egypt.

ABSTRACT

Artificial radionuclides are extremely valuable not only in research but also through their applications in medicine, agriculture, research and industry.

Nowadays, large quantities are produced by several specialized centers scattered all over the world. The number of consignments of radioactive materials being transported within countries and between different countries is likely to increase (tens of millions / year) with the development of nuclear power and the use of other nuclear techniques.

During transport, radioactive sources are likely to be in relatively proximity to the general public and transport workers. It is essential to enforce the IAEA regulations which aim to ensure that consignments of radioactive materials are inherently safe at all times, even during sever accidents.

International & national regulations for safe transport of radioactive materials are developed to provide protection of general public, transport workers, property and environment against radiation, contamination and criticality hazards.

The national regulations must fully and accurately reflect the requirements of IAEA regulations and its supplements as well as local circumstances.

Experience gained in Egypt during the last 50 Years was discussed with special reference to transport of radioactive consignments on board of vessels crossing the vital water way Suez Canal.

In 2010 new law related to nuclear and radiation activities was issued as well as its executive regulations in 2011. The law and regulation discuss in details the transport of radioactive materials in Egypt.
Rad. Prot. 3. Shielding of Nuclear Power Plants

E.H.AMIN

An operating reactor is a powerful source of radiation, since fission and subsequent radioactive decay produce neutrons and gamma rays, both of which are highly penetrating radiations.

In radiation protection there are three ways how to protect people from identified radiation sources:

- **Limiting Time.** The amount of radiation exposure depends directly (linearly) on the time people spend near the source of radiation. The dose can be reduced by limiting exposure time.
- **Distance.** The amount of radiation exposure depends on the distance from the source of radiation. Similarly to a heat from a fire, if you are too close, the intensity of heat radiation is high and you can get burned. If you are at the right distance, you can withstand there without any problems and moreover it is comfortable. If you are too far from heat source, the insufficiency of heat can also hurt you. This analogy, in a certain sense, can be applied to radiation also from nuclear sources.
- **Shielding.** Finally, if the source is too intensive and time or distance do not provide sufficient radiation protection the shielding must be used. Radiation shielding usually consist of barriers of lead, concrete or water. Even depleted uranium can be used as a good protection from gamma radiation, but on the other hand uranium is absolutely inappropriate shielding of neutron radiation. In short, it depends on type of radiation to be shielded, which shielding will be effective or not.

A reactor must have specifically designed shielding around it to absorb and reflect this radiation in order to protect technicians and other reactor personnel from exposure. In a popular class of research reactors known as “swimming pools,” this shielding is provided by placing the reactor in a large, deep pool of water. In other kinds of reactors, the shield consists of a thick concrete structure around the reactor system referred to as the biological shield. The shield also may contain heavy metals, such as lead or steel, for more effective absorption of gamma rays, and heavy aggregates may be used in the concrete itself for the same purpose. Generally power reactor containment building acts as a shield.

**The following Consideration should be adopted for Building a Reactor Shield**

1. Decide which type shield best suits the purpose. This decision encompasses decisions like building the shield around the reactor and all its components or compartment shielding where the reactor is partially shielded and the radioactive coolant system is separately enclosed in a shielded room.
2. Allowable radiation levels must be established for both power operation and shutdown conditions.
3. Location, energy, and intensity of the sources of radiation.
4. Calculate and design the required shield thicknesses.
5. Arrangement of piping and heat-exchange system in and outside the shield.
6. The selection of materials.
7. Design and fabrication details including bonding lead to steel and treating water and other shielding fluids, and selecting and handling heavy concretes.
8. Inspecting and testing materials prior to and after installation.
9. The consideration of radioactivity when the system is shut down.
10. The process of monitoring the potential for streaming radiation through gaps, thermal insulation, structural member, and shield penetrations.
11. How the geometry of the radiation sources can effect the shielding design.
12. Calculate radiation heating in the structure near the reactor to avoid excessive material weakening.

The radiation protection measures incorporated into a power reactor design are intended to ensure that internal and external radiation exposures to station personnel, contractors, and the general population, resulting from plant conditions, including anticipated operational occurrences (AOOs), will be within acceptable regulatory criteria and will be as low as is reasonably achievable (ALARA).

The present work summarizes some important features of the reactor shield for advanced reactor systems. Difference in design and analysis methodology between different system are presented.

The plant design features required to optimize the three factors of exposure reduction namely; time distance and shielding are illustrated.

Rad. Prot. 4. On the Regulatory Requirements to Combat Illicit Trafficking of Hazardous Materials
A. Z. Hussein and Kh. M. Zakaria

ABSTRACT

Since more than a decade illicit Trafficking of hazardous (CBRNE) materials (chemical, biological, radiological, nuclear and explosive) has been identified as a key threat in national, regional, interregional and international strategies. An effective response to hazardous material (CBRNE) risk and threat were realized to require a very high level of cooperation and coordination between various government and their responsible organizations and authorities of regional and international partner. While improper policy of actions may exploit by no-state members to (CBRNE) trafficking which may lead to develop weapon of mass destruction (WMD). Such strategies are paramount important between all levels of the states and among regional agreements through comprehensive tailored assistance packages (e.g. export control, illicit trafficking of hazardous materials, redirection of scientist, emergency planning, crisis response safety and security culture. Capacity building, action plans and instrument for stability are necessary actins for efficient combating against illicit trafficking of hazardous materials. Regarding the needs of assessments phase, assistance must be based on data collection, analysis and prioritization of implanting the regulatory controls. Several activities have to be conducted to reduce (CBRNE). The one-by-one approach, covering either nuclear and radioactive or chemical or biological materials has to be implanted on the country bases performance to mitigate (CBRNE) hazardous risk. On several consequent phases of intervention dealing with (CBRNE) risk mitigation the country has to establish a network of local, regional and international capabilities. Such network is setting up the mechanism for the country needs identifications, the guidelines for data collection, for data platform maintenance and update, the data assessment and the competent and operative organizations. This network will be strengthen the long -term national and regional capabilities of responsible durable cooperation legacy in intervening the (CBRNE) material hazards and threat.
Monday 22/2/2016

Chairmen:
Prof. Dr. N. Ashoub
Prof. Dr. Moustafa Aziz
Prof. Dr. A.A. El-Kafas

Hall (C)

9) Reactors (1) 9:00 -11:00 pm:

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<td>Effect of MOX Utilization on the Design Parameters of BN-600 Fast Reactor Core Moustafa Aziz and Mohga Hassan</td>
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<td>Loss of Flow Accident (LOFA) Analysis using LabView-based NRR Simulator Arafa A., Saleh H. I. and Ashoub N</td>
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Reactors 1-2. Thorium-Based Spent Fuel Characteristic Parameters Evolution after Irradiation in Candu Reactors

C. A. MARGEANU, G. OLTEANU
Reactor Physics, Nuclear Safety and Nuclear Fuel Performances Dept., Institute for Nuclear Research Pitești, Romania
e-mail: cristina.margeanu@yahoo.com

ABSTRACT

Nowadays there is an active and continuous increasing interest in advanced Nuclear Fuel Cycles development. Both open fuel cycles and closed fuel cycles (include the spent fuel reprocessing) are currently analyzed, the main interests being nuclear fuel resources better utilization, reduction of radioactive waste amount produced by reactors operation and proliferation resistance enhancing.

CANDU reactors offer a proven technology, safe and reliable reactor technology, with an interesting evolutionary potential for proliferation resistance, their versatility for various fuel cycles creating premises for a better utilization of global fuel resources.

In order to initiate and sustain the fission reaction, Th-based fuels have to contain small amounts of fissile material (driver fuel) such as low enriched uranium (LEU), Pu or recovered uranium from LWR spent fuel; in the future, using of Pu or $^{233}\text{U}$ produced by Fast Breeding Reactors is foreseen.
The paper investigates Thorium-based mixed oxides fuels behavior after the irradiation in CANDU reactors by estimation of the spent fuel characteristic parameters (radioactivity, thermal power and gamma energy) evolution after the spent fuel was discharged from the reactor core and sent to intermediate wet storage. Above mentioned analyses have been performed by considering a single fuel bundle, namely the advanced CANDU type fuel bundle with 43 fuel elements, SEU43, developed by INR Pitesti Fuel Performances group (similar with Canadian CANFLEX fuel bundle): cylindrical fuel bundle with 43 fuel elements disposed in an annular geometry – one central element and 3 circular concentric rings of 7, 14 and 21 fuel elements, respectively. The fuel bundle elements are identical except for their diameter: the central element and the 7 inner elements are thicker than a CANDU standard fuel element, the remaining 35 elements being thinner than a CANDU standard fuel element.

Th-based fuels irradiation in CANDU reactor specific conditions has been simulated, considering the burn-up specific power 50 kW/kgHE and for and End of Irradiation (EoI) fuel burn-up 20 MWd/kgHE (Heavy Element). The fuel burn-up was simulated using ORIGEN-S code, included in SCALE6 programs package, developed by Oak Ridge National Laboratory. The spectral neutron cross-sections weighting factors (used as input data for fuel burn-up simulation) were given by previous DRAGON3.05E code lattice cell calculations.

A set of 42 (Th, U)O$_2$ fuel combinations, allowing to reach 20MWd/kgHE discharge burnup, have been analyzed, taking into consideration modifications in the fuel pellet density (9.8 g/cc, 10 g/cc), ratio of U/Th content (30%, 40%, 50%) and enrichment in U$^{235}$ (from 9 wt% to 15 wt%), respectively. The analyses have been carried out considering that all the fuel bundle elements contain the same Th-based fuel composition.

For considered (Th, U)O$_2$ fuel compositions, the spent fuel radioactivity, thermal power and gamma energy have been estimated and their evolution at EoI and after the discharge from the reactor core have been analyzed comparatively, emphasizing on the actinides and fission products contribution to the total value of the interest parameter.

Reactors 1-3. STGR-20 Reactor for Egypt

Dr. Ragaee Zaghloul, Emeritus Prof., Nuclear fission, Chemistry of Nuclear Fuel Department, Hot Lab. Center, EAEA.

ABSTRACT

The STGR 20, is an inherently safe, high temperature, graphite moderator, helium gas cooled, nuclear power station, using thorium as fuel. That makes it ideal for many co-generation electricity and heat applications.

It is a steam turbine & generator reactor "STGR 20" for producing 20MWe electrical power, drinking water & air conditioning, for sustainable development in Egypt.

The Estimated Additional Reserves (EAR) of Thorium Deposits in Egypt, according to IAEA report is 309000 tones of the metal.

Electricity is essential for improved and sustainable development. It is important to jump over older and inefficient technologies and prepare ourselves for the digital society of Industrialized Nations in order to enjoy an improved quality of life with much higher resources efficiency.

Therefore, the trend in power generation will be, towards distributed generation and small high efficiency power units.

The STGR is the excellent solution for the new global energy economy.

IAEA view on inherently safe nuclear power for the future has a comprehensive program to update the IAEA nuclear safety standards.
Reactors 1-4. Parity Simulation of A Neutronic Transient Studies for PWR 900-MW (e)

Tarek Nagla

Reactors 1-5. Effect of MOX Utilization on the Design Parameters of BN-600 Fast Reactor Core

Moustafa Aziz and Mohga Hassan

Nuclear and Radiological Regulatory Authority
Corresponding author email: moustafaaai@yahoo.com

ABSTRACT

BN-600 is a fast prototype reactor that utilizes uranium as a fissile material. In the process of improving the reactor to use it as a plutonium incinerator, a full MOX core design was suggested. In this work BN-600 full MOX core was modeled using MCNPX code. The model is three dimensional with all details of the reactor radial and axial zone, including an internal breeding zone. The results are compared with previously published results which indicated good agreement. Typical results of the present model for reactor multiplication factor are 1.00832 compared with transport model (1.00664) and diffusion model (1.00131). The model was used to calculate the effect of burnup on the criticality of the core. The thermal flux distributions, as well as the power distribution were calculated, and the results for one sixth of the core assemblies were presented. The ability of the core to breed additional fissile materials was also assessed.

Reactors 1-6. Loss of Flow Accident (LOFA) Analysis using LabView-based NRR Simulator

Arafa A., Saleh H. I. and Ashoub N

1 Radiation Engineering Department, National Centre for Radiation Research and Technology, Atomic Energy Authority, Cairo, Egypt
2 Reactor Physics Department, Nuclear Research Center, Atomic Energy Authority, Cairo, Egypt

ABSTRACT

This paper presents a scenario analysis of a Loss of Flow Accident (LOFA) and its impact on operational transactions and on the behavior of the reactor. This Scenario and its effects are studied using the LabView-based Nuclear Research Reactor (LNRR) Simulator. This simulator takes into account the heat and poison effects "Xenon and Samarium" on the performance of the reactor. This simulator has been designed for educational purposes because it allows operators to train and study the various accident scenarios. Through this simulator, the trainee can change inputs to test the performance of the reactor, including the loss of coolant flow rate. The LABVIEW program has been used to develop a mathematical model of the reactor also be used for the implementation of the application interface, including graphs needed to clarify the effects of the LOFA under study. The objective of this simulation is to be able to deal with such incidents and avoid their significant effects. It is also useful in the development of expertise in this area and reducing the operator training and simulations costs.
Monday 22/2/2016

Chairmen:
Prof. Dr. Farid Abou El-Nour
Prof. Dr. N. Belacy
Prof. Dr. E. Zakarya

Hall (A)
10) Water and Waste Treatment  11:00 -1:00 am:

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<td>Natural Attenuation Capacity Indicators (NACI) for Groundwater Remediation, to the East of Cairo</td>
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The Egyptian Society of Nuclear Sciences and Applications
http://www.esnsa-eg.com  e-mail: esnsa_group@yahoo.com
**WWT. 1 K N. Water Desalination Studies Using Forward Osmosis Technology**

F.H. Abou El-Nour  
*Nuclear Chemistry Department, Hot Labs Centre, Atomic Energy Authority, Egypt.*  
Author E-mail: FABUNOUR2012@HOTMAIL.COM

**ABSTRACT**

Fresh water and energy shortage represent acute challenges facing the whole world now. To cover the global water demand, an energy-efficient approach is required to be applied in the suitable technology to achieve the shortage in the fresh water demand. Different techniques are used to solve this problem. Among the different methods applied to desalinate seawater is the osmosis technologies. Although RO is the most familiar method used for this purpose, FO represents the more suitable technique due to several arguments including low energy cost. The present study describe the use of FO technique for water desalination with adsorption regeneration. In this respect granular active carbon is to be used as adsorbent agent. The physical characteristics of the active carbon are to be studied such as BET specific surface area, pore size, particle size and the structure using scanning electron microscope (SEM). Different advanced apparatus are used for such measurements. In addition, the adsorption isotherms (Langmuier and Freundlich) are established to explain the adsorption mechanism of the process. Accordingly, the review includes an essential information and sufficient backgrounds in the field of desalination using forward osmosis FO process, manipulated FO (MFO), dual-stage MF-membrane, membrane permeability, membrane models, osmotic agents, concentration polarization phenomenon, foulant categories, key parameters, activated carbon adsorbent, modern applications of water treatment, concentration of landfill leachate, water purification hydrogen bags, sea water desalination, food processing, pharmaceutical industry, osmotic pumps, osmotic power from the so-called pressure retarded osmosis (PRO) and the multi-stage flash distillation. The proposed experimental work includes the materials used in this study, the experimental facilities, the procedure followed to carry the study. Recent references providing the scientific information and results of the works carried out by the different scientists working not only in this field, but also in related fields must be included.

**WWT 2. Massive Production of Natural Absorbents from Recycling of Date Pits and Camel Bones for Water Treatment**

Nasser Awad

**WWT 3. Sorption of Cesuim from Aquese Soliution by Some Egyptian Pottery Materials**

Mobarak A.Sayed¹, A.I.Helal¹, S.M.Abdel Wahab² and H.F.Aly³  
¹Central Laboratory for Elemental and Isotopic Analysis, Nuclear Research Center,  
Atomic Energy Authority, Egypt.  
²Chemistry Department, Faculty of Science, Ain-shams University, Egypt.  
³Hot Laboratories Center, Atomic Energy Authority, Egypt.

**ABSTRACT**

Removal of Cs(I) from aqueous solutions using low-cost adsorbents such as Egyptian Pottery materials under different experimental conditions was investigated. Three kinds of pottery, in addition to their raw materials were tested. Instrumental characterizations of the Egyptian pottery materials were performed by different techniques such as XRF and XRD. The effects of pH, initial metal concentration, shaking time, adsorbent weight and temperature on the removal of Cs(I) from
aqueous solutions by the pottery materials were studied. The results indicated that the optimum pH for the removal of Cs(I) was found to be 7.0 for all types of pottery materials. The present study shows that raw pottery materials can be used as a potentially low cost sorbent for the removal of Cs\(^+\) ions from aqueous solutions more than fired pottery materials.

**WWT 4. NORM in Waste Derived From Oil and Gas Production**

Prof. Dr M.F. Abdel-Sabour  
*Nuclear Research Center, Atomic Energy Authority, Inshas, Cairo, Egypt.*  
Author E-mail: wise2007egy@yahoo.com

**ABSTRACT**

This review paper discusses NORM wastes generated from oil and gas production. Because the extraction process concentrates the naturally occurring radionuclides and exposes them to the surface environment and human contact, these wastes are classified as TENORM.

While uranium and thorium are not soluble in processing water, their radioactive decay product, radium, and some of its decay products are somewhat soluble. Radium and its decay products may dissolve in the brine. They may remain in solution or settle out to form sludges, which accumulate in tanks and pits, or mineral scales. In gas processing activities, NORM generally occurs as radon gas in the natural gas stream. Radon decays to Lead-210, then to Bismuth-210, Polonium-210, and finally to stable Lead-206. Radon decay elements occur as a film on the inner surface of inlet lines, treating units, pumps, and valves principally associated with propylene, ethane, and propane processing streams.

According to OSHA the average radium concentration in scale has been estimated to be 17.76 Bq/g. It can be much higher (as high as 14,800 Bq/g) or lower depending on regional geology. The average concentration of radium in sludges is estimated to be 2.775 Bq/g. This may vary considerably from site to site. Although the concentration of radiation is lower in sludges than in scales, sludges are more soluble and therefore more readily released to the environment. As a result they pose a higher risk of exposure.

Workers employed in the area of cutting and reaming oilfield pipe, removing solids from tanks and pits, and refurbishing gas processing equipment may be exposed to particles containing levels of alpha-emitting radionuclides that could pose health risks if inhaled or ingested. Wise performs NORM surveys for all aspects of the oil and gas industry is required.

**WWT 5. Natural Attenuation Capacity Indicators (NACI) for Groundwater Remediation, to the East of Cairo**

M. A. Sadek*, A.A. Imbaby**, R.A. Rayan*  
*Nuclear and Radiological Regulatory Authority, Egypt  
**Geology Depart, Fac. of Science, Domiate Branch, Mansura University, Egypt  
Author Email: Rafatrayan@yahoo.com

**ABSTRACT**

The remediation of groundwater is one of the important tasks that have recently received a great attention of many of the environmental scientific activities. Several methods are used for groundwater remediation; all of them are invasive and intentionally enhanced. However, groundwater systems may have some natural characteristics that can mediate processes of self-restoration, by suppressing the pollutants spread or degrading its toxicity (i.e. naturally attenuate the contaminants). The natural attenuation capacity of groundwater as being important for remediation purpose, it is also important for protection if it is considered in early phases of siting.
The present investigation introduces some indicators for exploring the natural attenuation capacity for remediation of the groundwater to the northeast of Cairo. It functions an approach that satisfies information about: nature and properties of pollutants of concern, conceptual modelling of the hydrogeological system, site characteristics and parameters that actuate the remediation processes, and adoption of measures and indicators for attenuation capacity.

The applied approach integrates inventoried data and information on geological, geochemical and hydrogeological conditions of the system under study, data of conducted hydrochemical and isotopic analysis (major cations, major anions, trace elements, isotopic content of selected samples) and analytical simulation of radio contaminants attenuation. The indicators introduced in the investigation dealt, on one side, with Lithogenic processes (e.g. adsorption, cation exchange, precipitation, permeability reduction …etc), and on the other side with the flow and contaminant transport processes (advection, diffusion, dispersion) and decay. The clay content of the unsaturated zone and water bearing aquifers, the depth to groundwater and velocity parameters, the solute content and pH /Eh conditions are used as attributes for specifying natural attenuation capacity in the study area. The sensitivity of the natural attenuation capacity to the different parameters has been tested to determine the core factors for attenuation; this helps the invasive remediation if the capacity of natural remediation is not satisfactory.
Monday 22/2/2016

Chairmen:
Prof. Dr. R. M. El Shinawy
Prof. Dr. Cristina Margeanu

Hall (B)

11) Session (II): Radiation Protection Research  11:00 - 1:00 pm

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Rad. Prot. 1. Luminescent nanophosphors and their applications in Radiation Dosimetry

Nagamani Suriya Murthy
Department of Nuclear Safety and Security
International Atomic Energy Agency
Vienna

ABSTRACT

Nano materials exhibit enhanced optical properties when the size of these materials goes down to nano regime. Novel approach has been adopted to synthesis the nano phosphors that emit lights in visible region with profound increase in luminescence efficiency. Researchers worldwide try to explore the application of nano phosphors for radiation dosimetry purposes. This paper articulates the studies carried out to ascertain the usability of nanophosphors in radiation dosimetric applications.

There has been a great demand for the development of new types of thermoluminescence dosimeter (TLD) phosphors for measuring high doses of ionizing radiation levels in personal and environmental fields. In this connection, significant advancements have been made in thermo stimulated luminescence (TSL) experiments during the last couple of decades. However, the most important application of TL lies in radiation dosimetry which spans areas of radiation protection and exposure control as part of personnel monitoring. TL experiments are equally helpful in defects and impurities related studies in solids. There are a number of commercially available thermoluminescent dosimeters, the most popular being LiF:Mg,Ti (TLD-100); CaSO₄:Dy (TLD-900); LiF: Mg,Cu,P (TLD-00H); CaF₂:Dy (TLD-200); and Al₂O₃ (TLD-500). However, efforts are still being made to improve the TL characteristics of these materials by preparing them using different techniques or by developing some new ones. Y₂O₃:Eu³⁺ nanophosphors is an outstanding red emitter has been synthesized by the solution combustion technique using EDTA as fuel and studied for its dosimetric properties in response to both gamma as well as UV irradiation.

![Fig. 1 TSL glow curve for the samples annealed at different temperatures (Gamma exposure).](image1)

![Fig. 2 TSL glow curve for the samples delivered different UV exposure time.](image2)

Fig.1 indicates the TL glow curves of as-formed and calcined Y₂O₃:Eu³⁺ (5mol %) nanophosphors exposed to gamma rays (¹³⁷Cs) with the dose of 100mGy. The highest TL intensity was recorded for the 1000 °C calcined sample (inset of Fig.1). The as-formed and calcined samples exhibit two satellite peaks at 90°C and 162 °C along with a broad peak at 116 °C observed at a heating rate of 5°C/s. The nature of the glow curve remains the same, and a significant enhancement in TL intensity is observed for calcined samples. This is due to formation of defect centres at higher annealing temperature. The effect of different UV (254
nm) exposure times on calcined samples (1000°C) was also studied and shown in Fig.2. A well resolved glow peak at 116°C along with 90°C and 162°C glow peaks were recorded. These TL glow peaks indicate three different sets of traps are present. The TL intensity is found to be 25 times more in the 1000°C calcined Y$_2$O$_3$:Eu$^{3+}$ sample, when compared to the as-formed sample. This observation indicates an important correlation between decreased trap density and increased TL emission intensity in these materials. The requirements of phosphor for the potential application dosimetry are, a well-defined glow curve, dose linearity and low fading of TSL signal. Table.1 indicates the trap parameters that govern the thermoluminescence process. Fig.3 explains the dose response curve of Y$_2$O$_3$:Eu$^{3+}$ nano phosphors which show desirable linearity over the wide range of dose.

The linear behaviour over a wide range of exposure time may be explained on the basis of the track interaction model (TIM). According to this model, the number of traps generated by the high energy radiation in a track depends upon the cross section and the length of the track inside the matrix. In the case of nanomaterials, the length of the track generated by high energy radiation is of the order of a few tenths of nanomaterials. At low exposure time, there exist a few trap centers (TC)/luminescent centers (LC). As the exposure time increases, the TL intensity increases, since the number of particles irradiated increases linearly over time. However, as the irradiation time exceeds 20 min, new types of defects could be created, many of which are likely behaving as trap centers. This would explain the quenching of the observed thermoluminescence, beyond 20 min of irradiation.

Rad. Prot. 2. Theoretical Approach to Calculate the Exposure Dose Rate Due to Gamma Rays from a Contaminated Pipe with Radioactive Material

W. M. Badawy$^1$ and S.V. Mamikhin$^2$

waelaea@yahoo.com

$^1$Department of Radiation Protection and Civil Defense – Nuclear Research Center – Atomic Energy Authority – P.O. Box 13759 Abu Zaabal- Cairo- Egypt
$^2$Dept. of Radioecology and Ecotoxicology– Faculty of Soil Science –Moscow State University, P.O. Box 119991, Moscow, Leninskie gory 1

ABSTRACT

Oil-field equipment can contain radioactive scale and sludge, both of which form coatings or sediments. Both of scale and sludge contain significant amounts of naturally occurring radioactive elements such as uranium, radium and radon, which are dissolved in the water and thorium during the process of oil and gas production. These radioactive scale and sludge give arise the radiation hazard to the exposed individuals as a result of exposure radiation dose. The present approach eases the calculation of the distance between any points on the surface of a contaminated equipment (i.e. oil pipe) with radioactive scale which coats the inner wall of the oil pipe. The suggested approach was carried out by two methods of calculations (analytical and numerical methods) and the results of the two methods are so close. A model was designed for calculations and can be used for the prediction of radiation dose with a certain interval of time.
Rad. Prot. 3. Thermoluminescence Features of Nanosized H-Bn after Uv Irradiation

A.M. Henaish1, 2,*, D.M. Spiridonov1, A.S. Vokhmintsev1, I.A. Weinstein1
1Ural Federal University, NANOTECH Center, 19 Mira Street, Yekaterinburg, Russia, 620002
2Tanta University, Physics Department, Tanta, Egypt
*e-mail: ahmed.henaish@science.tanta.edu.eg

ABSTRACT

Hexagonal boron nitride (h-BN) or «white graphite» is a prospective wide gap mate-rial for the purposes of ionizing radiation solid state dosimetry due to its unique electro-physical and luminescent properties. At present the researches were made within the short-UV range where laser generation was observed. It is known that luminescent properties were mainly caused by various intrinsic and extrinsic defects in the crystal lattice, formed during synthesis, have a significant effect on the electronic and optical properties. Understanding the radiation-induced mechanisms of luminescence, the na-ture of recombination centers and charge carriers traps becomes the important factor for the development of ionizing radiation detector based on this material under using in high temperature conditions. The goal of the work was to study spectral characteristics of h-BN nanopowder after UV irradiation by methods of luminescent spectroscopy.

h-BN nanopowder with 99.8 % purity and particle size 80 – 100 nm was provided by Hongwu International Group LTD. Samples were studied using photoluminescence (PL) and thermoluminescence (TL) technique. Study of luminescence properties was performed with Perkin Elmer LS 55 spectrometer with developed high-temperature ac-cessory in the RT – 750 K range. PL spectra were measured in 300 – 600 nm spectral range at room temperature using fluorescence and phosphorescence modes. PL excita-tion spectra were registered for the most two intensive emission bands. TL spectra were analyzed at 2 K/s heating rate with scanning speed 600 nm/min in 300 – 600 nm range after sample irradiation by 4.8 eV photons during 10 min. TL glow curves were regis-tered in 3.26 and 2.75 eV bands after unfiltered irradiation with Xe lamp or monochro-matic 4.77 eV radiation during 10 min.

It is shown that PL spectra in phosphorescence mode are characterized by two emis-sion peaks with energy maximum $E_{\text{max}} = 3.0$ and $3.6 \text{ eV}$ and three excitation bands with $E_{\text{max}} = 5.77, 5.27$ and $4.96 \text{ eV}$. Also PL spectra in fluorescence mode are characterized by several emission peaks with $E_{\text{max}} = 4.05, 3.89, 3.72$ and $3.56 \text{ eV}$ and two excitation bands with $E_{\text{max}} = 5.28$ and $4.27 \text{ eV}$. It is obtained that TL curves in investigated bands characterized with two obvious peaks with temperature maximum $T_{\text{max}} = 350$ and $495 \text{ K}$. At the same time in $3.26 \text{ eV}$ band several TL peaks were registered in $520 – 690 \text{ K}$ temperature range. The low temperature $350 \text{ K}$ TL peak is the most intense and its intensity decreases twice after unfiltered light irradiated.

Suppositions on the origin of studied luminescence are suggested according to the comparative analysis of literature data and obtained results. Possible emission mecha-nisms with participation of nitrogen vacancies ($V_N$-centers) as well as oxygen ($O_N$- centers) and carbon ($C_N$-centers) impurities are discussed.

Rad. Prot. 4. Study of Some Parameters Affecting the Biosorption of $^{137}$Cs Radionuclide by Non-living Biomass

S.A.Abu-Khedra, H.M.Killa¹, W.E.Y.Abdelmalik and M.Elrafie

Radiation Protection Department, NRC, AEA, Cairo, Egypt,
¹Faculty of Science, Zagazig University, Zagazig, Egypt.

ABSTRACT

Due to the atmospheric pollution and the increased man-made technologies, radioactive materials can reach man environment including the living animals, plants and living organisms. Several goals of studies have considered around this field. In this work, 9 kinds of non-living plant materials were collected for preliminary biosorption study of radioactivity. $^{137}$Cs isotope as predominant in the atmospheric pollution and due to its high toxicity to the human body was used as tracer material in this study. Of these 9 kinds of the non-living biomass; only three kinds were chosen for the condensed study namely; waste tea leaves, peanut shell and the waste sugarcane bagasse. Effect some parameters as heating, biomass weight contact time, carrier concentration and pH on the biosorption of $^{137}$Cs by the selected biomass. Heating the samples at 250°C, showed the highest % uptake of Cs. Increasing weight, the % uptake increased. Increasing carrier concentration from $10^{-7}$ M/l to $10^{-4}$ M/l, increased the amount biosorbed/g samples following Freundlich and Langmuir sorption isotherms. As solution pH increased from 3 to 9 showed insignificant effect the uptake. It is possible to state the these kinds of non-living biomass can be used as cheap materials for the decontamination of low level $^{137}$Cs radioactive wastes.

Rad. Prot. 5. Radiation Protection and its Relevant to Radiation Processing Facilities at NCRRT, AEA, Egypt.

A.M.Eid and M.A.Abdelrhman

ABSTRACT

The purpose of the national center for radiation research and technology (NCRRT) is to use radiation technology for industrial application such as sterilization of medical supplies and pharmaceutical raw materials, preservation of food products, and new material development. Also its responsibilities are to maintain research related to physical, chemical and biological changes in materials by absorption of high energy radiation.

Hence, the center employs various irradiation facilities such as radioisotope sources of co-60 & Cs-137 and machine sources such as electron beam accelerator and X-ray generator. It has been recognized since early studies on X-ray and radioactive materials that exposure to high level of radiation can cause clinical damage to the tissue of human body. It is therefore essential that works involving radiation exposure must be subject to radiation protection measures. The purpose of these measures is to protect individuals, society and the environment from the deleterious effects of ionizing radiation, this paper is highlighting the infrastructure of radiation protection program with high intensive measures.

Hence the average radiation exposure for personnel designated as radiation workers are maintained in the level of 1.3 mSv/y to 2.32 mSv/y and the highest individual exposure over the work life of the source, may only reach to 7.94 mSv/y.

Hence we could obtain the most benefit of radiation technology for our life and minimizing the radiation risk as low as practically achievable (ALARA)
Monday 22/2/2016

Chairmen :
- Prof. Dr. M. Salama
- Prof. Dr. E. Amin
- Prof. Dr. M.K.Shaat

Hall (C)

12) Reactors (2) 11:00 -1:00 pm:

| Reactors 2-1 | Coefficients of the Six Factors Formula in Reactor Moderated by Mixtures of Light and Heavy Waters at Different Ratios
Mohamed E. Nagy, Mohamed N. Aly, Fatma A. Gaber, Mahmoud E. Dorrah | Mahmoud El-Sayed Ahmed Dorrah |
| Reactors 2-2 | Availability Evaluation for Auxiliary Feed Water System
Mohamed Ahmed Elbaz, Ahmed Sultan and Tarek Nagla | Mohamed Ahmed Elbaz |
| Reactors 2-3 | Main Steam Line Break Accident Analysis in 2775 MWth PWR Reactor Core
Muhammad Eissa, Tarek Nagla, Alya Badawi | Muhammad Eissa |
| Reactors 2-4 | Nuclear Emergencies in Nuclear Reactors
M.K.Shaat | M.K.Shaat |
| Reactors 2-5 | Recent Advances in Nuclear Power Plants
A.A. El-Kafas | A.A. El-Kafas |
| Reactors 2-6 | Processing and Characterisation of Simulant Non-Oxide Fuel for Generation IV Reactors
O. Farid | O. Farid |
Reactors 2-1. Coefficients of the Six Factors Formula in Reactor Moderated by Mixtures of Light and Heavy Waters at Different Ratios

Mohamed E. Nagy a, Mohamed N. Aly a, Fatma A. Gaber b, Mahmoud E. Dorrah b

a Department of Nuclear and Radiation Engineering, Faculty of Engineering, Alexandria University, Hadara, Alexandria, 21544, Egypt.
b Department of Radiation Safety, Nuclear and Radiological Regulatory Authority, 3 Ahmed El-Zomor Street, El- Zohour Region, Nasr City, Cairo, Egypt

Corresponding author email: mahmoud.dorrah@gmail.com

ABSTRACT

An MCNP5 study was carried out to calculate the coefficients of the six factors formula in a model for LR-0 reactor when being moderated by 11 different mixtures of light and heavy water at molecular ratios ranging from 0% up to 100% D2O at increments of 10% in D2O. The coefficients were calculated from first principle; i.e. from the different nuclear reaction rates tallied using MCNP5 in each of the 11 study cases of heavy water percentage in moderator. It was found that all the six factors were significantly dependent on heavy water percentage in moderator. The six factors were not monotonically changing with change of heavy water percentage in moderator.

Reactors 2-2. Availability Evaluation for Auxiliary Feed Water System

Mohamed Ahmed Elbaz a, Ahmed Sultan b and Tarek Nagla a

a Nuclear power plants authority Cairo, Egypt
b Mansoura university Mechanical power department

ABSTRACT

One of the most important requirements for nuclear power plants is evaluating availability of safety systems to be sure that systems will be in a state to perform a required functions under given condition over a time interval. Availability goal must be enforced throughout the lifetime of the nuclear power plant, for achieving availability goal continuous testing of equipment and components must be performed at test intervals. The longer the interval between tests, the higher the probability that a failure may be occurred. On the other hand, testing the system too frequently may take it out of service too often, both of longer and shorter test intervals lead to increased unavailability. So those test intervals shall be optimized in order to increase availability of system.

Optimization of test intervals using Coleman & Abrams, Hirsch's and Jacobs' Methods and make availability evaluation based on those test intervals by FRANTIC Code showed that Jacobs method and Coleman & Abrams method test interval will increase the availability more than Hirsch's method. Comparison between perfect staggered test interval and simultaneous method showed that perfect staggered more efficient than simultaneous method for increasing the availability.
Reactors 2-3. Main Steam Line Break Accident Analysis in 2775 Mwth Pwr Reactor Core

Muhammad Eissa 1, Tarek Nagla2, Alya Badawi 3
1,2 Nuclear Power Plants Authority- Cairo -Egypt,
3 Nuclear and Radiation Engineering Department - Alexandria University - Egypt

ABSTRACT

This study aims to analyze the effects of accident of Main Steam Line Break (MSLB) for a three-loop Reactor, 2775 MWth PWR, where it can cause potential reactivity insertion accidents (RIA). Multi-group diffusion depletion 3D code TRITON was used to calculate both the neutron flux and the power density distributions, depending on the cross sections at the beginning of cycle conditions, in the normal case, and in case of temperature decrease as a result of this accident. The thermal-hydraulic calculations were carried out using a MATLAB script written to fit the power density values and to calculate the coolant temperature distribution inside the core.

The Boron concentration required to compensate the excess reactivity is calculated to maintain the criticality conditions.

Reactors 2-4. Nuclear Emergencies in Nuclear Reactors

M.K. Shaat
Prof. Nuclear Engineering, Former Director of Egyptian Research Reactors, PSC for IAEA,
Consultant for Nuclear Affairs, EAEA, Egypt.

ABSTRACT

Nuclear reactors are generally built in a relatively low population zone. An exclusion zone around the plant is established, which is under the exclusive control of the operating organization, and public habitation is permitted in the area. The dose limits to a member of the public, under design basis accident conditions specified, are applied at the boundary of the exclusion zone. A sterilized zone beyond the exclusive radius is also established. The Emergency Planning Zone is the zone defined around the nuclear plant up to a 16-Km radius and provides for the basic geographical framework for decision making on implementing measures as part of the graded response in the event of off-site emergency. In case of an accident, the emergency measures consist of emergency actions in respect of notification, altering personnel, assessment of situation, corrective actions, mitigation, protection and control of contamination.

The emergency management, radiological control, recommendations and lessons learned will be illustrated for the accident at the Fukushima Daiichi Power Plant as a case study.

Reactors 2-5. Recent Advances in Nuclear Power Plants

A.A. El-Kafas
Reactors Department, Nuclear Research Center, Atomic Energy Authority, Cairo-Egypt.

ABSTRACT

The nuclear power industry has been developing and improving reactor technology for more than five decades and is starting to build the next generation of nuclear power reactors to fill orders now materializing.

Several generations of reactors are commonly distinguished Generation, I reactors were developed in 1950-60s, and outside the UK none are still running today. Generation II reactors are typified by the present US fleet and most in operation elsewhere. Generation III (and 3+) is the Advanced Reactors. The first are in operation in Japan and others are under construction or ready to be
ordered. Generation IV designs are still on the drawing board and will not be operational before 2020 at the earliest.

About 85% of the world's nuclear electricity is generated by reactors derived from designs originally developed for naval use. These and other second-generation nuclear power units have been found to be safe and reliable, but they are being superseded by better designs.

The greatest departure from second-generation designs is that many incorporate passive or inherent safety features which require no active controls or operational intervention to avoid accidents in the event of malfunction, and may rely on gravity, natural convection or resistance to high temperatures. Another departure is that some will be designed for load-following. This means that potentially the unit can change its output from 25% to 100% in less than 30 minutes, though this may be at some expense of wear and tear.

The general safety objective for nuclear power plants (NPPs) is to protect the individual, society and the environment by establishing and maintaining in NPPs effective measures against radiological hazards.

Achieve the following considerations when choosing a design of new NPP, which are:-

- Balance between technology maturity and innovation.
- Development of national capabilities.
- Electrical and non-electrical applications.
- Advantages of “Owner Groups”, (Operating Experience, Market for spare parts, Assurance of supplier support).

Reactors 2-6. Processing and Characterisation of Simulant Non-Oxide Fuel for Generation IV Reactors

O. Farid

Reactors Department, Atomic Energy Authority, P.O. 13759, Inshas, Cairo, Egypt

ABSTRACT

Non-oxide ceramics such as carbides and nitrides are potential fuel candidates for use in Generation IV nuclear reactors such as the Gas Cooled Fast Reactor (GFR). Several reference fuel concepts exist for the GFR, including micro-dispersions; a fissile phase (such as U/PuN) is dispersed with an inert phase (such as ZrN, TiN), to provide structure and retain fission products. Spark Plasma Sintering (SPS) has been used to produce high density pellets of TiN and ZrN, and their microstructure and preliminary thermophysical properties have been characterized. Process routes to these non-oxide fuels is being investigated using cerium as a uranium surrogate. Cerium nitride fabrication by the carbothermic reduction of cerium oxide using carbothermal reduction/nitridation is being investigated and optimized. Cerium carbide with no oxide phase being detected by XRD has been produced. Macro-dispersion fuels are another concept of the GFR in which fissile fuel kernels of ~500 µm are dispersed in an inert matrix. The reference design of fuel particles involves coating the kernel with a porous layer (30% TD) of inert matrix as which acts as a fission gas plenum and then coating with a dense layer to which forms a barrier to fission product release. The internal gelation method has been optimized to fabricate sintered CeO$_2$ microspheres. CeO$_2$ spheres doped with carbon powder have also been produced using this method and the reactive sintering parameters to make CeN microspheres is being investigated.
Monday 22/2/2016

Chairmen:
Prof. Dr. A. A. El-Sayed
Prof. Dr. M.E. Abd El-Azim
Prof. Dr. M. Ashour

Hall (A)

13) Material Sciences  3:00 - 5:00 pm:

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Mat. Sci. 1. GPU-Based Implementation of Crystal Identification Algorithms
M. Sayed, A.A. Arafa and H.I. Saleh

Mat. Sci. 2. Effect of Natural and Pre-aging on Artificial Aging of 6061 Al Alloy
M.E. Abd El-Azim¹, O. E. El-Desoky² and M. R. El-Koussy³
¹ Metallurgy Department, Egyptian Atomic Energy Authority
² Quality Assurance Department, Egyptian Nuclear and Radiation Regulatory Authority
³ Metallurgy Department, Faculty of Engineering, Cairo University, Giza, Egypt

ABSTRACT
6061 Al alloy is one of Al-Mg-Si alloys (6xxx series) used as cladding and structural material in research reactors because of its low nuclear absorption cross section for thermal neutrons. The artificial aging behavior of this alloy was investigated by varying the aging temperature from 120°C to 260°C and aging time from 0.5 to 64 h and is expressed in terms of hardness and tensile properties. Precipitation hardening manifests itself in 6061 Al alloy by peaks in hardness and strength either yield stress or ultimate tensile strength in their relationships with time and temperature and a drop in total elongation associated generally with intergranular fracture. The natural aging for 100 h followed by artificial aging resulted in higher yield and ultimate tensile strength and shifted the time to reach the peak strength to shorter time than the artificial aging only. Pre-aging at 100°C for 5 min followed by artificial aging at 160°C for 18 h (peak aged condition) resulted in higher yield stress, ultimate tensile strength and initial rate of strain hardening than artificial aging only.

Mat. Sci. 3. Cylindrical-Design, Dehydration and Sorption Properties of Easily Synthesized Magnesium Phospho-silicate Nanopowder
Ismail M. Ali*, M. Y. Nassar², Y. H. Kotp³ and M. M. Khalil¹
¹ Hot Labs. Centre, Atomic Energy Authority, P.C. 13759, Cairo, Egypt,
² Chem. Department Faculty of Science, Benha Univ., Cairo, Egypt.
³ Hydrogeochemistry Department, Desert Research Center, Cairo, Egypt.
* Corresponding author E-mail: ismail_m_ali@yahoo.com

ABSTRACT
Nano-particles of magnesium phosphosilicate (MgPSi) with enhanced sorption properties have successfully synthesized using (NH₄)₂HPO₄ as precipitating media. Structure, morphology and dehydration changes of the synthesized powder were detected by means of DTA/TG, XRD, SEM, FT-IR and XRF. Studies showed that the material possess poor crystalline nature with diameter of ~40 nm. SEM image indicated that MgPSi particles were distributed as nano-clumps of cotton-wool morphology after heating up to 400 °C. The order and activation energy of main dehydration processes were estimated from DTA-thermogram. Evaluation of MgPSi as new adsorbent was investigated for Cu²⁺, Ni²⁺ and Co²⁺. In attempt to harmonize between the defects and features, MgPSi nanopowder was directly green fabricated into adsorption surface by pressing into cylindrical beads. This design make it has an excellent physical stability, easy to handle and provided a pathway to achieve the goal of adsorption. The powder-type showed an amount of adsorption 127.5 whereas the cylindrical-type design showed 72.5 mg/g for Cu²⁺ under identical conditions.
**Mat. Sci. 4. Application of Taguchi Methodology on the Preparation of Mullite Precursor by Hydrolysis Method**

S. H. El-Bialy (1), M. A. A. El-Masry (1), M. A. M. El-Saeed(1), G. M. M. El-Kady(b)

(1) Metallurgy Department, Atomic Energy Authority, Cairo, Egypt, P.O.13795.

(2) Applied chemistry Department, Faculty of science, Al-Azhar University, Cairo, Egypt.

**ABSTRACT**

This paper deals with application of Taguchi methodology on the preparation an important ceramic material- mullite- by hydrolysis method at low temperature.

The study aims at production of the greatest yield quantity from the reaction between aluminum nitrate nona-hydrate and silicon ethoxide to obtain mullite precursor (3Al2O3.2SiO2). Three factors were considered to estimate their effects on the quantity of the product yield. These factors are the reactants concentration (factor A), reacting medium temperature (factor B) and pH (factor C). Three levels for each factor were considered (A: 1, 2 and 3 wt. % mullite solids), (B: 50, 60 and 70 °C) and (pH: 4, 6 and 8). Three way ANOVA and signal to noise ratio (S/N) based on higher is better formula, with an orthogonal array L9 for the design of experiments (DOE) were considered.

ANOVA explains that the conditions that maximizes the production are concentration of 3%, reaction temperature 70 °C and pH at 6.

(S/N) HB, shows that both concentration and pH are significant factors for all confidence levels 90, 95 and 99% while temperature is significant factor only of 90 and 95% confidence levels.
Monday 22/2/2016

Chairmen:
Prof. Dr. M. A. Gomaa
Prof. Dr. Azza Hammoh

Hall (B)

14) Session (III): Medical Radiation Protection  3:00 -5:00 pm

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Med. Rad. Prot. 1. Radiation Health Effects

Dr. Mahmoud Hassan Shabon

I- PROBABILISTIC EFFECTS (Effect of Low Dose) is called Delayed, Probabilistic, and Stochastic Effects.

CHARACTERISTICS, FACTORS AFFECT PROBABILITY
THE MOST IMPORTANT DELAYED EFFECTS ARE:

(1) Hereditary effects. (5) Cataract.
(2) Congenital effects. (6) Infertility.
(3) Genetic effect. (7) Premature senility.
(4) Cancer transformation.

II- EFFECTS OF MEDIUM AND HIGH DOSES OF RADIATION are called Acute Deterministic Non-Stochastic Effects

III- TYPES OF ACUTE RADIATION SYMDROME

I) Renewal cell system: systems are cell populations that have high rate of division

1. Bone marrow syndromes.
2. G.I.T. syndrome.

II) Stable cell system: cell populations that are differentiated.

1. C.V.S syndrome.
2. Oro-respiratory syndrome.
3. C.N.S. syndrome.

III) Associated syndromes.

1. Cutaneous syndrome.
2. Immune system syndrome.
3. Psychosomatic syndrome.


The L.D.50/30 is defined as the lethal dose that will result in death of 50% of any exposed mammalian population in 30 days.
Med. Rad. Prot. 2. Hazard of Radiotherapy in Oncologic Patients

A. Abaza

Ass.Prof. of Safety and Prevention of Oncology in Radiation Protection Department, Nuclear and Radiological Regulatory Authority, Cairo, Egypt. PhD, M.D in Childhood Studies & Pediatric Oncology, Ain-Shams University, Cairo, Egypt.

Author e-mail: aya_abaza@hotmail.com

ABSTRACT

Effective risk-based therapy for the management of childhood cancer in the setting of clinical trials has been the cornerstone of the tremendous progress in overall survival seen over the last four decades, with 5-year survival rates now at 80%. The use of cancer therapy at an early age can produce complications. It has been demonstrated quite conclusively that long term survivors (LTS) of childhood cancer carry a high burden of morbidity, with one third of survivors reporting severe or life-threatening complications 30 years after their primary diagnosis. Nowadays, many different innovative radiotherapy (RT) treatment approaches are used to reduce potential side-effects. A common goal is to combine effective agents with non overlapping toxicities to optimize survival while minimizing therapy-related sequelae. Although most studies have achieved desired survival outcomes, data on late effects of therapy were waiting for long-term (LT) follow-up studies. The incidence of complications after antineoplastic therapy is increasing in relation to the incidence of cancer and prolonged survival rate. Radiation (RD) effects on normal tissues are divided into acute and chronic (late) effects. There is significant LT morbidity and mortality associated with treatment of childhood cancer. Unfortunately, the LT sequelae can potentially have an adverse effect on the overall quality of life (QOL) of the survivors, such as impairment in growth and development, cardiopulmonary compromise, endocrine dysfunction, renal impairment, gastrointestinal dysfunction, musculoskeletal sequelae, subsequent malignancies, neurocognitive dysfunction, and psychosocial problems, not only related to the specific therapy employed, but may also be determined by individual host characteristics. The evaluation and care regarding survivors of malignancies in childhood and adolescence is of major interest. Particular attention should be paid to the radiation schedules and filed with screening for early detection of late effect of radiotherapy.


A Hammou, H.Kamoun, C. Chouchane

ABSTRACT

Introduction and objectives:

Nuclear medicine department of Salah Azaiez Institute (SAI) is the first Nuclear Medicine Service in Tunisia. Radiation protection of workers recommends that radiation doses be kept as low as reasonably achievable (ALARA). Therefore we consider the estimation of occupational radiation exposure one of important factors in occupational radiation protection strategy.

The objective of our study was to evaluate radiation protection of workers in nuclear medicine department of SAI and to investigate the occupational annual external radiation doses of the nuclear medicine service staff during 5 years.
Methods:

To evaluate radiation protection of workers we used a checklist. We conducted a retrospective and exhaustive study concerning nuclear medicine staff exposure during five years from 2009 to 2013. Individual whole body thermo luminescent dosimeters were used by nuclear medicine workers. For statistical analyses we used SPSS and non parametric tests.

Results:

We found some insufficiency in radiation protection of workers in nuclear medicine department. 8 were physicians, 13 technologists and 5 workers non directly affected to radio pharmaceutics handling. Occupational exposure during 2012 was higher than the other years. The median of personal annual effective dose (mSv) for nuclear medicine workers was 1.2, 1.38, 1.1, 7.06 and 1.4 in 2009, 2010, 2011, 2012 and 2013 respectively. Kruskal Wallis Test shows correlation between grade and occupational exposure.

Conclusion:

In this study exposure levels were below legal limits, not negligible for some workers in 2012. Our observation suggests improving radiation protection program at our department. Education and training in radiation protection, availability and use of appropriate protective tools, and an effective monitoring program are essential elements in ensuring that workers in nuclear medicine are adequately and acceptably protected.

Med. Rad. Prot. 4. Radiation Protection
Round Table Discussion

M.A.Gomaa
Monday 22/2/2016

Chairmen :
Prof. Dr. M. Barakat
Prof. Dr. A.Z. Hussein
Prof. Dr. W. Salem

Hall (C)
15) Nuclear Safety  3:00 -5:00 pm:

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Nucl. Safety 1. On The Right Track of Investigations; Nuclear Accidents between Fact and Fictions
N. S. Mahmoud

Nucl. Safety 2. A Hypothetical Accident Scenario for a Fire Accident with UF₆ Packages Traversing Water Path Canal Close to a Highly Densely Populated City
M. Salama

Nucl. Safety 3. Design and Simulation of 5-DOF Vision-Based Manipulator to Increase Radiation Safety for Industrial Cobalt-60 Irradiators
A. E. Salman¹, *, M. R. Roman², A. B. Keshk ¹ and K. A. Sharshar¹
²Mechanical Power Engineering Dept. Faculty of Engineering, Helwan University.

ABSTRACT

Robotics has proved its efficiency in nuclear radiation fields. Computer vision is one of the advanced approaches that is used to enhance robotic efficiency. The current work investigates the possibility of using a vision-based controlled arm robot to collect the fallen hot Cobalt-60 capsules inside wet storage pool of industrial irradiator. A 5-DOF arm robot is designed and vision algorithms are established to pick the fallen capsule on the bottom surface of the storage pool, read the information printed on its edge (cap) and move it to a safe storage place. Two object detection approaches are studied; RGB-based filter and background subtraction technique. Vision algorithms and camera calibration are done using MATLAB/SIMULINK program. Robot arm forward and inverse kinematics are developed and programmed using an embedded microcontroller system. Experiments show the validity of the proposed system and prove its success. The collecting process will be done without interference of operators, so radiation safety will be increased.
Nucl. Safety 4. Steady-State Neutronic Calculations for AP1000 using QUARK

Esmat H. Amin\textsuperscript{a}, Hamdy M. Hussein\textsuperscript{b}, Hala K. Selim\textsuperscript{a}

\textsuperscript{a} Department of Nuclear Safety Engineering, Nuclear and Radiological Regulatory Authority, Cairo, Egypt

\textsuperscript{b} Engineering Physics Department, Faculty of Engineering, Cairo University, Giza, Egypt

ABSTRACT

The Reactivity Initiated Accidents (RIA) is part of the licensing basis accident analyses required for pressurized water reactors. RIA involves an unwanted increase in fission rate and reactor power. The power increase may damage the reactor core, and in severe cases, even lead to disruption of the reactor.

The Westinghouse AP1000 Advanced Passive pressurized water reactor is designed to achieve high safety and performance. The safety performance of the AP1000 at steady state and during a reactivity insertion accident is investigated by modeling the AP1000 core using QUARK code.

The QUARK system (QUAndry based Reactor Kinetics) is a 3D neutronic kinetics calculations coupled to core thermal hydraulics code.

The initial phase in the study, which is reported in the present work, describes the initial neutronic calculation that is the boundary of the thermal hydraulic calculation.

Nucl. Safety 5. Denatured Molten Salt Reactors (DMSR), Nuclear Option for Developing Countries

Badawy M. El-sheikh

Egyptian Nuclear and Radiological Regulatory Authority Cairo, Egypt

ABSTRACT

Developing countries suffer many challenges in achieving its desire to obtain nuclear power plants to meet their needs in electricity generation needed to achieve the economic and industrial prosperity for their people. Come on top of those challenges: economic, political and technological challenges and as well as the requirements of the ideal choice of reactors that meet engineering safety and environmental precautions and nuclear security.

But with return to the international interest for thorium reactors the door is opened to the hopes of many of those countries in access the nuclear program as a preferred choice for power generation, especially when it is to reach a better fitting liquid fuel thorium reactors options for the use of all countries. This paper discusses to what extent the Denatured Molten Salt Reactors achieve these ambitions and the proposed improvements and new simple designs for these reactors.
Monday 22/2/2016

Chairmen :
Prof. Dr. Ragaee Zaghloul
Prof. Dr. N. El Sawy
Prof. Dr. S. Elhemamy

Hall (B)

16) Posters (I)  5:00 - 7:00 pm:

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11th International Conference on Nuclear Sciences and Applications
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The Egyptian Society of Nuclear Sciences and Applications
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N.N.Nassar\textsuperscript{1}, F.S.Tawfik\textsuperscript{1}, S. A. Agamy\textsuperscript{2}, and T.F.Nagla\textsuperscript{3}

\textsuperscript{1}Nuclear & Radiological Regulatory Authority (ENRRA), Cairo, Egypt
\textsuperscript{2}Nuclear and Radiation Engineering Department, Alexandria university
\textsuperscript{3}Nuclear Power Plant Authority (NPPA), Cairo, Egypt

ABSTRACT

One of the most important principles in air pollution is to minimize the release of pollutants to the atmosphere, deposition on the ground and promote sufficient dilution of released pollutants within the atmosphere. Building downwash describes the effect that wind flowing over or around buildings essentially, buildings create a cavity of reticulating winds in the area near the buildings, and these building cavities cause increased vertical dispersion of plumes emitted from stacks on or near the buildings. Often it leads to elevated concentrations downwind of affected stacks.

The aim of this work is to evaluate the effect of the building downwash phenomena on the atmospheric dispersion behavior of released radioactive materials from Nuclear Power Plant (NPP). In this study, a hypothetical scenario is presented involving point source with varying stack parameters and rectangular shaped buildings (Milestone Nuclear Power Plant- USA) using meteorological parameters of a chosen day.

The concentrations of assuming released radionuclides taking into consideration the building downwash effect and without are calculated using the AERMOD-PRIME Model taking into consideration the effect of the type of atmospheric stability class. Also the analysis includes the model predictions for the highest 1- hour cavity concentration.

The results show that the size of the cavity zone doesn’t affect by the type of stability class, but it affects by the stack location, buildings shape and wind direction. On other hand the distance at which the plume touches the ground affects by the type of stability class, the stack location, buildings shape and wind direction. So the strategies for locating buildings need to be considered to maximize dispersion when planning for constructing several reactors and auxiliaries buildings at a nuclear site.

P. I -2. Regulatory Aspects for Site Selection for Radiological and Nuclear Installation

N. M. Sirag
P. I -3. Effect of Developing Glass Efficiency on Reducing Energy Usage

Amer, H.H 1, Kamel, R 2, Haleem, A 2, Alaraby, N.A 2,

1 Solid State Department, National Center For Radiation Research and Technology, EAEA, Cairo, Egypt
2 Architecture Department, Faculty of engineering Mataria, Helwan university

Corresponding author email: eng_nouranahmed@hotmail.com

ABSTRACT

This paper discussed the different types of glass used in architecture. It also investigated the importance of studying reasons and methods of energy consumption to find a solution utilize reducing that consumption rates through improving the efficiency of different types of glass used in buildings. The paper results producing a specific type of amorphous semi-conductor chalcogenide glass (InSnSeBi) which has better physical properties and factors achieving high rates of energy consumption in buildings. The structure as well as characterization of the synthesized materials has been studied by Density, X-ray Diffraction (XRD), Energy dispersive X-ray (EDX), Differential Thermal Analysis (DTA), Scanning Electron Microscope (SEM), UV Spectrophotometer and effect of gamma radiation.

P. I -4. Review of Geophysical and Environmental Engineering Methods, for Site Characterization of Nuclear Easte Disposal Sites, by Using GIS

Soheir el hemamy, Nadia Mahmoud Sirag

P. I -5. Grading of requirements for radioactive waste activities in nuclear research reactors: radioisotope production facilities

Yasser E. Tawfik
ETRR2 Complex – RPF, Egyptian Atomic Energy Authority P.O. Box 13759, Inshas, Cairo – EGYPT
E-mail: tawfik_yasser@hotmail.com

ABSTRACT

A graded approach is applicable in all stages of the lifetime of a research reactor. During the lifetime of a research reactor, any grading that is performed should be such that safety functions and operational limits and conditions are preserved, so that there are no undue radiological hazards to workers, public or environment. The grading of activities should be based on safety analyses, and regulatory requirements. Other elements to be considered in grading are the complexity and the maturity of the technology, operating experience associated with the activities and the stage in the lifetime of the facility. In order to ensure that proper and adequate provision is made for the safety implications associated with the management and disposal of radioactive waste, the waste is characterized and classified. The general scheme for classifying radioactive waste as presented in the current study is based on considerations of long term safety, and thus, by implication, disposal of the waste. This classification provides a starting point for the grading of activities associated with the packaging and disposal of radioactive waste.
P. I-6. Radiological Impact Assessment to the Environment Due to Waste From Disposal of Porcelain

T. M. Morsi, R. A. Hegazy and W. M. Badawy

Radiation Protection Department, Nuclear Research Center, Atomic Energy Authority
13759 Abu Zaabal, Egypt.

ABSTRACT

The objective of the present study is to assessment the risk from the disposal of local and imported porcelain. The risk due to the presence of natural radionuclides in some disposal of porcelain was estimated in this study. Identification of radionuclides in the investigated samples was performed by gamma spectroscopy. The average activity concentration for the local analyzed samples using HPGe detector is 208.28 Bq/kg for Ra-226, 125.73 Bq/kg for U-238, 84.94 Bq/kg for Th-232 and 1033.61 Bq/kg for K-40 and for the imported sample was 240.57 Bq/kg for Ra-226, 135.56 Bq/kg for U-238, 115.74 Bq/kg for Th-232 and 1312.49 Bq/kg for K-40. The average activity concentration of local samples is lower than that of the imported samples. But it’s clear that the activity concentrations of these samples were higher than the recommended level.

P. I-7. Water Hyacinth for Phytoremediation of Radioactive Wastes Simulate Contaminated with Cesium and Cobalt Radionuclides

Saleh, H.M.

Affiliation Addresses: Radioisotope Department, Nuclear Research Center, Atomic Energy Authority, Dokki 12311, Giza, Egypt
Corresponding author e-mail: hosamsaleh70@yahoo.com

ABSTRACT

Phytoremediation is based on the capability of plants to remove hazardous contaminants present in the environment. This study aimed to demonstrate some factors controlling the phytoremediation efficiency of life floating plant, water hyacinth (Eichhornia crassipes), toward the effluents contaminated with $^{137}$Cs and/or $^{60}$Co. Cesium has unknown vital biological role for plant while cobalt is one of the essential trace elements required for plant. The main idea of this work has been receiving much attention by using undesirable species, water hyacinth, in purification of radiocontaminated aqueous solutions. The controlling factors such as radioactivity concentration, pH values, the amount of biomass and the light were studied. The uptake rate of radiocesium from the simulated waste solution is inversely proportional to the initial activity content and directly proportional to increase the mass of plant and sunlight exposure. A spiked solution of pH $\approx 4.9$ was found to be the suitable medium for the treatment process. The uptake efficiency of $^{137}$Cs present with $^{60}$Co in mixed solution was higher than if it was present separately. On the contrary, uptake of $^{60}$Co is affected negatively by the presence of $^{137}$Cs in their mixed solution. Sunlight is the most required factor for the plant vitality and radiation resistance. The results of the present study indicated that water hyacinth may be a potential candidate plant of high concentration ratios (CR) for phytoremediation of radionuclides such as $^{137}$Cs and $^{60}$Co.
Monday 22/2/2016

Chairmen:
Prof. Dr. F.A. Shehata
Prof. Dr. Azza Shahin
Prof. Dr. A. El Kmash

Hall (B)
16) Posters (II) 5:00 - 7:00 pm:

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<td>Recycling of Aluminum Waste for Production of Alumina as a Sorbent Material</td>
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<td>Application of Hydrochemical and Isotopic Techniques to Study Groundwater Resources Along Ismailia Canal, Egypt</td>
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<td>Increase the Selectivity and Capacity of Silica Extracted from Rice Husk Ash for Adsorption of Cobalt: A fixed Bed Column Study</td>
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<td>Purification of Wastewater Effluent from Organic Ligand using one Step Chemically and Physically Rice Husk Activated Carbon: Ar(III) as a Case Study.</td>
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<td>Adsorption Behavior of $^{134}$Cs Radionuclide onto Grafted Chitosan Derivative Acrylic Acid Polymer</td>
<td>E. Metwally</td>
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P. II - 1. Recycling of Aluminum Waste for Production of Alumina as a Sorbent Material

Sohair Elreefy¹, Monira Ghoniem, Tarek Sami², Saad Abedel Wahab³.
¹Hot Lab. Center, EAEA, Egypt
²Tabbin Institute for Metallurgical Studies
³Faculty of Science, Ain Shams University

ABSTRACT

The present work is directed to the production of alumina (Al₂O₃) from the solid waste cake produced as a by-product from some small factories, which manufactured aluminum utensils. This solid waste contains aluminum ions mainly as aluminum hydroxide and as sodium aluminate. These aluminum ions are separated first by leaching with sodium hydroxide solution. This is followed by precipitating the leached aluminum ions using different precipitating agents (H₂SO₄, H₂O₂, solution and CO₂ gas. The resulting precipitate has been separated by filtration, dried at ~ 100 °C and then calcined at ~ 600 or 1000 °C to produce alumina of γ- or α- form, respectively. The produced alumina when activated leads to porous material when subjected to progressive dehydration. This activated alumina has great value as sorbent material, catalyst support, ion exchanger and chromatographic media. The different parameters affecting both the leaching and precipitating processes have been investigating. Characterization of the produced alumina has been also investigated. A yield of ~ 88% of the recovered alumina was obtained from such solid waste which is considered to be of negative impact to the environment.

P. II - 2. Application of Hydrochemical and Isotopic Techniques to Study Groundwater Resources Along Ismailia Canal, Egypt

W.M. Salem*, A.M. Khoudary**, M.K. Fouad**
*Egyptian Nuclear and Radiological Regulatory Authority
** Cairo University, Faculty of Eng., Chemical Eng. Dept.

ABSTRACT

The aim of the present work is to achieve better understanding of the water resources in the Ismailia Canal area. The area of study which is located on the eastern side of the River Nile bound by latitudes 31°0′38″ and 31°19′00″ East and 30°23′00″ and 30°12′42″ North, is considered one of the most promising areas for new communities and land reclamation projects. A hydrochemical study was performed for the water resources in the study area which involved collection and analysis of water samples from both surface and groundwater. Electrical conductivity and TDS were measured and major ions were analyzed for all samples. Based on the hydrochemistry, the types of the ground water samples were determined, the majority of which were found to be mixed water characterized by salt composition of NaCl, KCl, Na₂SO₄, NaHCO₃, Mg(HCO₃)₂, Ca(HCO₃)₂. In addition the suitability of ground water for drinking, domestic, irrigation and industrial purposes was studied. The analysis of total dissolved solids, sodium adsorption ratio and %Na was performed for all samples. Results indicated low TDS implying suitability of most samples for drinking and domestic uses except for a few which were found to be contaminated with heavy metals due to industrial activities. The stable isotopic content (Deuterium and Oxygen-18) was determined for groundwater samples as a monitor of its origin and its interrelation with surface water in the study area. Results indicated that groundwater was affected by both the River Nile and irrigation water.
P. II - 3. Increase the Selectivity and Capacity of Silica Extracted from Rice Husk Ash for Adsorption of Cobalt: A fixed Bed Column Study

H.M.H. Gad¹, H.A. Omar², M. Aziz ², M.R. Hassan²
¹Hot Laboratories and Waste Management Center, Atomic Energy Authority, P.O. 13759, Inshas, Cairo, Egypt.
²Nuclear Research Center; Atomic Energy Authority, P.O. 13759, Inshas, Cairo, Egypt.

ABSTRACT

Continual fixed-bed column scientific studies were performed by utilizing silica precipitated by having HCl (Si-Cl-RHA) as an adsorbent with regard to removing Co(II) coming from aqueous solution. The result of varied parameters such as bed depths (1.5, 3.2 and 4.8 cm), flow rate (1, 3 and 5mL/min) and influent Co(II) concentrations (50, 100 and 150 mg/L) seemed to be researched. The actual exhaustion period improved together with improve of bed depth, decrease of flow rate and influent concentration. The Thomas, Yoon-Nelson and Adams–Bohart models had been given to the adsorption within different experimental conditions to forecast the breakthrough curves and also to assess the design variables on the fixed-bed column which are helpful for method style. Thomas and Yoon–Nelson models had been within excellent understanding using the experimental information. The actual Si-Cl-RHA column examine states the worth from the excellent adsorption capacity for removing Co(II) from aqueous solution.

P. II - 4. Removal of Co²⁺ and Ni²⁺ using Natural Bentonite and Kaolin Clays from Simulated Liquid Waste

* Department of Analytical Chemistry and Environmental Control, Hot Labs.Center, EAEA, Cairo, Egypt
** Department of Chemistry, Faculty of Science, Ain Shams University.

ABSTRACT

Kaolin and bentonite have been used as adsorbents for Co(II) and Ni(II) in aqueous medium. The effect of different variables such as, concentration of metal ions, pH and time was investigated using a batch technique. Adsorption increased with pH till precipitation of both metal ions up to pH>8. The optimum pH was chosen to be 6. The equilibrium time was 20 min and overnight agitation was chosen to ensure the maximum stability of metal ions on clay surface. Montmorillonite had a much higher adsorption capacity for the metal ions than kaoline and the experimental date of both ions fit well to Langmuir and Freundlich isotherm models. In case of kaolin the experimental data fits well to Langmuir models only. Both Egyptian kaolin and bentonite were observed to be suitable for treating water activation products such as cobalt and nickel.
P. II - 5. TL-Properties of Some Environmental Materials and Assessment the Effects of Other Different Parameters.

H.S. Hafez\textsuperscript{b}, Emad R. Sheha\textsuperscript{a}, K.E. Abd-Elmageed\textsuperscript{c}, M.A. El-Kolaly\textsuperscript{b} and M.S. Sayed\textsuperscript{a}

\textsuperscript{a} Radiation Protection And Safety Department, Hot Laboratories Center, AEA, Cairo, Egypt.
\textsuperscript{b} Radiation Protection Department, Nuclear Research Center, AEA, Cairo, Egypt.
\textsuperscript{c} Physics Department, Faculty of Science, Benha University, Cairo, Egypt.

**ABSTRACT**

The Thermoluminescence technique (TLD-3500 series) was utilized to study the dosimetric properties of Red sand (Rs) from Red Mountain, Egypt. The Rs samples have been studied in relation to the main dosimetric properties such as (grain size, glow curve, dose response, TL-kinetic parameters and fading effect). The characterization of Rs sample has been estimated using X-ray fluorescence (XRF), X-ray diffraction (XRD) and scanning electron microscopy (SEM). The results showed that Rs sample has high concentration of SiO\textsubscript{2} (95.84\%) and XRD data showed presence of large amount of high crystalline quartz in form of silica that exhibit thermoluminescence. The glow curves of Rs samples have been obtained after irradiation with various $\gamma$-doses of (Co-60) from 10 Gy up to 30 kGy. The glow curve is consisted of three peaks at $P_1=141$ °C, $P_2=207$ °C and $P_3=328$ °C. The dose response curve is linear within range from 10 Gy up to 500Gy. The Rs sample showed TL- stability through three months and the rate of fading during this period was about 17 \%. The previous data indicate that Red sand could use for high-doses dosimetry in several areas of applications of ionizing radiation.

P. II - 6. Purification of Wastewater Effluent from Organic Ligand using one Step Chemically and Physically Rice Husk Activated Carbon: Ar(III) as a Case Study.

H.M.H. Gad, T.F. Mohammeden and M.A. Mahmoud

P. II - 7. Adsorption Behavior of $^{134}$Cs Radionuclide onto Grafted Chitosan Deravative Acrylic Acid Polymer

E. Metwally\textsuperscript{1}, R.R. Ayoub\textsuperscript{1}, M. Atrees\textsuperscript{2} and Hend Salem\textsuperscript{2}

\textsuperscript{1} Nuclear Chemistry Department, Hot Labs Center, Atomic Energy Authority, Cairo, Egypt.
\textsuperscript{2} Nuclear Material Department, Production sector, Nuclear Materials Authority, Cairo, Egypt.

**ABSTRACT**

Chitosan acrylic acid polymer has been prepared by radiation-induced grafting of acrylic acid onto chitosan. It has been successfully used for the removal of $^{134}$Cs radionuclide from aqueous solutions. Certain parameters were applied for studying its adsorbitivity, including change in pH, contact time, ion concentration, and temperature. The obtained isotherm data have been correlated with Freundlich, Morris-weber, Lagergren, Reichenberg, and Hasley models.
Monday 22/2/2016

Chairmen:

Prof. Dr. Z. Ismail
Prof. Dr. E. Metwally
Prof. Dr. K. Sakr

Hall (B)

16) Posters (III)  5:00 - 7:00 pm:

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<td>P. III -3 Comparative study of Cadmium(II) Removal from Chloride and Nitrate Solution using Amberlite IR-120 and Dowex 1X10 M. M. Shehata, S. A. Waly and H.H. Mahmoud</td>
<td>Hazem Hassan Mahmoud</td>
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<td>P. III -6 Neutron Capture Cross-Section Measurements and Theoretical Calculation for 186W (n, g) 187W Reaction M. Al-abyad, Gehan Y. Mohamed</td>
<td>Gehan Y. Mohamed</td>
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<td>P. III -7 Radiation Protection and Regulatory Aspects of Waste NORM Petroleum Samples Talaat Salah El din Ahmed</td>
<td>Talaat Salah El din Ahmed</td>
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P. III - 1. Dispersion Modeling: Methodology and New Trends

A. I. M. Aly, F. S. Tawfik and H. B. Hassan
Siting and Environmental Department, Nuclear and Radiological Regulatory Authority NRRA, Cairo, Egypt, 11762, P.O.Box 7551

ABSTRACT

Dispersion modeling is a technique for calculating concentration of pollutants emitted into different media. Depending on the environment considered they are classified into atmospheric, aquatic (freshwater, river or marine) or terrestrial models. A dispersion model is a series of equations coded for use by a computer. Computers are extremely useful for the repetitive calculations required in estimating concentration at a number of receptor locations, from a number of sources. Gaussian-plume Model GPM is considered the most common used model in defining dispersion parameters and associated concentration of pollutant. It has been used since 1960. This model is applicable to ideal conditions of uniformity and steady state under which the data don't change with time and distance. It can only be applied for short travel distance of about 10 km and smooth terrain. On other hand the impact of severe accidents like Fukushima Daiichi event March 2011 and the Chernobyl 1986 was on regional scale more than 200km. The objective of this work is to review the basic dispersion model and the approaches used in some countries.


M. A. Sadek*, k.hagagg*, M.F.ElShahat **
* Nuclear and Radiological Regulatory Authority, Egypt
** Faculty of Science, Ain-Shams University

Corresponding Author: k.hagagg@yahoo.com

ABSTRACT

This paper analyzes the hazard and assesses the risk that might arise from a waste disposal system assumed to be established to the northeast of Cairo, based on a Probabilistic Safety Assessment (PRA) model. The analysis has been done for four scenarios and the system sensitivity to different parameters has been tested. An analytical model has been used for out sighting type curves for Pumping and Treat system supposed to be designed for remediation.

Six radioisotopes of high retention time and variant high half-life (>10 years) have been selected for the analysis (³H, ¹⁴C, ⁶⁰Co, ⁵⁹Ni, ⁹⁹Tc, and ⁹⁰Sr). The time / distance simulation of contamination pattern indicates that ³H- has the largest downstream pollution range (safety distance, polluted area, pollution duration), followed by ¹⁴C, ⁹⁹Tc and ⁹⁰Sr. The maximum doses to a member of the critical group occur between 2-10 years for ³H and ⁹⁹Tc and 270-700 years for ¹⁴C. The maximum contaminated plume at 50m from the release point needs a well of discharge rate 1.78E+4 m³/d, capture width 82.21m and stagnation point 26.18m, to be pumped for treatment. The groundwater system contamination is highest sensitive to velocity followed by dispersion parameters and finally mass inventory.
P. III – 3. Comparative study of Cadmium(II) Removal from Chloride and Nitrate Solution using Amberlite IR-120 and Dowex 1X10

M. M. Shehata, S. A. Waly and H.H. Mahmoud


Galal, Y.G.M., Abdel Aziz, H.A., and Degwy, Sh. M.

Abstract: Pot experiment was conducted to evaluate the effect of different organo/bio and mineral fertilizers on iron, zinc and copper uptake by sorghum crop grown on clay soil. Mineral fertilizer in the form of labeled ammonium sulfate with 2% $^{15}$N atom excess was applied at two rates of 200 and 400 mg N pot$^{-1}$. Compost, chicken manure and leucaena residues were applied at the same rates per pot according to its content of nitrogen. Sorghum plants treated with organic or mineral fertilizers were inoculated or uninoculated with Azotobacter chrooccocum. Completely randomized block design was followed for statistical analysis. Dry matter yield of shoots and roots was enhanced by application of 400 mg N pot$^{-1}$ combined with chicken manure comparable to compost and leucaena residue. Inoculation with Azotobacter has a positive effect on dry matter yield of both organs as compared to uninoculated plants. In most cases, the uptake of Fe, Zn and Cu was enhanced by inoculation and 200 mg N pot$^{-1}$ rate. High quantities of these elements were accumulated in roots. Application of chicken manure resulted in higher accumulation of these elements in either shoots or roots as compared to compost or leucaena residue. Sometimes, it was fluctuated according to plant organs as affected by bio-organic or mineral fertilization treatments.


S. A. Abd El Aal, A. A. El-Shaftawy, A. Hassan, M. M. Shehata and M. H. Ebrahim
P. III – 6. Neutron Capture Cross-Section Measurements and Theoretical Calculation for $^{186}\text{W} (n, \gamma) ^{187}\text{W}$ Reaction

M. Al-abyad, Gehan Y. Mohamed

Experimental Nuclear Physics Department, Cyclotron Facility, Nuclear Research Centre, Atomic Energy Authority, Cairo 13759, Egypt

ABSTRACT

The thermal neutron cross-section and the resonance integral of the reaction $^{186}\text{W}(n, \gamma)^{187}\text{W}$ by the activation method were measured using a $^{197}\text{Au}(n, \gamma)^{198}\text{Au}$ monitor reaction as single comparator. The high-purity natural W and Au metallic foils with and without a cadmium shield case of 0.5 mm thickness were irradiated in a neutrons were obtained from neutron irradiation facility that uses an (Am-Be) radio-isotopic neutron source with a modification to have thermal and epi-thermal neutrons. The induced activities in the samples were measured by high-resolution $\gamma$-ray spectrometry with a calibrated high-purity Ge detector. The thermal neutron cross-section for the $^{186}\text{W}(n, \gamma)^{187}\text{W}$ reaction has been determined to be $37.2 \pm 2.1$ barn, relative to the reference value of $98.65 \pm 0.09$ barn for the $^{197}\text{Au}(n, \gamma)^{198}\text{Au}$ reaction. The present result is, in general, in good agreement with most of the experimental data By assuming the cadmium cut-off energy of 0.55 eV, the resonance integral obtained is $461 \pm 39$ barn, which is determined relative to the reference values of $1550 \pm 28$ barn for the $^{197}\text{Au}(n, \gamma)^{198}\text{Au}$ reaction.

P. III – 7. Radiation Protection and Regulatory Aspects of waste NORM Petroleum Samples

Talaat Salah El din Ahmed

Radiation Protection &Civil Defense Dept., Nuclear Research Center, Egyptian Atomic Energy Authority (EAEA),13759 Abu Zaabal, Egypt.

E-mail: Talaatsalah2002@yahoo.com

ABSTRACT

Naturally Occurring Radioactive material (NORM) was detected in the waste of several petroleum companies. In Egypt, Exemption levels for Radioactivity in materials were reported in 2004 and upgraded in 2008. In the present study radiation measurements were carried out around 15 wastes NORM petroleum samples collected from several companies. Alpha particles were measured using SSNTD, Beta particles and Gamma rays survey meters and radioactivity concentration were measured using gamma ray spectrometry by Mansour et al . From radiation measurements samples Results indicated that 60% of the samples are not exempted from regulatory control.
P. III – 8. Characterization of Solid/Liquid Waste Samples Produced from Oil Production Fields

M.E.M. Amin¹, Y.M. Abass¹, M.A.M. Gomaa², A.I. Helal² and H.S. Eissa²

¹Physics Department, Faculty of Science, Suez Canal University, Egypt.
²Nuclear Research Centre, Atomic Energy Authority, Egypt.

ABSTRACT

The purpose of this study is to present a radiometric, mineralogical and elemental characterization of solid/liquid waste samples produced through oil production process. Alkaline earth elements, O, S, Fe, Zn and Ti were the major constituents in samples. Mineralogical analysis showed that natural radionuclides are co-precipitated with alkaline earth metals and some quantities of lead as sulphates, carbonates and silicates. Radiometric analysis was performed using HPGe detector. Mean natural activity concentrations of $^{238}$U and $^{232}$Th series and $^{40}$K, in solid waste samples, ranged from 51 to 1.2 kBq/kg, from 2 to 0.8 kBq/kg and from 1.5 to 0.2 kBq/kg, respectively. Results obtained are discussed and compared to the national and international exemption levels and those from other studies.
Tuesday

23/2/2016
Tuesday 23/2/2016
Hall (A)

Reporters:
Prof. Dr. A. I. Helal
Prof. Dr. A. H. Ashour
Dr. S. M. El-Marakby
Dr. S. Salama

17- Milestones in the History of Atomic Energy in Egypt (In Arabic) 9:00-11:00 am:

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<td>علامات مضيئة في المسيرة العلمية للطاقة الذرية المصرية من 1955 حتي الآن (باللغة العربية)</td>
<td>مقرر الجلسة أ/د/ هشام فؤاد علي</td>
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Hall (A)

11:00 – 1:00 Closing Ceremony