

ISSN 0030-9885

Coden: PSIRAA 34 (4)111-160 (1991)



PAKISTAN JOURNAL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

Vol. 34, No. 4, April 1991

Physical Sciences. Pages 111-136

Biological Sciences. Pages 137-147

Technology. Pages 148-160

Published monthly by

Scientific Information Centre

PAKISTAN COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH
KARACHI

Physical Sciences Section

Pak. j. sci. ind. res., vol. 34, no. 4, April 1991

RING EXPANSION REACTIONS OF TRICHLOROMETHYL RADICALS WITH TRIAZOLES AT HIGH TEMPERATURE IN THE VAPOUR PHASE

M. EHSAN*

Chemistry Department, Brunel University, Uxbridge, United Kingdom

(Received July 16, 1990; revised May 9, 1991)

The ring expansion reactions of trichloromethyl radicals, generated in the vapour phase from carbon tetrachloride in a flow system at 550° with 1-methyl-1,2,4-triazole and 1-methylbenztriazole, have been investigated separately. The former gave cyanuric chloride as the major ring expansion product while the latter yielded no ring expansion products, only chlorinated benzenes could be obtained as the reaction products.

Key words: Reactions, Trichloromethyl radicals, Triazoles.

ORGANOTIN COMPLEXES OF DONOR LIGANDS***Part - I. Synthesis, Characterization and Biological Activity of Organotin Complexes of 1-Nitroso-2-Naphthol***

SAQIB ALI, M. MAZHAR, ABIDA KALSOOM AND A. QADEER

Department of Chemistry, Quaid-i-Azam University, Islamabad, Pakistan

(Received November 21, 1990; revised May 6, 1991)

A number of organotin derivatives of general formula (1-nitroso-2-naphthoxy) SnR_3 where R = phenyl, butyl, chloride have been synthesized and characterized by different instrumental techniques such as, elemental analysis, ^1H nmr, ir, uv and thermal analysis. The biological activity of these compounds is reported.

Key words: Organotin complexes, Elemental analysis, Biological activity.

Pak. j. sci. ind. res., vol. 34, no. 4, April 1991

ESSENTIAL OILS OF THE SPECIES OF LABIATAE
Part - IV. Composition of the Essential Oil of *Thymus serpyllum*

A. SATTAR, M. SHAFIQ MALIK AND SHAFIQ A. KHAN
PCSIR Laboratories Complex, Lahore-54600, Pakistan

(Received February 14, 1991; revised June 13, 1991)

The composition of the essential oil of *Thymus serpyllum* (N. O. Labiatae) growing wild in Pakistan has been studied with the help of gas chromatography. The major terpenes found in the oil are γ -terpinene (1.66%), *p*-cymene (9.54%), camphor (3.54%), caryophyllene (2.19%), terpinen-4-ol (2.90%), borneol (3.13), thymol (42.63%) and carvacrol (8.16%) along with other terpenes in minor amounts.

Key words: Essential oil, *Thymus serpyllum*, Labiatae, Thymol, Carvacrol.

Pak. j. sci. ind. res., vol. 34, no. 4, April 1991

ACTIVATED CARBON FROM FRUIT PITS

Part I. Effect of Chemical Treatment on the Adsorptive Properties of Carbonized Date Pits

TAMoor WAHAB AHMAD, TANZIL. H. USMANI AND MOHAMMAD MUMTAZ
PCSIR Laboratories Complex, Karachi-75280, Pakistan

(Received January 2, 1991; revised May 8, 1991)

The effect of chemical treatment on disintegrated pits of date (*Pheonix dactylifera* L.) by zinc chloride and phosphoric acid as compared to simply carbonized date pits on their adsorptive properties have been studied. It has been observed that the fraction of lower particle size, apparently found in the outer layer of the pit, gives a product of balanced micro and macropores, low bulking value and enhanced activity in liquid as well as gas phase by zinc chloride activation. In contrast, the phosphoric acid activation gives a product quite low in activity and available pore space.

Key words: Activated carbon, Date pits, Chemical activation.

Pak. j. sci. ind. res., vol. 34, no. 4, April 1991

ACTIVATED CARBON FROM FRUIT PITS

Part I. Effect of Chemical Treatment on the Adsorptive Properties of Carbonized Date Pits

TAMoor WAHAB AHMAD, TANZIL. H. USMANI AND MOHAMMAD MUMTAZ
PCSIR Laboratories Complex, Karachi-75280, Pakistan

(Received January 2, 1991; revised May 8, 1991)

The effect of chemical treatment on disintegrated pits of date (*Phoenix dactylifera* L.) by zinc chloride and phosphoric acid as compared to simply carbonized date pits on their adsorptive properties have been studied. It has been observed that the fraction of lower particle size, apparently found in the outer layer of the pit, gives a product of balanced micro and macropores, low bulking value and enhanced activity in liquid as well as gas phase by zinc chloride activation. In contrast, the phosphoric acid activation gives a product quite low in activity and available pore space.

Key words: Activated carbon, Date pits, Chemical activation.

Pak. j. sci. ind. res., vol. 34, no. 4, April 1991

ACTIVATED CARBON FROM FRUIT PITS

Part I. Effect of Chemical Treatment on the Adsorptive Properties of Carbonized Date Pits

TAMoor WAHAB AHMAD, TANZIL H. USMANI AND MOHAMMAD MUMTAZ
PCSIR Laboratories Complex, Karachi-75280, Pakistan

(Received January 2, 1991; revised May 8, 1991)

The effect of chemical treatment on disintegrated pits of date (*Pheonix dactylifera* L.) by zinc chloride and phosphoric acid as compared to simply carbonized date pits on their adsorptive properties have been studied. It has been observed that the fraction of lower particle size, apparently found in the outer layer of the pit, gives a product of balanced micro and macropores, low bulking value and enhanced activity in liquid as well as gas phase by zinc chloride activation. In contrast, the phosphoric acid activation gives a product quite low in activity and available pore space.

Key words: Activated carbon, Date pits, Chemical activation.

Pak. j. sci. ind. res., vol. 34, no. 4, April 1991

FRACTIONATION OF THE VENOM OF THE NIGERIAN PUFF ADDER (*BITIS ARIENTANS*)

T.K. OBIDAIRO* AND M.H. ETUKUDO

Department of Biochemistry, University of Benin, Benin City, Nigeria

(Received July 7, 1990; revised June 15, 1991)

Two fractions A and B were obtained from the gel filtration on Sephadex G-75 of the crude puff adder (*Bitis orientans*) venom. When purified on ion-exchange chromatograph, fraction A gave subfractions A₁, A₂, and A₃ while fraction B gave subfraction B₁, B₂. Fractions A and B produced haemorrhagic effect although the individual subfractions A₁, A₂, A₃, B₁ and B₂ did not.

Key words: Nigerian puff adder, Venom, Fractionation.

Introduction

An adult puff adder (*Bitis orientans*) was milked by a

Pak. j. sci. ind. res., vol. 34, no. 4, April 1991

CHARACTERISATION OF TRYPSIN INHIBITOR FROM MILLET (*Pennisetum TYPHOIDEUM*)

T. K. OBIDAIRO* AND H. N. OBASUYI

Department of Biochemistry, University of Benin, Benin City, Nigeria

(Received July 7, 1990; revised June 15, 1991)

Trypsin inhibitors were shown to be present in bulrush millet (*Pennisetum typhoideum*). Chromatography of the crude extract first on a DEAE-cellulose column and then on a Sephadex G-75 column revealed the presence of four trypsin inhibitors. Inhibitor A₄ was the most active and was found to lose most of its activity on heating at 100° for 40 mins. Its molecular weight was estimated using molecular sieve chromatography and found to be 12,950.

Key words: Trypsin inhibitor, Chromatography.

Introduction

column was achieved by separation on a column of

Pak. j. sci. ind. res., vol. 34, no. 4, April 1991

STUDIES ON EFFECTS OF RETANNAGE ON THERMAL STABILITY OF LEATHER AND ITS USEFULNESS

A.K.M. MOSLEM ALI, S. JAMSHED HASAN AND (MISS) DILARA
Leather Research Centre, PCSIR, Karachi, Pakistan

(Received August 1, 1989; revised June 19, 1991)

Retannage of tanned leather raises the shrinkage temperature (T_s) which is dependent on the characteristics and quantum of tannins used for the purpose, where cross links are formed with the polypeptide chains ($-Co-NH-$) of collagen or its other reactive groups ($COOH-NH_2-$). Vegetable tanned leather of $75^\circ T_s$ when treated with organic, synthetic and mineral tanning agent gave T_s rise of 15° , 16° and 35° respectively. Full chrome tanned leather at $105^\circ T_s$ when treated with organic, synthetic and mineral tanning agent gave T_s rise of 14° , 20° and 25° respectively in varied proportion in addition to the development of physical properties to suit different needs.

Key words: Retannage, Thermal stability, Leather.

Pak. j. sci. ind. res., vol. 34, no. 4, April 1991

GAS CHROMATOGRAPHIC EXAMINATION OF THE ESSENTIAL OIL OF *CINNAMOMUM CAMPHORA*

ABDUL SATTAR, ASAD MUSTAFA GILANI AND M. AKBAR SAEED

PCSIR Laboratories Complex, Lahore - 54600, Pakistan

(Received October 28, 1990; revised June, 19, 1991)

The volatile oils obtained by steam distillation of leaves, twigs, wood bark of an old tree and whole young plant of *Cinnamomum camphora* seib. Subsp. eucamphor (Camphor tree) on gas chromatographic analysis revealed the presence of over twenty five monoterpenoids. Camphor was present in highest amounts in oil of leaves (83.78%) followed by whole young plant (64.70%), twigs (61.83%) and wood (51.65%). The bark oil contained least amount of camphor (3.53%). Safrole, linalool and cineol generally present in large amounts in other varieties of *C. camphora*, were found in very small quantities.

Key words: *Cinnamomum camphora*, N. O. Lauraceae, Essential oil, Monoterpenes, Camphor.

Biological Sciences Section

Pak. j. sci. ind. res., vol. 34, no. 4, April 1991

CUCUMBER MOSAIC VIRUS AND SOME OTHER VIRUSES ON TOBACCO IN PAKISTAN

S. HAMEED, S. KHALID AND S.M. MUGHAL

Plant Virology Laboratory, National Agricultural Research Centre, Islamabad, Pakistan

(Received December 3, 1989; revised May 26, 1991)

A tobacco disease in Pakistan, characterized by mosaic, vein clearing, necrosis and reduction in plant height, was found to be caused by a complex of three viruses two of them reported previously as tobacco mosaic virus and potato virus Y. A spherical component was identified by host range, particle morphology and serology as cucumber mosaic virus. This is the first report of the occurrence of CMV in tobacco from Pakistan.

Key words: Cucumber, Mosaic, Virus, Tobacco.

INFLUENCE OF CADMIUM TOXICITY ON GERMINATION AND GROWTH OF SOME COMMON TREES

M. ZAFAR IQBAL, M. TARIQ MAHMOOD AND FIRDOUS AHMED

Department of Botany, University of Karachi, Karachi-75270, Pakistan

(Received June 27, 1990; revised May 22, 1991)

Seed germination of *Leucaena leucocephala*, *Samanea saman* and *Dalbargia sissoo* showed significant reduction with increase in concentration of cadmium solution. *Dalbargia sissoo* showed most dismal germination as compared to other species. The seedling length of assigned species showed gradual decrease with increase in concentration of cadmium, but the reduction was significant. The dry biomass of the above species also showed significant reduction with increasing concentration of cadmium solution.

Key words: Cadmium, Germination, Growth, Trees.

Pak. j. sci. ind. res., vol.34, no. 4, April 1991

PHYSICO-CHEMICAL PROPERTIES OF GUAVA SEED OIL

SHERIN IQBAL, AZRA YASMIN, N. A. SUFI AND ALTAF HUSSAIN*
PCSIR Laboratories , Peshawar, Pakistan

(Received October 28, 1990; revised June 27, 1991)

Seed of guava fruit yielded 9.26% oil on fresh seed basis. The seed oil, extracted with solvent hexane, on analysis by gas chromatography showed a Fatty acid composition of C 6:0 (0.26%) C 8:0 (0.83%) C 12:0 (0.02%), C 14:0 (0.06%) C 16:0 (8.14%) C 18:0 (3.04%), C 18:1 (3.04%) C 18:2 (75.52%).

Key words: Guava seed oil, Physico-chemical analysis.

Short Communication

Pak. j. sci. ind. res., vol. 34, no. 4, April 1991

**Two Kinds of Stick-Lac from South India Studied
in Cross Sections. *Part-II***

S. MAHDIHASSAN

SD-34, Block A, N. Nazimabad, Karachi, Pakistan

(Received December 30, 1990)

Short Communication

Pak. j. sci. ind. res., vol. 34, no. 4, April 1991

Control of Biofouling in Industrial Water Cooling System

M. DAUD ALI ALVI

*Fertilizer Research and Development Institute, P. O. Box
1012, Jaranwala Road, Faisalabad, Pakistan*

(Received July 29, 1986; revised February 26, 1991)

Technology Section

Pak. j. sci. ind. res., vol. 34, no. 4, April 1991.

UTILIZATION OF POLYETHYLENE TEREPHTHALATE (PET) WASTE IN THE PREPARATION OF NEW RESINOUS MATERIALS

M. ALAM*, C.M. ASHRAF AND W.R. SHAMSI
PCSIR Laboratories Complex, Lahore-54600, Pakistan

(Received September 17, 1990; revised May 4, 1991)

Various reactions of phenol and formaldehyde have been investigated under acidic conditions and in the presence of polyethylene terephthalate waste. These reactions led to the formation of new resinous materials, which were used to prepare different moulding powders under various parameters. A variety of articles were prepared from these moulding powders using compression mould press, some of which were free from blisters and indicated good finish. Moreover, their hardness, resistance to chemical corrosion and moisture penetration etc., suggest that some of the products thus prepared have good potential for use as caps and closures for pharmaceutical and other containers. Possible course of reactions leading to the formation of new resinous materials has also been briefly described.

Key words: Polyethylene terephthalate, Waste utilization, New resinous materials.

EVALUATION OF COMMERCIAL GRADE POTASSIUM SULPHATE, SODIUM SULPHATE AND COPPER SULPHATE FOR USE IN KJELDAHL NITROGEN ANALYSIS OF SOIL AND PLANT MATERIALS

FAQIR HUSSAIN, KAUSER A. MALIK AND ANWAR-UL-HAQ

Soil Biology Division, Nuclear Institute for Agriculture and Biology, Faisalabad, Pakistan

(Received September 29, 1990; revised May 26, 1991)

This study was carried out in the year 1989 to explore the possibility of using commercial grade K_2SO_4 , Na_2SO_4 and $CuSO_4$ in the salt-catalyst mixture required in Kjeldahl digestion of soil and plant materials. Of the chemicals tested, commercial grade K_2SO_4 and Na_2SO_4 were found suitable for the purpose. On account of some advantages of commercial grade Na_2SO_4 over commercial grade K_2SO_4 , its use in the Kjeldahl method is suggested.

Key words: Kjeldahl nitrogen, Commercial grade chemicals, Kjeldahl digestion.

Pak. j. sci. ind. res., vol. 34, no. 4, April, 1991

CONCENTRATION OF NICKEL IN EDIBLE FATS

N. KHALID, S. RAHMAN, RIAZ AHMED AND I. H. QURESHI

Nuclear Chemistry Division, Pakistan Institute of Nuclear Science and Technology, P. O. Nilore, Islamabad, Pakistan

(Received June 8, 1989; revised June 10, 1991)

The concentration of nickel in various types of edible fat samples including vanaspati, domestic ghee, cooking oil, butter and margarine was determined by atomic absorption spectrophotometric technique after pre-concentration by solvent extraction using the APDC-MIBK system. Among all the varieties of edible fats analyzed, vanaspati samples were found to contain much higher amount of nickel with a significant variation indicating the lack of standardized industrial procedures for the addition and post hydrogenation removal of the catalyst used in the hydrogenation process. Cooking oils were found to have the lowest nickel contents. The results were compared with the reported values from the other countries. Daily intake of nickel through various types of edible fats was estimated for urban populations in the low, middle and high income groups.

Key words: Nickel, APDC, MIBK, Atomic absorption spectrophotometry, Edible fats.

ISOLATION AND IDENTIFICATION OF COLOURS USED IN FOOD ADJUNCTS

ABDUL HAMID, ABDUS-SALAM SHEIKH AND F. H. SHAH

PCSIR Laboratories Complex, Lahore-54600, Pakistan

(Received December 9, 1990; revised June 8, 1991)

One hundred and forty samples of food adjuncts were collected from shopkeepers and restaurants and the food colours extracted were identified by subjecting them to thin layer chromatography (TLC) alongwith standards. 22.9% samples were found to contain amaranth a food colour whose listing was terminated by the United States Food and Drug Administration (US-FDA) in 1976. 23.6% samples were found to contain colours not permitted by US-FDA as synthetic food colours.

Key words : Food, Colours, Toxicity.