

8th Environmental Physics Conference

23-26 Sept. 2018
Marsa Matrouh, Egypt

8th Environmental Physics Conference

EPC' 18

Scientific Sessions

Sunday, 23 Sept. 2018

7:00 - 7:30 Cairo Registration
13:30 - 18:00 Marsa Matrouh Registration
16:30 - 18:00 Session OS / Oral-1

Monday, 24 Sept. 2018

9:30 - 11:00 Session Oral-2
11:30 - 13:00 Session KN
14:00 - 15:30 Session Oral-3
15:30 - 17:00 Session Poster

Tuesday, 25 Sept. 2018

11:30 - 13:00 Session Oral-4

Wednesday, 26 Sept. 2018

9:30 - 11:00 Session RT
11:30 - 11:45 Session CS

Book of Abstracts

September 2018

EPC' 18

Conference Abstracts Arranged by Receiving Date

1- MULTI-ELEMENTAL ANALYSIS AND EQUIDOSIMETRIC EVALUATION OF INHALED AIRBORNE DUST

Atef El-Taher

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A total of 15 dust samples were collected and analyzed by means of different analytical techniques. The concentrations of 42 elements and 11 oxides were measured, the obtained results were compared and enrichment factors were calculated for the obtained elements. The concentrations of the elements were lower than those compared, with an exception for Br, Zr, Hf, As, and Sb. Principal component analysis was carried out for enriched elements to extract three factors; the main contribution was provided by Br and the most enriched elements were As, Br, Zr, Sb, and Hf. In terms of a better understanding the equidosimetric evaluation, the chemical daily intake of selected elements namely, Cr, Co, Ni, Cu, Zn, and Pb and the associated carcinogenic hazard risk *CR* and hazard quotient *HQ* via inhalation were calculated. Further, the annual committed effective dose *ACED* and related excess lifetime cancer risk *ELCR* were calculated. The results of risk calculations revealed that there is no significant hazards due to the inhalation of dust from the point of view of toxicity of the selected elements. Contrariwise, considerable values of risk calculations from the inhaled contaminated dust with Th and U were found. Accordingly, the contaminated dust poses an extent health hazard from the radiological point of view and reaffirms a growing conclusion that there is an inverse relationship between the grain size of dust and the radioactivity concentration

Keywords: Major and trace elements/ enrichment factor/ Equidosimetric evaluation/ dust.

2- ANALYSIS OF CREEP BEHAVIOUR OF WELDED JOINTS OF P91 STEEL AT 600°C

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The martensitic P91 steel (9Cr-1Mo-V-Nb) has been developed for ultra- supercritical pressure application in steam power plants. The creep rupture strength of the welded joint of this steel is limited by the fine-grained region of its heat affected zone (HAZ). The factors which result in the reduction of the creep rupture strength of the fine-grained region of HAZ were discussed. It was found that the most effective factor reducing the creep rupture strength of the fine-grained region of the HAZ of the welded joint of P91 steel, in comparison with other regions of the welded joint, is the finer prior austenite grain size. These fine prior austenite grains of the fine-grained region of the HAZ accelerate the rate of growth of martensite lath subgrains which results in a softer martensite matrix. The minimum creep rate dependence on applied stress for base metal, welded joints and the samples simulating the fine-grained region of the welded joints was described by Norton's power law equation in the stress range 70-150 MPa with stress exponent higher than one in all conditions. This gives an indication that the steady state creep deformation in the welded joints is controlled by dislocation climb.

3- RECENT DESIGN CONCEPTS OF ONSHORE AND OFFSHORE NUCLEAR POWER PLANTS

M.A.Z. Farahat

Nuclear and Radiological Regulatory Authority, Cairo, Egypt

(Abstract not available)

4- ENVIRONMENTAL IMPACTS OF MOLTEN SALT REACTORS Badawy Mahmoud Elsheikh

Egyptian Nuclear and Radiological Regulatory Authority Cairo, Egypt

Nuclear power reactors have different types of radioactive waste, solid, gaseous and liquid that may impact the environment. The Molten salt reactor MSR one of the most promising important reactors of IV generation and its environmental impacts in comparable to others conventional reactors is a one of its important advantages. This research discusses and highlights this characteristic of the molten salt reactor that is distinguished from other solid reactors.

5- CONSTRUCTION AND EXECUTION QUALITIES OF A NOVEL COATED WIRE POTENTIOMETRIC SENSOR FOR SELECTIVE DETERMINATION OF MN (II) IONS IN VARIOUS AUTHENTIC SAMPLES

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In this article, a novel solid state coated wire ion selective electrode based on synthesized Schiff base N-salicylidene-o-aminophenol as a new ionophore for selective determination of manganese ions is described. This sensor has a wide linear range of concentration (1.0×10^{-7} – 1.0×10^{-1} mol L⁻¹) and a low detection limit of 1×10^{-7} mol L⁻¹ of Mn(II) ions. It has a Nernstian response with slope of 30.17 ± 0.1 mVdecade⁻¹ and it is applicable in the pH range of 2.0–8.0 without any divergence in potential. The coated electrode has a short response time of 5 s and is stable at least for 70 days. The electrode shows a good selectivity for Mn(II) ion toward a wide variety of metal ions. Effect of various plasticizers; tricresylphosphate (TCP), dioctylsebacate (DOS), dibutylphthalate (DBP), o-nitrophenyloctylether (o-NPOE) and dioctylphthalate (DOP) had been studied. The membrane with a composition of ionophore: NaTPB: PVC : o-NPOE (w/w, mg) in the ratio of 7 : 3 : 30 : 60 exhibited best performance. The selectivity coefficients

determined by using match potential method (MPM) and separate solution method (SSM) indicated high selectivity for Mn(II). The proposed sensor was successfully applied for the determination of Mn(II) ions in different real samples. Theoretical calculations also supported the complexation behavior of Mn (II) ions with N-salicylidene-o-aminophenol.

Keywords: Solid state coated wire electrode, manganese (II) determination, N-salicylidene-o-aminophenol, potentiometric measurement. Schiff base

6- BIOLOGICAL TREATMENT OF WASTEWATER CONTAMINATED WITH Cu(II), Fe(II) AND Mn(II) USING LUDWIGIA STOLONIFERA AQUATIC PLANT

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The liberation of metals into aquatic ecosystems is currently a significant issue in developing countries as a result of many industrial applications. Soil and water pollution due to metals is a main environmental problem, and most traditional treatment approaches do not achieve acceptable results of high efficiency and low cost. Plants have the ability to stabilize metals at a reduced cost. Aquatic plants are being applied successfully for remediation of hazardous elements present in industrial wastewater. This study investigates the capability of the wetland macrophyte, *Ludwigia stolonifera*, in taking up and accumulation of three metal species (Cu, Fe and Mn) dissolved in water to simulate the wastewater released from industrial activities. The treatment processed for 100 ppm of Cu, Fe and Mn resulted in efficient accumulation of about 86%, 74%, 93% for the three metals respectively after four days. *Ludwigia stolonifera* was exposed to different environmental conditions such as acidity, darkness and high metal concentration with an acceptable outcome. The data obtained in this study explained that *Ludwigia stolonifera* is a highly potential agent for purification of wastewater contaminated by metals.

7-

REDUCING ENVIRONMENTAL IMPACTS OF URBANIZATION THROUGH VERTICAL LIVING WALLS

Samia Wafik Morsy

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The increase in population consequently results in the increase in the number of buildings. If also plantation gets neglected the result is a decrease in oxygen in urban areas. Urban developers, architects and landscapers have a role to play to increase oxygen through planting green areas in urban areas. Buildings, columns of bridges, can house vertical gardens or living walls on their facades. However, the process is costly in terms of water consumption and can create filtration problems if not properly erected. Improving its function can encourage its application in a country like Egypt. Also it can cover the facades of power buildings and auxiliary buildings around nuclear power plants. This work discusses the practicality of the application and its advantages and disadvantages.

Keywords: Vertical gardens, living walls, power buildings, oxygen, auxiliary buildings around nuclear power plants.

8-

PROPOSAL FOR ESTIMATING THE IMPACT OF QUANTUM COMPUTATION ON ENVIRONMENTAL EVALUATION

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Environmental evaluation is performed through three primary scientific tools which are (i) direct field observations; (ii) laboratory scale tests and physical modeling studies; and, (iii) mathematical modeling. Now days both of physical modeling and mathematical modeling are performed by computer programs. For some cases these programs takes several days or may be several weeks to accomplish the required modeling. These programs are working according to a classical computation via classical computer. If these programs are working according to a quantum computation via quantum computer then they will have significant advantage in terms of speed over the classical computation. Quantum computation also significantly speeds up the database search algorithm, which is important in

computer science because it comes as a subroutine in many important algorithms. Quantum database search of Grover achieves the task of finding the target element in an unsorted database in a time quadratically faster than the classical computer. In this work we review the quantum computation, estimate the impact of quantum computation on environmental evaluation. The estimated impact shows speeding up the environmental evaluation by about hundreds times then classical computation.

Keywords: Quantum computation; Environmental evaluation.

9-

THE ENVIRONMENTAL IMPACTS OF ENERGY INSTALLATIONS

M.N.H. Comsan

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Energy is vital for the development of society and an essential element for meeting the challenges of sustainable development. Electricity is the cleanest form of energy. It can be easily transmitted through vast distances, and used whenever and wherever deems needed. However, it is nearly impossible to produce, transport, or consume energy without significant environmental impact. Thus, before reaching its end-use energy entails the consumption of natural resources, emissions that directly and indirectly generate a number of global and local impacts. These include air pollution, water pollution, thermal pollution, generation of conventional and nuclear waste, and finally, the installation of infrastructures that have effects on certain natural spaces and on the flora and fauna of the area. The type and severity of these environmental impacts can vary depending on the type of energy technology and its energy generating capacity. Combustion of fossil fuels such as coal, oil, and natural gas accounts for the worst of these impacts through harmful green house emissions and toxic pollution; it is responsible for the emission of air pollutants - the major cause of urban air pollution.

The article aims at discussing the environmental impacts associated with some energy installations.

Keywords: Energy, electricity, sustainable development, environmental impact, pollution, emissions, climate change.

**10-
THE EFFECT OF RADIATION ENVIRONMENT ON ELECTRICAL
INSULATION MATERIALS**

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Ultra Violet radiation (UV) is the major factor that has serious effects on degradation of electrical insulators. Radiation sources of UV are mainly Sun's rays, corona partial discharge formation and dry band arc discharge on the surface of the insulation that cause tracking and erosion phenomena. The effect of Ultra violet emission on the insulator surface flashover in presence of contamination has been presented. As UV sources, a special setup to simulate the UV rays of corona and dry band arcing and a Xenon-arc-lamps light to simulate the sunlight have been used. Artificial weathering has been made under controlled temperature and humidity. A light source less than 400 nm wavelength, producing more than 90% of the daylight spectrum has been used. Results show that the flashover voltages and the hydrophobicity of aged insulators decrease as the UV exposure time increases for different levels of moisture and pollution. The other characteristic that is important for monitoring the condition of insulators is the Leakage Current (LC). The harmonic of the LC for three distinct cases has been evaluated. The cases are: without arc (nominal voltage), the second is in presence of dry band arcing and corona discharge and the third is continuous arc.

**11-
THE DESIGN REQUIREMENTS OF SAFETY AND SUSTAINABLE
DEVELOPMENT IN NUCLEAR INSTALLATIONS**

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The main purpose of this study is to highlight the strong connection between nuclear installations and economic development, taking environmental resources into consideration to achieve the concept of the sustainable development.

The study also aims to show that the safe design means the integration of hazard identification, risk assessment and control methods early in the design process to eliminate or, minimize risks to health and safety throughout the life of the product being designed.

The safe design of a building is always a part of a wider set of design objectives, including aesthetics, cost and functionality. These competing objectives sometimes need to be balanced in a manner that does not compromise the health and safety of those who work on or use the building or structure over its life.

So it is important to ensure that a design of multilevel (defense in depth) system of sequential, independent provisions for protection and safety is commensurate with the likelihood and the magnitude of the potential exposures resulting from sources.

**12-
STUDY OF GAMMA IRRADIATED HIGH DENSITY
POLYETHYLENE/CARBON BLACK COMPOSITE AND ITS
DURABILITY AS GEOMEMBRANE**

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The aging and degradation of local product of High Density Polyethylene loaded with 2.5% of Carbon Black content (HDPE/CB) composites are studied experimentally for the purpose of radiation safety applications. The effect of different \square - irradiation doses in air on the mechanical properties such as strain and elongation at break, and tear resistance has been investigated. Morphological studies using scanning electron microscope (SEM) showed the surface fracture of Carbon Black-filled HDPE composites for unirradiated and irradiated samples. Among various uses of HDPE/CB composites, sheets are liners of dumps used to dispose intermily for low and medium Level Waste of NORM^s and TE NORM^s. HDPE geomembrane liners are working in their desired function and performance under exposed environmental condition.

**13-
RISK ASSESSMENT FOR OCCUPATIONAL POTENTIAL
EXPOSURE AT COBALT TELE-THERAPY UNITS**

**A.S. Darrar¹, R.M.M. Mahmoud¹, M.R. Ezz El-Din¹, A.M.Khalaf² and
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reported

Role of radioprotectors in inhibition of DNA damages and enhancement of DNA repair after radiation exposure: Alpha tocopherol monoglucoside (TMG), Baicalein, Caffeine, Chlorophyllin, Ferulic acid, Troxerutin, Vanillin and Mentha piperita.

Future prospects for radioprotectors in mitigation of radiation damage and Radioprotective Gene Therapy

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CLIMATIC CHANGE (IN ARABIC)

Ferdous bint Saud Alsaleh

Member of Saudi Shoura Council, Kingdom of Saudi Arabia

التغير المناخي

ا. د. فردوس بنت سعود الصالح

أستاذ الفيزياء النووية

عضو مجلس الشورى السعودي

تغير المناخ مشكلة معقدة ، فمع أنها مشكلة ذات طابع بيئي . إلا أن لها آثار على جميع المجالات ، فهي إما تؤثر في قضايا عالمية – أو تتأثر بها – بما فيها الفقر، والتنمية الاقتصادية، والنمو السكاني، والتنمية المستدامة وإدارة الموارد. فتغير المناخ يمثل تحدياً لإدارة المخاطر .

يمكن تلخيص بعض التغيرات المناخية خلال السنوات الحالية :

. ارتفاع درجات الحرارة ، ارتفاع لمعدل مستوى البحار ، زيادة في الظواهر المناخية الحادة .

وهذه لها عواقب و تأثيرات بيئية و اقتصادية سلبية .

فما هو السبب و ما يجب علينا فعله ؟

الأسباب:

• النشاط البشري ، نشاط طبيعي.

الاحتباس الحراري (Global warming) هو ازدياد درجة الحرارة السطحية المتوسطة في العالم مع زيادة كمية الغازات الدفيئة والتي تساهم في تدفئة جو الأرض السطحي .

و يمكن للتخفيف من حدة تغير المناخ خفض المخاطر . إحدى الرسائل الرئيسية التي قدمت هي : التخفيف مع تغير المناخ و التخفيف من حدته و يكمل كل منهما الآخر . و من التحديات الحقيقية التي نواجهها هو أن التخفيف و التخفيف من حدة تغير المناخ لا يسيران بوتيرة واحدة .

أنشأت المنظمة العالمية للأرصاد الجوية وبرنامج الأمم المتحدة للبيئة في عام 1988 الهيئة الحكومية الدولية المعنية بتغير المناخ (Intergovernmental Panel on Climate Change) كي تزود مقرري السياسات بتقييمات منتظمة للأساس العلمي لتغير المناخ، وآثاره ومخاطره في المستقبل، وخيارات التكيف والتخفيف.

بعد إقرار المجتمع الدولي اتفاق باريس للتصدي للاحتباس الحراري عام 2015 اتفقوا على بعض السياسات لخفض انبعاث الغازات الدفيئة.

تأثير الإنسان على المناخ واضح . وكلما طال انتظارنا ؛ بات التصدي للمشكلة أصعب . فتأثيرات تغير المناخ صارت بالفعل واسعة الانتشار و متتابعة . لذا علينا إن نختار : فإما أن نواصل السير

The occupational potential exposure risk that may be initiated due to source stuck event in Cobalt-60 teletherapy irradiation facility was estimated. The event consequences were evaluated by measuring the occupational absorbed dose during the event response. Sets of Thermo Luminescent Dosimeters were placed at different positions corresponding to operator locations while performing event response procedure. The risk was estimated quantitatively and qualitatively using probabilistic safety assessment and risk matrix methods respectively. Both of the two methods give low and accepted risk as a result of several safety barriers in the facility design and low event consequences. The results shows that it was recommended in the future to use risk matrix method in risk analysis for Cobalt-60 Tele-therapy as an essential stage of safety assessment process for licensing /renewal decision making.

Keywords: Probabilistic Safety Assessment (PSA), Risk Matrix Method, Co-60 teletherapy unit.

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NATURAL RADIOPROTECTORS TO MITIGATE THE RADIATION EFFECTS ON RADIOTHERAPY PATIENTS AND RADIATION WORKERS

Mahmoud Hassan Shabon

Nuclear and Radiological Regulatory Authority, Cairo, Egypt

Radioprotectors are compounds that are designed to reduce the damage in normal tissues caused by radiation. These compounds are often antioxidants and must be present before or at the time of radiation for their effectiveness. Other agents, termed mitigators, may be used to minimize toxicity even after radiation has been delivered.

Radiosensitivity is defined as the relative response of different types of cells, tissues and organs in biological system to a given radiation dose with a particular LET value considering all other factors to be the same.

Three main categories of factors that affect the radiosensitivity of biological system: Physical, Biological and Chemical Factors.

Classification of radioprotective agents Prophylactic, Mitigator and Therapeutic agents. Radioprotection Mechanisms: Free radical scavenger, Formation of mixed disulfides,

Binding of aminothiols and disulfides to DNA, Modification of ionizing radiation-induced damage and other radioprotective mechanisms have been

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Conference Timetable

Time	Sun., 23 Sept.	Time	Mon., 24 Sept.	Tue., 25 Sept.	Wed., 26 Sept.
7:00-	AEA Site, Nasr City	9:30 11:00	Oral-2	Free Morning	RT
7:00- 7:30	Cairo Registration	11:00 11:30	Break	Break	Break
7:30	Departure	11:30 13:00	KN	Oral-4	CS
13:30	Arrival Marsa	13:00 -	Break	Break	12:30 Departure (Bus to Cairo)
13:30 -	Hotel Accommo	14:00 -	Oral-3	Free	
16:00		15:30		Afternoon	
16:30 -	OS/ Oral-1	15:30 -	Poster		Cairo Arrival
18:00		17:00			
19:00 -	Free Evening		Cult Evening	Cult Evening	
22:00					

Programme abbreviations:

OS	Opening Session	Poster	Poster Session
KN	Keynote Talks	RT	Round Table
Oral	Oral Session	CS	Closing Session

المؤتمر الثامن للفيزياء البيئية

26-23 سبتمبر 2018
مرسى مطروح - جمهورية مصر العربية

كتاب المحاضرات

سبتمبر 2018