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INDC INTERNATIONAL NUCLEAR DATA COMMITTEE

TEHRAN UNIVERSITY NUCLEAR CENTRE

REPORT OF RESEARCH AND EDUCATIONAL ACTIVITIES

1971 - 1973

Vienna, August 1975

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C O N T E N T

INTRODUCTION

Tehran University Nuclear centre (T.U.N.C) was established in 1959 in order to supply and develope means to utilize this important and new form of energy, i.e. Nuclear energy, in various fields, such as science, Agriculture, Medicine and industry.

T.U.N.C., is functionally administered by a Directorate, assisted by advisory and coordinating committees. Its budget which includes the salary of the employees, expenses for performing research activities, and other educational and laboratory expenses is included in the Tehran University budget. There are a total of 40 scientists in T.U.N.C all - with doctoral degree from abroad. Major research Facilities at T.U.N.C. include a 5 M.W. pool type research reactor, a 3 MeV. Van De Graaf, a 6000 curies cobalt source and research laboratories such as: Nuclear physics, Nuclear Electronics, Radiochemistry, Activation Analysis, Radiobiology, Food preservation and Carbon Dating.

ACTIVITIES

A-EDUCATION

1- Academie Courses:

a) Participation in teaching graduate and under granduate courses at different colleges in Tehran University.

b) Master of Science degree in Nuclear Science in three different majors of Nuclear physics, Nuclear chemistry and Radiobiology with cooperation

of Science Faculty, Tehran University.

c) Master of public Health degree in Health physics with cooperation of Faculty of Public Health of Tehran University and World Health Organization.

2- Training Courses

Tehran University Nuclear centre organizes annually a Radioisotope course to familiarize participants from Tehran University and other national organizations on the use of radioisotopes in Science, Industry, Agriculture and Medicine. Special Courses in Health physics and radiation protection are held regularly in T.U.N.C.

International and regional courses are also organized at T.U.N.C with assistance of such organization as International Atomic Energy Agency, Food and Agricultural organization, World Health Organization and Central Treaty Organization.

Name of the course & seminar and symposium	Date	No. of participants
1- Ninth Radioisotope course.	29 May 29 June 1971.	22
2- Second course in Health physics.	3 Oct.-7 Nov. 1971.	23
3- Seminar on utilization of nuclear power reactor in Iran	11-14 Dec. 1972	60
4- IAEA. International Symposium on irradiation facilities for research reactors.	6 10 Nov. 1972	110 (24 countries).
5- Training course for adminestration Staff of Nuclear Power Reactor.	23 Dec. 1972 -6 Jan. 1973	8
6- Training course for technical Staff of Nuclear Power Reactor.	23 Dec. 1972 -10 Jan. 1973	14
7- Tenth Radioisotope course.	20 May-15 June 1973.	21
8- First Advanced course in Health physics.	8 May-8 June 1973.	18
9- Eleventh Radioisotope course	9 June-9 July 1973.	21

B-SERVICES:

This includes services in radiation protection (film badge, dosimetry, area monitoring, repaire of electronic equipments and consultation and assistance to various institutions to train their adminestrators and emplyees in the use and safe handling of radioactive materials. This activity is presented by T.U.N.C. on request of any organization in need of it.

C-RESEARCH:

The research projects at T.U.N.C are conducted in the various research section of the centre. Following are the titles of research projects which are being carried out at present.

1- Reactor power measurement using N-16 Activity.

2- Reactor power measurement using fluctuations of the neutron detector.

3- Neutron spectrum measurement in TURR core and at beam port D.

4- Track recording of charged particles in organic materials.

5- Construction of wire scanning system and thermal neutron flux distribution measurement using DY-Al and gold foils.

6- Investigation on abration of piston rings using Iranian motor oils.

7- Radiation damage, by proton, on ionic crystals.

8- Study of Colour Centres in γ-irradiated monocrystal of BaClF.

9- Radioisotope production and Quality Control.

10- γ-Ray Polymerization of methacrylic acid in Presence of water and N.N. dimethyl formamide.

11- Grafting of acrylic acid onto polyvinyl chloride by direct radiation methods.

12- Preparation of wood polymer composite by ionzing radiation.

13- Uranium and Thorium measurement in Iranian rocks.

14- Trace elements in archeological samples measured by activation analysis technique.

15- Radiocarbon dating of archaeological samples .

16- Measurement of radionucleides and trace elements in Iranian sea Water.

17- Non destructive neutron activation analysis of atmosphere pollutants utilizing Ge-(Li)-γ-ray detectors.

18- Measurement of trace elements in Iranian cigarett smokes by neutron activation analysis.

19- Dosimetry of Natural radioelements in the air.

20- Determination of Iodine in eggs by neutron activation analysis and study of possibility to increase iodine in egg by nutrition behavior.

21- Radiation effects on amino acids and peptides.

22- Effect of cyclohexamide on Salt uptake.

23- Effect of different levels of phosphours on salt tolerance in Iranian varieties of barley.

24- Chemical analysis of Iranian Caviar.

25- Pasteurization of Salmonella and E. Coli contaminated caviar by γ-radiation.

List of The papers published by T.U.N.C. Academic Staff

1971 - 1973

A-PHYSICS:

1- B. Parsa, A. Ashari, L. Goolvard, and Y.M. Nobar, 1971 Decay Scheme of 2.7th ^{92}Sr, "Nuclear physics, A125, 629-640.

ABSTRACT:

Gamma rays emitted in the decay of 2.71 h ^{92}Sr have investigated with a Ge(Li) detector. Sources were prepared by Separating Sr from fission products. A total of 10 γ-rays were attributed to the decay of ^{92}Sr in a complex spectra with interferences from ^{91}Sr and ^{92}Y. Gamma coincidences in the decay of ^{92}Sr were observed with a NaI(Tl)-Ge(Li)- setup. The decay scheme of ^{92}Y excited states at 241.4, 892.8, 953.3 and 1383.9 KeV. The observed level structure is compared with previously reported predictions based on effective interaction calculations. The value for the half-life of ^{92}Sr was determined to be 2.71 ± 0.01 h.

RADIOACTIVITY ^{92}Sr (from ^{235}U (n, fission); measured $E_{\gamma\gamma}$, γγ coin, $T_{1/2}$ deduced log ft. ^{92}Y deduced levels, J.X. Ge(Li) and NaI(Tl) detectors.

2- M. Yuste, M. Rahmani, D. Jumeau. L. Taurel and J. Badoz, 1973, "E.S.R. Study of U_2 Centres in Ba CLF". J. Phys. C. Solid State phys., 6, 3167-3173.

ABSTRACT:

An X Irradiation, at 78 K, of a BaClF crystal containing OH^- ions leads to the formation of hydrogen atoms in interstitial sites (H_1^o or U_2

centres) thermally stable below T ~100K. The magnetic properties of the U_2 centres are compared with those observed in the case of U_2 centres in NaCl crystal. The thermal stability is studied and compared with those of the U_2 and $U_3(H_3^o)$ centres in NaCl.

3- M. Rahmani, "Etude des Centres Colores qui apparaissent dans le mono cristal de BaCLF irradie aux rayons - X a 295° K et de leurs Cinetiques de formation", 1973, Bull. Faculty of Science, Tehran Univ. Vol 4, No. 5

RESUME:

Les bandes fines a 308 nm et 288 nm dans le cristal non irradie sont les resultats des transitions excitoniques des impuretes OH^-.

Dans le cristal irradie a 295°K, la bande a 550 nm et la bande double a 440 nm mesurees a 78°K sont attribuable respectivement aux centres $F(F^-)$ et $F(Cl^-)$.

La cinotique de formation des centres $F(F^-)$ est plus grande que celle de $F(Cl^-)$.

B. Nuclear Technology

1- A. Afshar -Bakeshloo, 1971,"prospect, of Nuclear power plant in Iran" Economic Integration of Nuclear power Station in Electrical power Systems, 619, IAEA, Vienna.

ABSTRACT:

Iran, with an area of 1,65 million Km^2 and a population of about 26.5 million, is very rich in fossil-fuel resources. The total amount of oil, natural gas, and coal reserves in the country are estimated to be approximately 6000 million tons, 300 trillion ft^3, and 100 million tons, respectively. The potential hydro power is estimated at about 30 billion KWh/yr. In addition, because of the suitable latitude in south Iran, there is the possibility of using solar energy. Promising uranium are deposits are also reported in some parts of Iran. Because Iran has had no need for nuclear raw materials, prospection has proceeded rather slowly. Thus information about the uranium resources of the country is very limited at present. However, in a country such as Iran, which is undergoing a process of rapid industrialization, both future demand and supply of power are subject to wide uncertainties. So the forecast of power demand and supply vary within much wider limits than in highly - industrialized countries. The electrical utility in Iran is under the Government. The country is divided into 10 electrical zones, each supplied by several units At the end of 1969 the total installed capacity was 1313 MW(e).

Details of the forcast future power demand and type of units for all the zones for 20 years (up to 1987) are presented. Net generation is expected to be 9574 MW(e) in 1987. This figure reflects the development of industry according to Government plans. The estimated specifications for the required stations are included. Figures are given for the energy exchange between the electrical zones. Also, price information on oil and coal are presented. The existing percentages of total capacity in hydroelectric (35%), steam (33%), diesel (22%) and natural gas (10%) power stations will be by 1987 respectively 68%, 25%, nil and 7%. Recently, the Government has been interested in studying the economic feasibility of nuclear power for the future in Iran. This subject is under study, but the paper gives some very preliminary estimates of the probable size of a nuclear power plant. It is concluded that a UNIT of 500 MW(e) nuclear power would be desirable in 1980 for an area that is far away from the fuel resources and also close to the industrial load centre.

2- A. Afshar-Bakeshloo, N.Farivar-Sadri. H. Panahandeh. H. Parnianpour, A. Pazirandeh, M. Sarram, 1972, "Peaceful uses of Nuclear Energy and prospects of Nuclear power in Iran", Peaceful uses of Atomic Inergy, Vol. 6, 455 IAEA, Vienna.

ABSTRACT:

The first step towards the utilization of nuclear energy for peaceful purposes was initiated by the establishment of the Tehran University Nuclear Center. The 5-MW research reactor at Tehran University went cirtical in November 1967 and has been fully operational since May 1970.

The research reactor is used for research and educational purposes and also for the production of radioisotopes. At present, the main emphasis in peaceful uses of nuclear energy in Iran is put on the utilization of nuclear power plants for production of electricity; therefore this paper will deal with this subject.

Iran, with an area of 1.65 million square kilometers and a population of about 29 million, is very rich in fossil fuel resources. The estimated resources of oil, natural gas, and coal in the country are approximately 70×10^9 barrels, 214×10^{12} ft^3, and 4.55×10^9 tons, respectively. Information regarding the price of oil, gas, and coal is presented. Hydro potential is also estimated to be about 30×10^9 KWh/yR.

Due to a suitable latitude in the south of Iran, there is the possibility of utilizing solar energy; uranium ore deposits have been reported in some parts of the country. Because Iran has had no need for nuclear raw materials, prospecting has proceeded rather slowly. Thus, information about the uranium resources in the country is very limited at the moment. However, in a country such as Iran, which is undergoing a process of rapid industrialization, both future demand and supply of power are subject to wide uncertainties.

Iran is divided into 10 electrical zones, each one supplied by several units. At the end of September 1970, the total installed capcity was 1330 MW(e). Forecast details for the future power demand for the type of units for the period up to 1987 are presented. Net generated - power in 1987 is expected to be 9547 MW(e). This figure reflects, to large extent, the country's industrial development according to Government plans. The distribution of the total existing electric power stations is 35% hydro, 33% steam, 22% diesel, and 10% gas. The repective figures for 1987 are predicted to be 68, 25, 0 and 7%.

Recently the Government initiated a feasibility study for utilization of nuclear power for future energy demands. A very preliminary study has shown that a 500-MW(e) nuclear power plant would be desirable in about 1980.

3- M. Sarram and N. Farivar - Sadri, 1973, "Irradiation Facilities at the Tehran University Resarch Reactor", Irradian Facilities for Research Reactors,385, IAEA, Vienna.

ABSTRACT;

IRRADIATION FACILITIES AT THE TEHRAN UNIVERSITY RESEARCH REACTOR.

The Tehran University Research Reactor is a 5-MW pool type, light-water moderated, heterogeneous solid fuel reactor. Initial criticality was achieved in Novembre 1967 and 5-MW operation was reached in January 1968.

The reactor, being a typical research reactor, has the standard experimental and irradiation facilities such as beam tubes, thermal column, pneumatic rabbit system. In addition, the reactor has a dry gamma room and dry neutron irradiation chamber. The design features of thes irradiation facilities are presented in detail. In addition, the installation of various experimental facilities which are under study are discussed.

4- M. Sarram, 1973, "The Current Safety philosophies for Design and Operation of Nuclear power plants", Principles and standards of Reactor Safety, IAEA - SM - 169/1.

ABSTRACT:

Experience has shown that the current safety philosophies practised in the design of nuclear power plants and their operations are - more than adequate; however one must always plan for a dditional safety measures. One of the main problems to be considered in evaluating the safety of a power plant is the reactor structural design, in particular the containment. The current containment systems constructed for thermal power plants may be classified as pressure containment, and multiple containment systems. Salient design features of the multiple containment system and its safety philosophies are presented. Another main problem encountered in the design of power plants is the philosophy of secondary safety systems. The importance of a secondary safety system such as - emergency cooling comes into the picture when one considers the following figures for energy releases in a typical PWR, 185 MW(e), Maximum Hypothetical Accident, with 20% concept of stretch; nuclear excursion: $2X10^7$ Btu, chemical reactions: 10^7 Btu, decay heat:

$3X10^7$ Btu and stored energy in coolant: 10^8 Btu, which is an order of magnitude higher than others. The paper also presents other standard limits for risk evaluation, safety measures to be used for design of nuclear power plants.

5- H. Karami and A. Afshar-Bakeshllo, 1970,"The Age of ^{241} Am-Be Neutrons in H_2O", Bulletin of Tehran University Nuclear Center, Vol 2, No. 1.

ABSTRACT:

The neutron age for non-fision source^{241} Am-Be neutrons was measured in H2O. The age was evaluated from the second moment of the slowing down distribution at the 1.458 ev. resonance of Indium and then the value of for termal neutrons (%25 eV) are abtained. The age is found to be 97.8 Cm^2.

6- M.R. Hamidian and A. Pazirandeh, 1973, "Gamma Dosimetry in the Tehran University Research Reactor Core."Atomkern Energie, Vol. 22, 67-68.

ABSTRACT:

The Radio-photo-Luminescence (RPL) property of some materials can be utilized for dosimetry purposes. In the present work the FD-R1-1 glass dosimeter, 1 mm diameter and 6 mm long made by Toshiba was used. First the glass dosimeter was calibrated using Victoreen Chamber.

The neutron sensitivity of dosimeter was determined by using dysprosium foil, for absolute flux measurement, and covered glasses with Cd and Sn the sensitivity was determined to be 1 rem=10^9 n $Cm^{-2}S^{-1}$.

The heating up the dosimeter up to 400 ^{o}C was studied and the sensitivity of heated and unheated glasses are compared. The experimental resuls show that the FD-R1-1 glass loses about 10% of its dose after 10 minutes being at 200 ^{o}C, about 50% at 320 ^{o}C and 100% at 400 ^{o}C for the same heating time.

The sensitivity of the fission chamber, used for start-up the reactor, to gamma was studied. Experimental results show that the fission neutrons, travelled 30 cm in water.

Gamma dose distribution inside the fuel element of the reactor during operation and shut down was studied and compared to the neutron flux distribution.

7- A. PAZIRANDEH, and C.B. Besant 1973, "Measurement of Fission Ratios in zero Power Reactors" British Nuclear Energy Society II, 377.

ABSTRACT:

Fission rate ratios of ^{238}U relative to ^{235}U have been measured in the University of London reactor CONSORT by detecting the fission product gamma activity from irradiated uranium foils. It was necessary to utilize a time-dependent calibration factor to relate the gamma activity ratio to the true fission ratio. Possible systematic errors in the technique have been investigated in detail. The technique has been used by other laboratories for measurements in fast reactors and so the neutron spectrum dependence of parameters, such as the time-dependent calibration factor, has been examined.

It has been found that the calibration factor can change by 6% in going from a typical thermal reactor spectrum to a typical fast reactor spectrum. The overall systematic error in fission rate measurements has been reduced to 1.5%. Comparisons between experimental $^{238}U/235_U$ fission ratios and predictions using the GMS-I code have also been made.

8- M. Kasari, H. Panahandeh, A. Pazirandeh and S. Bozorg- Cami, 1973, "Farah-Abad gas line test using a radionuclide". Kerntechnik, 9,424-425.

ABSTRACT:

The test was carried out successfuly and no obstraction was - found in the pipe. This experiment shows that this type of non-destructive testing is very cheap and fast and can be utilized in many similar cases.

9- Y.M. Nobar, Dj. Moghimi, and Z. Breezinski, "A New Solid State Safety Amplifier For Reactor Control", Accepted by Kerntecknik.

ABSTRACT:

A new transistorized safety amplifier has been designed and constructed for the T.U.N.C. research reactor. The new unit will replace the present one using vacuum tubes and relays. The input signals for the safety amplifier come from two ionization chambers. Each ionization chamber actuates three memory circuits which they operate under a majority voting procedure. Furthermore, each ionization chamber simultaneously actuates the memory cercuit of the other by cross coupling. Consequently, reactor scrams will mostly result from faults of nuclear origin, and not of electronic failures.

Ease of serveing, exchangeability of components, subasemblies and the suitable size are the other advantages of the new system,

10- S. Farrokhi, Dj. Moghimi, R. Nahavandi, M. Pichevar and B. Delaunay, 1972, Le van de Graaff de 3 MeV du centre Nucleaire de Tehran. B.I.S.T. Commessaria at ıa l'energie atomique. No. 172, 65-70.

ABSTRACT:

A 3 MeV horizontal van de Graaff has been installed in the Tehran Nuclear Centre.400μ A of 3 MeV hydrogen beam, 50μ A of 3 MeV proton beam, and 100μ A of 3 MeV electron beam have been obtained. This operation is briefly described.

C- Chemistry

I- M. Kasrai and A. U. Maddock, 1970, "Chemical Effects of Nuclear Transformations in Alkali Chlorides. Part II. Analytical problems with sulpur - 35 "J. Chem Soc., A 1105,

ABSTRACT:

^{35}S released in an alkali chloride matrix is present infour chemically disinguishable forms. As analytical procedure enabling one to determine their proportions is described. Evidence is given that the four products. Sulphide, thiocyanate, sulphite, and sulphate, separated in the process are derived from four different lattice entities.

2- M. Kasrai, A. U. Maddock, and J.H. Freeman, 1971, "Chemical Effects of Nuclear Transformations in Alkali Chlorides. Part III. Behaviour of Ion Implanted ^{35}S "Trans. Faraday Soc., 67, 2108.

ABSTRACT:

The valence distribution of ion implanted ^{35}S in sodium chloride has been investigated and the influences of pre-bombardment of the crystal with O,S and Cl measured. The effects of pre- or post-irradiation of the crystals with γ radiation and of thermal annealing combined with these - treatments have been examined. A small part of the ^{35}S penetrates deeply into the crystal, giving a supertail to the distribution. This phenomenon is attributed to interstitial diffusion and the valence distribution of this sulphur has been measured.

3- M. Kasrai, A.G. Maddock, and I.S. Suh, 1973, "^{35}S in Doped Alkalin Chloride; CN^-, SH^-, and $S^=$ Doping", Presented in the 7th International Hot Atom Chemistry Symposium, Julich, W. Germany Sept., 10 - 14.

ABSTRACT:

The influence of CN^-, SH^- and $S^=$ anionic doping of hydroxide-free sodium chloride on the initial distribution and the annealing characteristics of ^{35}S produced by the (n,p) reaction in the crystals has been investigated. The analytical prodedure allowing the determination of four forms of ^{35}S developed earlier has been used. The doping leads to spectacular differences in behaviour and provides further evidence of the role of V centres in the formation of the $*SO_3^=$ and $*SO_4^=$ precursors.

4- M. Kasrai and M. Raie, 1973,"The State of 35_S in Doped Crystals of Alkali Chlorides", Presented in the 7th International Hot Atom Chemistry Symposium, Julich, W. Germany, Sept. 10-14.

ABSTRACT:

It has been shown that when neutron irradiated alkali chloride crystals are dissolved in carrier solution containing CN^- ions, a fraction of ^{35}S appears as CNS^- ions. This fraction has been attributed to the presence of atomic sulphur in the lattice. In order to examine the effect of CN^- ion in the lattice, samples of potassium chloride have been doped with various concentrations of potassium cyanide. After the irradiation samples were analysed for $S^=$, CNS^-, $SO_3^=$ and $SO_4^=$.

The results show that the $SO_3^=$ and $SO_4^=$ proportions in the doped crystals are generally low (less than 10%) and as the mole fraction of CN^- ion is increased the CNS^- proportion is also increased. There is an evidence to show that not all atomic sulphur in the lattice is converted to CNS^- but some still remains as atomic. Photo and thermal annealing of doped crystals show an increase in the $S^=$ fraction mainly at the expense of the CNS^- fraction. The results of KCN doping and HCN doping have been compared. In the latter case it is presumed that an OH^- impurity is replaced by the the CN^- ion.

These results are interpreted on the basis of disappearance of usual type of V centres in the doped crystals and the formation of a new type of centres, "CN" centres, which are less oxidizing entities.

5- G. Marino, L. Valente, R.A.W. Johnstone, F. Mohammedi-Tabrizi. and G.C. Sodini, 1972, "N-Methylation of peptides", J.C.S. Chem.Comm., 357.

SUMMARY

A method for the N-methylation of peptides (amide bonds) is described and preferred conditions are suggested whereby all amino-acid

residues except arginine react without prior modification.

6- Z. Khalkhali, B. Parsa and B. Parsa, 1972, "Measurement by Non-Destructive Neutron Activation Analysis of Bromine Concentration in the Secretions of Nursing Mothers, "Nuclear Activation Techniques in the Life Sciences, IAEA-SM-157/26, 461 Vienna.

ABSTRACT:

A study was made of secretional pathways of bromine in nursing mothers. Ten nursing subjects were given a do_{se} of 0.5g Br/ 50 Kg weight, and the changes in the bromine concentration in their plasma, milk, sweat and urine were measured over a period of one week. Activation analysis of the collected samples was performed by irradiation at the Tehran University Research Reactor in a thermal flux of $2X\ 10^{13n}\ cm^{-2}s^{-1}$ for a period of 1 h. The irradiated samples were analysed by a Ge(Li) detector and an 800-channel analyser. The bromine concentration in the plasma and observed body secretions reached its maximum after 48 h. In the case of plasma it then fell giving a biological half-life of about 4 d and later levelled off to a longer decay period. Bromine concentration in urine tended to become steady after the 48-h peak. In the case of milk a sharp decline with a biological half-life of about 3 d followed the - observed peak in the second day. A similar situation was obtained with sweat where the excretion of bromine was mainly in the first few days. Measurement of bromine concentration in the plasma and body secretions various individuals revealed that those with higher standards of living had a bromine concentration about three times greater than that of people

with low living standards. This is most probably due to the different dietary conditions. It was concluded that the bromine has a cumulative effect in the body. By comparison, the tissues have a higher bromine binding capacity than the plasma components. The high rate of bromine excretion in the milk suggests a significant poisoning route in case of mothers who breast-feed their newborn infants and take bromine compounds as medication.

7- M. Razeghi and B. Parsa, 1973, "The Determination of Microimpurities in Quartz Samples by the Radioactivation Method of Analysis, "Radiochemical and Radioanalytical Letters, 13, 95,.

ABSTRACT:

Seventeen elements at trace levels have been determined by - neutron activation analysis in a quartz sample. Na, K, Sc, Mn, Fe, Co, Zr, Nb, Sb, Cs, La, Eu, Yb, Hf, Ta, Au and Th have been determined by a nondestructive technique using a high resolution Ge/Li/ detector.

8- Z. Abedinzadeh and B. Parsa, 1973, "Determination of Trace Elements in the Iranian Cigarette Tobacco by Neutron Activation Analysis, "Journal of Radioanalytical Chemistry, Vol. 14, No. 1, 139.

ABSTRACT:

The concentration of 24 trace elements in the tobacco of two different brands of Iranian cigarettes. "Zarrin" amd "Oshnoo", has been measured. by neutron activation analysis employing a high-resolution

Ge(Li) detector. These elements are: Na, K, Sc, Cr, Mn, Fe, Co, Zn, Se, Br, Rb. Ag, Sb, Cs, Ba, La, Ce, Sm, Eu, Tb, Hf, Au, Hg and Th.

9- Z. Abedinzadeh and B. Parsa, "Instrumental Neutron Activation Analysis of Iranian Wines", Bull. Faculty of Science, Tehran Univ., 42,4, No. 2.

ABSTRACT:

Instrumental neutron activation analysis employing a high-resolution lithium drifted germanium γ-ray detector has been used to identify some of the trace elements in two different brands of Iranian wine, "Velvet" and "1001". This was carried out by irradiating the wine samples in the Tehran University Research Reactor at a flux of $2X10^{13}$ $\frac{\text{neutrons}}{\text{cm}^2 - \text{Sec}}$ for - periods which ranged from 15 minutes to 4 hours. The irradiated samples were then analyzed at suitable priods with a 40 cm^3 Ge(Li) and an 800-channel analyzer. A total of 10 elements have been identified employing this technique. These include Na, K, Sc, Cr, Mn, Fe, Co, Br, Rb, and Zn.

10-B. Parsa and S.S. Markowitz, "Determination of Lead in Atomospheric Air and in Aluminum by ^{3}He-Induced Nuclear Reactions", LBL-1901, June 1973 (to be published in the Analytical Chemistry).

ABSTRACT:

Helium-3 activation analysis has been applied to develop a very sensitive means of trace lead analysis. The procedure involves the bombardment samples with ^{3}He particles to induce Pb + ^{3}He → ^{207}Po reaction on lead isotopes.

The 992-KeV γ-ray of 5.84-hr ^{207}Po is used as the "signal" for lead determination. Only milligram amounts of sample are required. The excitation function for the production of ^{207}Po from the reaction of ^{3}He with lead of natural isotopic composition is presented. If necessary, destructive analysis may be carried out, and a radiochemical separation procedure to plate polonium onto a silver foil is discussed. The accuracy of the measurement is about 3 to 5% for comparative analysis. For absolute determinations the error is estimated to be 9-12%. Under reasonable irradiation and counting conditions, the detection limit is approximately 50 pg/cm^2 corresponding to 0.5 ppb in a martrix 100 mg/cm^2 thick.

11-B. Parsa and S.S. Markowitz, "The Half-Life and the Decay Branching Ratio of ^{207}Po ", LBL-1902, June 1973, to be published in the Journal of Inorganic and Nuclear Chemistry).

ABSTRACT:

^{207}Po was produced via ^{3}He activation of lead samples. Polonium was chemically separated from the irradiated targets. Measurements were performed with Ge(Li) and surface-barrier type α counters. The decay of the 992-KeV γ-ray of ^{207}Po was followed and a half-life of 350.3 ± 4.1 min (or 5.84 ± 0.07 hrs) was obtained for ^{207}Po. The α-decay branching of ^{207}Po was measured to be 0.0210±0.0018%.

12-A. Owlya and F. Fakhr-Vaezie, 1973 "Determination of Selenium in Astragalus Sp. (by Neutron Activation Analysis). Bull. Faculty of Science, Tehran University, Vol. 5, No.2.

ABSTRACT:

A report from veterinary faculty indicated that within 15 days more than 68 sheeps were found dead by eating a plant called "Gavan". Later on, sample of this plant was sent to T.U.N.C. for analysis. Clinical evidence showed that the poisening has been possibly due to the presence of selenium in plant. This element could not be determined by chemical method, because of its low concentration in the sample. Activation analysis technique which is a very sensitive method for the determination of trace elements in biological and nonbiological materials is being used for this study.

In this work this particular element was determined in the - sample by nondestructive neutron activation analysis, using a high resolution Ge(Li) detector. After a decay period of one month radionucleids with short and intermediate half lives die out. Then photopeaks of selenium 75 with half-life of 120 days is easily characterized. The 0.265 and 0.280 MeV peak of selenium-75 are used for this determination. The result of the several experiments showed the existance of 513±32 ppm. of selenium in the plant samples which is above the permissible dose of - this element. In this study we did not determined the other trace elements in the sample.

13- A. Owlya, F.FAKHR-Vaezi and B. Parsa, 1974 "Determination of the - Trace Element levels in Iranian Margarine by Neutron Activation - Analysis", Radiochem., Radioanal. Letters. 16/6/355-362.

ABSTRACT:

By means of neutron activation analysis the concentration levels of trace elements in Iranian Margarines were studied. A high resolution

γ-ray spectrometer has been used to identify the radionuclids in irradiated "Shah-Passand" and "Ghoo" samples of Margarines. A total of 13 elements at trace levels have been determined by this technique. They include Cl, Mn, Na, K, Br, La, Au, Cr, Fe, Cs, Sc, Zn, and Co.

14-A. Mahdavi,1970, "Instrumental Neutron Activation Analysis Of Some Rock Forming Minerals". Bull. Faculty of Science, Tehran University, No. 3, 24-30.

ABSTRACT:

Rock forming minerals from an "Oslo essexite" from Ranviksholman, Oslofjorden and a Larvikite from Malberget, Tjôm, have been analysed using NaI (Tl) detector, by instrumental neutron activation analysis. In addition, a Norwegian geochemical reference sample apatite from Odegarden, Balm, and an apatite from Knipan (Ljosland) were analysed.

15- A. Mahdavi, 1971 "Antimony Contents of some Oslo Essexites", Bull. Faculty of Science Tehran Univ. Vol. 3, No. 2.

ABSTRACT:

The antimon content of ten Rock samples and two minerals (biotite and pyroxene) from Oslo essexites determined by neutron activation, range from 0.03 to 0.35 p.p.m. The highest figures were from two rock samples higher in sulfide Minerals. Which are believed to carry most of the antimony.

The rock samples come from Viksfjell volcanic neck, Hedland area; the two mineral samples were separated from an essexite rock sample from ranviksholment.

16- A. Mahdavi and C.H. Bovington, 1972, "Neutron Activation Analysis of some Obsidian Samples from archeological and Geological Sites in Iran" , Journal of British Institute for Persian Study, Vol. 10.

ABSTRACT:

Obsidian is a volcanic glass which occurs in restricted sites. Cuthing tools and other objects made from this material were used by - prehistoric man and are found in many prehystoric archaeological Sites. It is possible to characterize and relate archaeological and geological samples in terms of their trace element composition. In the present - work we have analysed a number of excavated and source samples for their Na and Mn content. The analysis were carried out by neutren Activation. The results indicate an obvious relation between source samples and -- archaeological Samples, and suggest a pre-hystoric obsidian trade rout from central Anatabia and lake van area to Hassanlu, Sosa and Fars.

17- C.H. Bovington, A. Mahdavi, S. Dessaunettes, and R. Masoumi, 1972, "Radio-carbon Date of some Carbonate Concentrations and Surrounding Soil Sample", Bull. Faculty of Science, Tehran Univ. Vol. 4

ABSTRACT:

A preliminary study on the relative radiocarbon ages of calicium carbonate in the surrounding soil has been jointly carried out by the Soil Institute of Iran and the Radiocarbon Laboratory of Tehran University Nuclear Centre.

Samples of concretions and surrounding soil were collected from different locations and the results obtained are based on the 5730 years half life $_{C}14$. Benzene synthesis and liquid scintilation were used for this study.

Samples came from Chazvin and Shiraz area. The ages obtained ranges from 10381-15527 years. Both soil carbonates and concertion give near identical ages.

18- C.H. Bovington and R.Masoumi, 1972. "Tehran University Nuclear - Centre Radiocarbon List I. Radiocarbon 14, 456.

19- C.H. Bovington, A. Mahdavi, and R. Masoumi, 1973, "Tehran University Nuclear Center: Radiocarbon Dates II", Radiocarbon, Vol.15 No. 3.

ABSTRACT:

Ages reported in this date list are calculated using the Libby half life of 5568± 30 years with 1959 as the standard year of reference; results are quoted in years B.C. and A.D./B.C. time scale .

Since much of our work involves correlations with material in an historical context in Mesopotamia it is important that the reader considers the implications of using 5730 years as the half-life of C^{14} and the corrections proposed by Ralph and Michael (1969) and other to allow for discrepancies between radiocarbon ages and calendrical ages.

All samples were examined for plant rootlets and other foreign matter, treated with 3M HCl, 3M NaOH, and de-ionized water. The contemporary - reference used is 0.95 of the specffic activity of NBS oxalic acid.

20- C. Bovington, A. Mahdavi and R. Massoumi, 1973, Radiocarbon evidence for a chronalogy for S.W. Iran, from the mid fourth to mid third Millenia B.C. Accepted by ISMEO, East and West.

ABSTRACT:

Attempt has been made to review the radiocarbon evidence for S.W. Iran and related sites and its consistency with typological evidence.

Considerable confusion exists in many circles about the relationship between "Radiocarbon age" and true or callenderical Age. The - correction Terms proposed by Ralph and Michael, permit a coversion of - radiocarbon to callendrical age, sufficiently accurate for the purpose of the establishment of a reasomanble chromalogy in S.W. Iran from the mid IV to mid 111 rd Millenia B.C. evidences for the periods at Shar Sokhte, tape Yahya, Namazga, and Mundigak have been concidered and the suggested chreonalogy for this periods does not seem to be in variance with typological evidence.

BILOGY.

1- F. Didehvar, 1971, "The phosphorus Fertilization of Alfalfa (Medicago sativa". Bull. Faculty of Science, Tehran Univ., Vol. 2, No. 4, 25.

Part I:

Phosphours uptake from top dressing with Ammonium phosphate.

The percentage of P in the plant derived from fertilizer estimated from the measurements of P^{32} ranged from 22-30 per cent on the older Crop.

Part II.

The effect of different methods of cultivation on the uptake

of shosphate by newly seeded Alfalfa. The results suggest that under experimental Condition disc ploughing and deeper placement of fertilizer was beneficial to alfalfa in the early stages of growth and maturity.

Part III.

The effect of different methods of cultivation on the uptake of phosphours by alfalfa and Barly. overall results suggest that the fertilizer may be least efficiently distributed after chisel ploughing but that the magnitude of the difference can be much affected by condition.

2- F. Didehvar, A. Myers and L. Watson 1971, "Growth of the Wheat Leaf (Triticum aestivum)", Bull. Faculty of Science, Tehran University, Vol. 3, No. 3, 9.

ABSTRACT:

The wheat leaf in the early stages of growth consists only of a blade which grows from the base; when the blade is completed the ligule forms and from this time no more growth of the blade can be observed. The sheath then develops proximally to the ligule, its base being the last part to mature. There is a single basal (intercalary) meristem, throughout the period of growth of leaves.

3- F. Didehvar, 1972, "Absorption of ^{32}P phosphate by Alfalfa (Medicago sativa) from Various Depths of Soil", Bull. Faculty of Science, - Tehran Univ. Vol. 4, No. 2 100.

ABSTRACT:

The results presented here suggest that effectiveness of any given method of placing the fertilizer depends on the time of the year.

Shallow placement of fertilizer is more effective earlier in the year and deeper incorporation is more effective later.

4- N. Rouhanizadeh and Zh. Khalkhali, 1971, "Evaluation Biochimique de la propriete radioprotectrice du "Shirkhesht",Radioprotection 6, 279.

In order to investigate the radioprotective action of "Shirkhesht", a non toxic natural substance, a biochemical evaluation of the DNP complex in irradiated animals has been made both with and without administration of "Shirkhesht". The sensitivity of the DNP complex to irradiation has also been investigated. The results so far confirm:

- the considerable change of the DNP complex in the irradiated tissues,
- "Shirkhesht" appears to have quite a considerable radioprotective action (25-30%) with the main advantage of being administrated orally.

5- N. Rouhanizadeh, L. Riazi, A. Owlya, and Zh. Khalkhali, 1973, "Preparation of ^{113m}In - Ferric Hydroxide Macroaggregate For Lung Scanning", IAEA/SM-171/13.

The aim of this work was to prepare ^{113m}In - labelled iron hydroxide macroaggregate with pH and particle size suitable for lung scanning. The aggregate was prepared by mixing the required amount of $FeCl_3$ with ^{113m}In followed by the additionnof NaCl and co-precipitation of ^{113m}In with Fe^{+++} ions. The final pH was adjusted by gelatine solution and 0.1 N HCl. The prepared aggregates were then analysed for activity, pH and particle size and injected into rats. The distribution of activity in the lungs,

liver and blood was investigated using scintillation counting.

It was found that the grade and concentration of gelatine and the PH of the solution at the precipitation step are the most significant factors affecting the quality of the macroaggregate.

6- M. Raie and N. Rouhanizadeh, 1972, "Uptake of ^{32}P in Different Organs of Caspian Sea Fish", Bull. Faculty of Science, Vol. 4, No. 2.

ABSTRACT:

IN VITRO phosphorus absorption in all organs of sturgeon, was higher than white fish. This may be due to the physiological and structural differences between the two fish, the higher absorption.

Seen in the white fish in the in vivo case, may possibly be due to the higher rate of growth and earlier maturation of the white fish(27). The higher phosphorus uptake by kidney in both in vivo and in vitro can be attributed to the particular structural features and vital functions of the organ. Similar results were obtained by Anderzej and Iysak (17).

In order to investigate further details of phosphorus absorption by different organs of the two fish, differential absorption ratios of phosphorus was measured. Autohistoradiography of liver and other tests showed that the strugeon fish in general absorbed more phosphorus than the white fish.

7- N. Rouhanizadeh, S. Samii et ZH. Khalkhali, 1973. Degradation des desoxyribopolynucleotides dans les tissus Lymphatiques du Rat Apres Irra-

diation et action Radioprotectrice du Shirkhesht. **Radioprotection**, Vol. 8, No. 4,

ABSTRACT:

The aim of this work was to study the radipprotective action of a natural substance "Shirkhesht". This was performed by a simple biochemical evaluation of the DNP complex of the irradiated animales prior and after application of "Shirkhesht". The sensitivity of the DNP complex of the irradiated Lympophitic tissues has also been investigated. We concluded that: Consider able changes occur in the DNP complex of the irradiated animals. Shirkhesht appears to moderate these changes to an appreciable extent.