

Physical Sciences Section

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ADSORPTION OF ORGANIC ACIDS FROM AQUEOUS SOLUTION ON CHARCOAL

M. AFZAL and AMTUL NASEER

Institute of Chemistry, University of Islamabad, Islamabad

(Received April 15, 1971; revised December 6, 1971)

Abstract. Adsorption of various organic acids (monobasic and dibasic) from aqueous solution on charcoal has been studied by the usual titration method. The Freundlich and Langmuir plots have been drawn and the constants involved in the Freundlich and Langmuir isotherms were evaluated. The values of the constants were used to throw light on the mechanisms and the nature of forces involved in adsorbate-adsorbent interactions.

SLOW COMBUSTION OF METHYL VINYL KETONE

J.A. BARNARD

Department of Chemical Engineering, University College, London, England

M. AKBAR SHAIKH

Production Division, Daigol Brothers Ltd., Kala Shah Kaku, Punjab

(Received January 22, 1972)

Abstract. In the slow combustion of methyl vinyl ketone, the variation of maximum reaction with temperature was studied for equimolar mixtures of methyl vinyl ketone and oxygen at a fixed total initial pressure. The temperature range covered was 250–450°C. The results of these experiments are presented as $\log_{10} P$ against $1/T$ °K. The variation of the induction period and the acceleration constant was also studied. In the high and low temperature zones the overall activation energies were obtained.

MAGNESIUM PHOSPHATE

Part VII. Study of X-ray Powder Diffraction, Infrared Absorption and Differential Thermal Analyses of the Compounds $\text{Mg}(\text{H}_2\text{PO}_4)_2 \cdot 4\text{H}_2\text{O}$, $\text{Mg}(\text{H}_2\text{PO}_4)_2 \cdot 2\text{H}_2\text{O}$, $\text{Mg}(\text{H}_2\text{PO}_4)_2$ and $\text{Mg}(\text{PO}_3)_2$

SIDDIQUE AHMED*

Departments of Silicate Research and Inorganic Chemistry, Chalmers University of Technology, Gothenburg, Sweden

(Received May 1, 1971; revised August 4, 1971)

Abstract. The compound $\text{Mg}(\text{H}_2\text{PO}_4)_2 \cdot 4\text{H}_2\text{O}$ has been prepared from phosphoric acid and magnesium carbonate. The substance is finely crystalline to X-rays; its X-ray powder diffraction data have been indexed. IR spectrum of the compound has been recorded and studied in detail. Differential thermal analysis has shown that the compound loses its water of crystallization in several steps producing the compounds $\text{Mg}(\text{H}_2\text{PO}_4)_2 \cdot 2\text{H}_2\text{O}$, $\text{Mg}(\text{H}_2\text{PO}_4)_2$ and $\text{Mg}(\text{PO}_3)_2$. All of these three compounds are crystalline to X-rays; their X-ray powder diffraction data have been indexed. Their IR spectra have been recorded and discussed. The anhydrous compound $\text{Mg}(\text{PO}_3)_2$ forms glass when its melt is cooled rapidly to room temperature. The IR spectrum of the glass has been recorded. The recrystallization temperature of this glass has been determined by differential thermal analysis and it is found to be 834°C .

STUDY OF THE INFRARED SPECTRA OF SOME INORGANIC SULPHATES

SIDDIQUE AHMED

PCSIR Laboratories, Dacca 5

(Received June 30, 1971; revised October 20, 1971)

Abstract. IR spectra of the anhydrous sulphates, CaSO_4 , MgSO_4 , MnSO_4 , $\text{Al}_2(\text{SO}_4)_3$ and $\text{Cr}_2(\text{SO}_4)_3$ have been recorded and discussed. In connection with the preparation of the anhydrous sulphate samples, the dehydration temperature of the hydrated compounds and the decomposition temperature of the anhydrous ones have been mentioned.

PYROLYSIS OF CHLOROMERCURYACETALDEHYDE

A.H.K. YOUSUFZAI, M.M. ZAFAR and A.A. USMANI

PCSIR Laboratories, Karachi 39

(Received July 22, 1971; revised December 30, 1971)

Abstract. A detailed kinetic study of the pyrolysis of chloromercuryacetaldehyde (CMA) and the effect of a radical initiator (benzoyl peroxide) and a radical scavenger (hydroquinone) has been made at temperatures 217, 232 and 250°C. The rate of ketene formation follows the first order rate law. The energies of activation for the degradation of the systems CMA, CMA/BP and CMA/HQ are 12.8, 5.5 and 18.0 kcal/mole, respectively.

ULTRASONIC IRRADIATION OF AQUEOUS KMnO_4 SOLUTION

MOHSIN AZIZ FARUQI, MARGHOOB AHMAD KHAN and M. GAZIMUDDIN

PCSIR Laboratories, Karachi 39

(Received November 11, 1970; revised December 21, 1971)

Abstract. The study of the ultrasonic decomposition of 25.5 p.p.m. aqueous solution of KMnO_4 has been carried out at 2 MHz frequency and with an average energy intensity of 5.8 W/cm^2 at 32°C . The spectrophotometric measurements of optical density of the ultrasonic treated solutions have been performed at 580 nm and their pH values are recorded from time to time. The mechanism of decomposition of the aqueous KMnO_4 solution has been divided in two stages. The reaction proceeds as:

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KINETICS OF INHIBITED DECOMPOSITION OF BENZOYL PEROXIDE WITH NOVALAC RESIN

A.H.K. YOUSUFZAI, M.M. ZAFAR and S. A. HUSAIN

PCSIR Laboratories, Karachi 39

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**STUDIES ON THE SYNTHESIS OF 2,4,6-
TRIMERCAPTO-S-TRIAZINE AND A POLYMER
OF THIOCYANIC ACID**

NISAR AHMAD* and N.A. WARSI

PCSIR Laboratories, Karachi 39

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A survey of the literature on 2,4,6-trimercapto-s-

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REACTION OF THIONYL BROMIDE WITH DIHYDRIC PHENOLS

S.D. SARAF,* Z.A. MALIK and Z.I. BHATTI

*Institute of Chemistry, University of Islamabad,
Islamabad*

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UNIT CELL AND SPACE-GROUP OF DIANISYLACETYLENE

S.A. CHAUDHURY and I.H. SHIBLY

Physics Department, Rajshahi University, Rajshahi

(Received August 2, 1971; revised November 29, 1971)

POLYSACCHARIDE COMPONENTS OF SUNFLOWER HEADS

Part I. The Pectins

SOHELA RIAZ and MAHBOOB UDDIN

Department of Chemistry, University of Karachi, Karachi 32

(Received May 31, 1971; revised November 18, 1971)

Abstract. Samples of polysaccharides were extracted from three varieties of sunflowers, in a stepwise manner, with water, ammonium oxalate and disodium ethylenediamine tetracetate (EDTA). The polysaccharide samples had similar uronic acid anhydride (u.a.a.) contents and specific rotations and were found to contain D-galacturonic acid as major sugar component with small amounts of L-arabinose, D-galactose, L-rhamnose, D-xylose and 2-O-methyl-L-fucose. Samples of pectins were fractionated by diethylaminoethylcellulose chromatography and graded precipitation with sodium acetate. The results of this fractionation show that the polysaccharides are homogeneous and the neutral sugars are the integral constituents of the pectin extracted from these varieties of sunflower, under mildest possible conditions.

EFFECT OF DDT ON TEMPERATURE SELECTION OF SOME SALMONIDS*

M. YAQUB JAVAID†

Department of Biology, Carleton University, Ottawa, Canada

(Received January 11, 1972)

Abstract. Treatment for 24 hr with sublethal doses of DDT, ranging from 2 to 200 parts per billion (p.p.b.), resulted in shifts in temperature selection of three species of salmonids. In both the Atlantic salmon and brook trout, in general, low doses of DDT decreased the selected temperature, higher doses increased it. In rainbow trout exposure to DDT led to only an upward shift in selected temperature. A 'shock-response' to cold temperatures of the gradient was observed in both the Atlantic salmon and brook trout at higher DDT concentrations, while the rainbow-trout exhibited a 'shock-response' to warm temperatures. Exposure of Atlantic salmon to potassium cyanide doses, ranging from 1 to 200 p.p.b., resulted in a downwards shift in selected temperature which was dose-dependent. The ATP-uncoupler 2,4-dinitrophenol treatment was without any effect on temperature selection of Atlantic salmon. It seemed that DDT-induced changes in the behaviour of fish observed were due to interference by DDT with the thermal acclimation mechanism. A hypothesis of DDT action is discussed in which metabolic rate is the causative factor in thermal acclimation mechanism.

AN IMPORTANT RICE PEST *THAIA ORYZIVORA* GHAURI (TYPHLOCYBINAE:HOMOPTERA) AND SOME REMARKS ON ITS POPULATION IN EAST PAKISTAN*

MANZOOR AHMED and Miss KHURSHID SAMAD

Bioecology Research Project, Department of Zoology, University of Karachi, Karachi 32

(Received May 5, 1971; revised October 20, 1971)

Abstract. *Thaia oryzivora* Ghauri⁵ was collected on paddy from Thailand. Ahmed¹ reported it from East Pakistan. Later observations on the bioecology of this leaf-hopper have revealed high economic value of *Thaia oryzivora* in East Pakistan. The species surpasses all other insects in number, during periods of its peak breeding. The local varieties of rice are much more susceptible to the attack of this species, and hold much heavier population of the species than the IRRI-Pak variety of paddy. The species freely breeds during February-March and October-November. The present account contains a description of the taxonomical morphology of *Thaia oryzivora* Ghauri as well as some preliminary remarks on its population. The species although of high economic significance had not been reported by Alam.^{2,3}

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**IMMATURE STAGES OF SPILOSTETHUS PANDURUS MILITARIS FABRICUS
(HETEROPTERA: LYGAEIDAE: LYGAEINAE)**

ABDUL HAMID and ALAM ARA AHMED

Department of Zoology, University of Karachi, Karachi 32

(Received June 30, 1971; revised November 6, 1971)

Abstract. Immature stages from egg to fifth instar nymph of *Spilostethus pandurus militaris* are described. Dorsal views of all nymphal stages are illustrated. *Fagonia cretica* L. is recorded as the host plant of the species.

SOME OBSERVATIONS ON THE DECAY OF P-32 IN THE DESERT LOCUST-SCHISTOCERCA GREGARIA (FORSK)

HESHAMUL HUQUE and MOHAMMAD ABDUL KHALIQUE

Department of Plant Protection, Karachi 27

(Received January 12, 1971; revised September 14, 1971)

Abstract. Biological half-life of P-32, when injected to immature and mature locust adults, was found to vary from 4.3 to 5.4 days to 4.5 to 6.2 days respectively. Except in case of mature, tagged males when mated with untreated females radioactivity persisted to a varying extent in the egg-pods and resultant hoppers obtained by mating the tagged mature and immature females, as well as the immature males when mated with opposite untreated sexes.

**THE IMMATURE STAGES OF THE MANGO FRUIT WEEVIL, STERNOCHETUS FRIGIDUS
FABRICIUS (COLEOPETRA: CURCULIONIDAE)**

MD. LATIFUR RAHMAN and MONAWAR AHMAD

Department of Entomology, East Pakistan Agricultural University, Mymensingh

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Abstract. The immature stages of the mango fruit weevil, *Sternochetus frigidus* Fabricius, are described and illustrated in this paper.

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STUDIES IN ROOT-PROMOTING SUBSTANCES

Part I. Rooting Activity of Poplar Stem Cuttings

Mrs. SADDIQA MALIK, S. IFTIKHAR H. SHAH and MAHMOOD AKRAM

PCSIR Laboratories, Peshawar

(Received August 31, 1971)

Abstract. Alcoholic extracts of poplar stem cuttings were fractioned by descending paper chromatography and assayed by mung bean seedlings. Seven zones of different colours and R_f values were detected and some of the substances were found to be active in root initiation and promotion.

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CORYNEUM BLIGHT AND OTHER DISEASES ON APRICOT (PRUNUS ARMENIACA) IN NORTH-WEST PAKISTAN

SAEED I. ZAFAR and N.A. SUFI

PCSIR Laboratories, Peshawar

(Received August 11, 1971)

Abstract. Three major stone fruit diseases, viz: coryneum blight, bacterial canker and gummosis and ring pox virus were found severely attacking apricots in various apricot growing areas of NWFP. None of these diseases have been previously reported from Pakistan. *Stigmina carpophila*, the incitant of coryneum blight, is also a new fungal record for Pakistan. In the present paper are presented disease symptoms on various parts of the plant, and morphological studies on the causal organisms.

THE MEGASPOROGENESIS AND THE DEVELOPMENT OF EMBRYO SAC IN WITHANIA SOMNIFERA

PARVEEN AZIZ, (Mrs.) NASEEM IFTIKHAR and N.R. KHAN

PCSIR Laboratories, Karachi 39

(Received November 26, 1971; revised February 21, 1972)

Abstract. The archesporium is hypodermal in origin, being distinguished by having a polygonal cell of large dimension with granular, dense cytoplasm and large nucleus. The single archesporial cell which is usually present directly functions as megasporocyte. After meiosis the megasporocyte produces a solitary linear tetrad of megaspores. The chalazal megaspore develops into a polygonum type of embryo sac, while the other three spores disintegrate. The surrounding nucellar cells break down and are being assimilated by the developing embryo sac, as a result the later comes in contact with the inner epidermis of the integument which functions as a nutritive layer. A single massive integument originates as a ring of meristematic tissue at the base of the nucellus.

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STUDIES ON THE BACTERIOSTATIC PROPERTIES OF WILD, MEDICINAL PLANTS OF KARACHI REGION. PART I

(Miss) MARYAM SALEH ATTIA, (Miss) SHAHNAZ AHMAD, S.A.H. ZAIDI and ZAHIR AHMED

PCSIR Laboratories, Karachi 39

(Received November 12, 1971; revised April 22, 1972)

Abstract. The present communication deals with the bacteriostatic properties of the ethanolic extracts of wild, medicinal plants of this region. Experiments were conducted on sixty plants of seventeen families against fourteen different bacteria. Results of the tests have been described. *Abutilon indicum* (L.) Swt., *Juglans regia* L., *Mimosa hamata* Willd, *Prosopis glandulosa* Torr, *Trigonella occulta* Delile, *Vernonia cinerascens* Schultz. Bip. and *Withania somnifera* (L.) Dunal were found to be active against all the bacteria tested.

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EXTRACTION OF PECTIC SUBSTANCES FROM SUNFLOWER HEADS

M. QUDRAT-E-KHUDA, IKRAM-UR-REHMAN SIDDIQI
and S.M. AMIR*

*Biochemical Research Division, PCSIR Laboratories,
Karachi 39*

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POLYSACCHARIDE COMPONENTS OF SUNFLOWER HEADS

Part II. The Hemicelluloses

SOFIA BAQAI, SOHELA RIAZ and MAHBOOB UDDIN

*Department of Chemistry, University of Karachi,
Karachi 32*

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SHREDDERED-LEAF DISEASE OF THE PAPAYA TREE

MOHSIN AZIZ FARUQI and M. RAFI-UZ-ZAMAN

PCSIR Laboratories, Karachi 39

S. MAHDIHASSAN

S.D. 34, Block A, North Nazimabad, Karachi 33

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PROPAGATION OF YEAST ON LEAF PROTEIN CONCENTRATE BY-PRODUCTS *

A.M. BUTT, S.U. AHMAD and F.H. SHAH

PCSIR Laboratories, Lahore 16

(Received August 2, 1971; revised September 30, 1971)

Abstract. Nine strains of yeast were propagated on the filterates left after precipitation of proteins from leaf juices of *Trifolium alexandrinum*, *Phaseolus mungo* and *Cyamopsis psoralioides*. The growth of all the strains was supported by the filterates. Supplementation of the filtrates with glucose increased the cell yield. The combined effect of glucose and ammonium sulphate was maximum in case of *Candida utilis* No. 395.

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UTILIZATION OF MOLASSES IN THE PRODUCTION OF A NEW PEPTIDE ANTIBIOTIC PRODUCED BY STREPTOMYCES SPECIES

ABOU-ZEID A. ABOU-ZEID and YOUSEF M. SHEHATA

Microbiological and Enzyme Chemistry Research Unit, National Research Centre, Dokki, Cairo, A.R.E.

(Received August, 13, 1971)

Abstract. Egyptian molasses with other ingredients was used for the production of a new peptide antibiotic produced by *Streptomyces* species, isolated from Egyptian soils. The presence of potassium ferrocyanide or EDTA in the fermentation medium reduced the toxic effect of molasses by reducing availability of trace elements by forming insoluble salts. Also the addition of starch, NaNO_3 and KH_2PO_4 to the fermentation medium increased the antibiotic yield.

EXPERIMENTS ON THE CULTURAL CONDITIONS OF CHEESE STARTERS IN WHEY AND ON THEIR ACID PRODUCTION IN MILK

Factors Affecting Growth and Acid-Producing Ability of *Streptococcus Lactis*

A.F. MD. EHTESHAMUDDIN, M.Y. IKRAMUL HAQ and Mrs. RASHIDA ZAMAN

PCSIR Laboratories, Lahore 16

(Received March 31, 1970; revised November 27, 1971)

Abstract. Factors affecting the growth of two isolates of *Streptococcus lactis* in a whey-based medium, and their acid-producing ability in milk were studied. Supplementation of diluted whey with peptone and extracts of yeast and beef allowed maximal growth of both the bacteria. Evidence has been presented which shows the presence of stimulatory factor(s) common to both peptone and yeast extract. An almost linear relationship occurred between the growth and increase in the peptone concentration up to 0.5%. A pH of 7.1 and stationary incubation in air provided optimum growth conditions for the bacteria. Associative growth of the two species resulted in symbiotic effect and both growth and acid production increased under the condition. Supplementation of milk with adenine and yeast extract brought about increased acid production in milk by AH2. Such potentiation of acid production was more pronounced by yeast extract alone and also in combination with adenine.

THE FATTY ACIDS OF INDIGENOUS RESOURCES FOR POSSIBLE INDUSTRIAL APPLICATIONS**Part III. Investigation of *Peganum harmala* Linn Seed Oil**

M.A. JAVED, S.A. KHAN, M.I. QURESHI and M.K. BHATTY

PCSIR Laboratories, Lahore 16

(Received July 2, 1971; revised January 13, 1972)

Abstract. *Peganum harmala* Linn seeds have been shown to contain 12–14% of an oil. Vapour phase chromatographic analysis of this oil has shown that it is composed of the glycerides of oleic, linoleic and stearic acids with minor amounts of palmitic, palmitoleic and linolenic acids.

GAS CHROMATOGRAPHIC AND RADIOMETRIC STUDY OF THE BEHAVIOUR OF C^{14} -DDT ON MUSTARD PLANTS UNDER TROPICAL CONDITIONS

M.M.H. BAIG, M. SHARIF KHAN, (Miss) NASIMA KHAN, (Miss) SHAMIM FERHAT, ABU HOSSAIN, M.J.A. OSMANI, and K.A. LORD*

Toxicology and Pesticides Laboratory, Department of Plant Protection, Karachi 27

(Received October 7, 1971)

Abstract. The behaviour of a DDT emulsifiable concentrate sprayed onto mustard plants was examined under tropical conditions using chemical and radiochemical techniques. The steady loss of DDT from the surface of leaves, measured as surface radioactivity, was closely similar to the loss assessed by washing the insecticide from leaves with hexane and measuring it by gas chromatography and radiometry. About one quarter remained on leaf surfaces 2 days after spraying and less than one tenth remained after 10 days.

After 2-4 days about one fourth of the DDT had penetrated into leaves, as shown both by chemical and radiochemical measurements of insecticide which could be extracted from leaves after washing the surfaces with hexane. The amount of DDT in the plant diminished with time although radiometric assay indicated a faster loss than chemical assay.

Most of the radioactivity found appeared to be present as DDT although there was gas chromatographic evidence of some slight degradation of DDT. It is concluded that loss was mainly by volatilization.

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VOLATILIZATION OF GAMMA-BHC AT TROPICAL TEMPERATURE

(Miss) NASIMA KHAN, (Miss) SHAMIM FERHAT, M.M.H. BAIG and K.A. LORD*

Toxicology and Pesticides Laboratory, Department of Plant Protection, Karachi 27

(Received October 7, 1971; revised November 5, 1971)

Abstract. Gamma-BHC emulsion was sprayed on rice plants and residues tested by gas chromatography. Results indicated rapid loss of insecticide from the plants as very little quantity was found on them after 3 hr. Volatilization, therefore, appears to be the possible cause of loss. This suspicion was confirmed when small quantities of gamma-BHC, in n-hexane, was applied onto glass cover-slips, washed and assayed and found that evaporation rate was dependent upon surface area. BHC emulsion is, therefore, unlikely to give prolonged protection to plants.

ULTRASONIC EMULSIFICATION OF PETKOLIN

Part I. Pure Petkolin in Water and Petkolin-Kerosine Solution in Water System

MARGHOOB AHMAD KHAN and M. GAZIMUDDIN

PCSIR Laboratories, Karachi 39

(Received September 18, 1970; revised January 5, 1972)

Abstract. A solution of Petkolin, a chlorinated pesticide, and kerosene with 27–33% (by volume) Petkolin content, has been emulsified in the matrix of water in the ratio of 1:6 to 1:10 (by volume) P-K/W mixture by treatment with ultrasonic radiation of 300–500 kc frequency range and 30–40 watts power range. The required radiation time was about 5–10 min which decreased to almost half on addition of 1% Teepol (by volume) of P-K/W mixture.

CHARACTERISTICS OF LOOSE WOOL COMPRESSIBILITY

MUHAMMAD ASHRAF ALI

PCSIR Laboratories, Rajshahi

(Received May 29, 1971; revised September 14, 1971)

Abstract. The regression coefficients of a load-thickness equation which has been derived empirically, show wide variations in a spectrum of raw, processed and treated wools. Throughout their changes secured by water-saturation, woollen or worsted processing, acid-relaxation and oxidation of the wool assemblies, the compressional parameters appear to be interdependent as expected from their observed association with the reaction constants' of the polymer bending rate process. In addition, some of the parameters exhibit significant correlations with the natural variations of crimp form, fibre length, softness of handle and moisture content of the raw wools. Eventually, the nature of loose wool compressibility has been discussed in the light of the observed correlations.

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LABORATORY EVALUATION OF MALATHION AND VAPONA FOR THE CONTROL OF RED FLOUR BEETLE, TRIBOLIUM CASTANEUM (HERBST), IN WHEAT

**MOHSIN ALI SARDAR, MONAWAR AHMAD and
MOHAMED MANIKU**

*Department of Entomology, Agricultural University,
Mymensingh*

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**ISOLATION OF PSORALENE AND ANGELICIN
FROM PSORALEA PLICATA DEL**

VIQAR UDDIN AHMAD and ANWER BASHA

*Postgraduate Institute of Chemistry, University
of Karachi, Karachi 32*

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CHEMICAL INVESTIGATION OF PROSOPIS GLANDULOSA

M. IKRAM, M. ISRAR Khan and A. RAZZAQ

PCSIR Laboratories, Peshawar

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SOME PHYSICOCHEMICAL CHANGES IN IRRADIATED BER (*ZIZYPHUS JUJUBA*) DURING STORAGE AND RIPENING

MAQBOOL AHMAD, A. SATTAR, A. HUSSAIN, M. JAMIL, W.A. FAROOQI and AMIN M. HUSSAIN

Food Preservation Division, Nuclear Institute for Agriculture and Biology, Lyallpur

(Received January 31, 1972)

Abstract. Mature, hard green *bers* of *Umran 13* variety were subjected to gamma radiation and doses of 10, 20, 30, 40 and 50 Krads were administered. The irradiated and unirradiated fruits were stored at room temperature ($30^{\circ} \pm 2^{\circ}\text{C}$) and changes in physiological and biochemical parameters like weight loss, change of skin colour, total soluble solids, acidity, sugars, ascorbic acid, pectic substances, chlorophyll and carotenoids were studied. Fruits subjected to dose of 20–40 Krads were relatively firmer and greener, as compared with unirradiated control after 8 days' storage. There was no significant loss of any nutritive constituents due to irradiation. Organoleptic tests also did not show any detectable adverse effect of taste and flavour in irradiated fruit.