LIST OF PUBLICATIONS AND PATENTS WITH ABSTRACTS

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FOOD PROCESSING
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Bureau of Agricultural and Industrial Chemistry
Agricultural Research Administration
United States Department of Agriculture

FOOD PROCESSING

Air flow through beds of dehydrated vegetables. O. H. Spaugh. Food Technol. 2(1):33-38, Jan., 1948. In the design of finishing bins for final drying of dehydrated vegetables, it is necessary to know the resistance offered by these products to the through circulation of air. This article presents equations and experimental coefficients by means of which this resistance may be calculated with a reasonable degree of accuracy.

Compression and storage of dehydrated foods. C. A. Magoon (Research Coordinator, Agricultural Research Admin., U.S.D.A., Washington, D.C.). Food Indus. 20(3): 384-386, March, 1948. Volume of dried fruits, vegetables, eggs and soups, and flours was reduced an average of 60 percent without injury to the product or reduction in quality. Storage performance was likewise unaffected.

*Concerning the mechanism of interaction of egg white trypsin inhibitor and trypsin. H. L. Fraenkel-Conrat, R. S. Bean, and H. Lineweaver. Fed. Proc. 7(1)part 1:155, March, 1948. The chemical groups essential for interaction of trypsin inhibitor and trypsin were investigated. It was determined that the interaction involved the amino groups of trypsin and the carboxy groups of the inhibitor.

Condition of oranges as affecting bacterial content of frozen juice with emphasis on coliform organisms. E. R. Wolford and J. A. Berry. Food Research 13(2):172-178, March-April, 1948. Juice prepared experimentally from "soft-rot" Valencia oranges was found to contain a microbial population approximately 2500 times as great as juice similarly prepared from sound fruit. The coliform content was also much greater. Elimination of unsound fruit is extremely important in the production of frozen orange juice of low microbial content and coliform index.

Enzymes of fresh hen eggs. H. Lineweaver, H. J. Morris, L. Kline, and R. S. Bean. Arch. Biochem. 16(3):443-472, March, 1948. The enzyme content of fresh hen eggs was studied. The enzyme activities, while variable from enzyme to enzyme, are so low that it appears extremely doubtful that the egg enzymes are primary causes for egg deterioration.

The production of mushroom mycelium (Agaricus campestris) in submerged culture. H. Humfeld. Science 107(2780):373, April, 1948. Describes production of mushroom mycelium by growth on a liquid medium under submerged conditions. Mushroom mycelium is obtained in good yield and possesses the characteristic mushroom flavor, hence can be used for production of mushroom soups, gravies, flavorings, etc.

*Biochemical factors influencing the shelf life of dried whole eggs and means for their control. H. D. Lightbody and H. L. Fevold. Advances in Food Research, New York, Academic Press, 1948, Vol. 1, pp. 149-202. Detailed information is given concerning the shelf life of dried eggs. The article includes such topics as composition of eggs, criteria of quality and deterioration, chemical and physical changes associated with deterioration, and methods of retaining quality.

Experimental compression of dehydrated foods. U. S. Dept. Agr. Misc. Pub. 647. 57 pages. Feb., 1948. Contains detailed information regarding compression of dehydrated foods. Some of the topics covered are procedures and equipment, compression studies on specific fruits, vegetables, cereals, and eggs, also storage studies on the compressed products.

PECTIN

Equilibrium moisture and x-ray diffraction investigations of pectinic and pectic acids. H. J. Palmer, R. C. Merrill, and H. Ballantyne. Jour. Amer. Chem. Soc. 70(2):570-577, Feb., 1948. Equilibrium moisture content at ten relative humidities between zero and 95 percent are given for seven pectinic and two pectic acids. The moisture content was found to be essentially independent of the methoxyl content. The variation of the equatorially accentuated x-ray reflection with water content has also been determined.

Pectinate films. T. H. Schultz, H. S. Owens, and W. D. Maclay. Jour. Colloid Science 3(1):53-62, Feb., 1948. Pectinate films possess strengths between 7 and 14 kg./mm.^{2}, and are extensible to about 3 to 9 percent. They can be plasticized with glycerol, which decreases the tensile strength about 30 percent at effective concentrations. Increased resistance to water and washing agents is achieved by conversion of the films to polyvalent metal pectinates. At present, the most promising use of pectinate films is as a dip coating for food packaging.

Pectic materials and method of preparing same. U. S. Patent No. 2,444,266 to H. S. Owens and W. D. Maclay. Patented June 29, 1948. Concerns preparation of low-methoxyl pectinic acids by enzymic de-methoxylation of the pectin naturally occurring in citrus peel. The pectinesterase which is present in the peel is utilized as the reactive enzyme. The process involves subjecting peel to alkaline conditions, the pH being maintained from 6 to 10, while the temperature is held in the range from 0° to 60°C.

PROTEINS, PLASTICS, FIBERS, ETC.

Glutamic acid-free protein hydrolysate and the production thereof. U. S. Patent No. 2,434,715 to H. S. Olcott and J. C. Lewis. Patented Jan. 20, 1948. Glutamic acid separated from protein hydrolysates by heating at particular pH to convert glutamic acid into its lactam followed by extraction of the lactam. The glutamic acid-free hydrolysate is useful as culture medium for microorganisms, particularly for bioassay procedures.

Stability of synthetic keratin fibers in alcohol-water mixtures. I. Theoretical basis for a new method for solubilizing feather keratin. H. P. Lundgren, A. M. Stein, V. N. Koorn, and R. A. O'Connell. Jour. Phys. and Colloid Chem. 52(1): 180-206, Jan., 1948. A method for measurement of equilibrium force-temperature behavior of synthetic feather keratin fibers in alcohol-water-salt mixtures is described. Evidence was obtained for three types of interaction that stabilize fiber network structure: (1) salt linkages that interact with inorganic ions, (2) nonelectrostatic interactions, presumably hydrogen bonds, which interact with alcohols (methyl, ethyl, and n-propyl), and (3) disulfide bonds which interact with reducing agents. An example is given to show how this solvent system can be used for solubilization of keratin directly from feathers at neutral pH.

*An egg-yolk protein containing 10% phosphorus. D. K. Mecham and H. S. Olcott. Proc. Fed. Amer. Socs. Expt. Biol. 7(1):173, March, 1948. At least 40 percent of the total protein phosphorus content of egg yolk can be accounted for in a new phosphoprotein (containing 10 percent P), for which the name "phosvitin" is proposed.

Thread advancing, storage and stretching reel. Patent No. 2,439,903 to R. A. O'Connell. Patented Apr. 20, 1948. Device consists essentially of a reel provided with a series of endless belts arranged longitudinally. Thread is supported by belts and caused to advance by moving belts longitudinally. Belts are also adjustable toward or away from shaft so that thread can be stretched or contracted while in motion. Device is useful in preparation of artificial fibers of any type.

Phosphorylation of proteins with phosphoric acid containing excess phosphorus pentoxide. R. E. Ferrel, H. S. Olcott, and H. Fraenkel-Conrat. Jour. Amer. Chem. Soc. 70(6):2101-2107, June, 1948. Proteins were reacted with phosphoric acid containing excess phosphorus pentoxide. After neutralization the products contained considerable amounts of phosphorus, much of which could be removed by dialysis against 10 percent sodium chloride solution. Stability of the phosphate groups in the remaining material in neutral, acid, and alkaline solutions has been determined.

ANTIBIOTIC SUBSTANCES

An alternate step for the isolation of subtilin. H. Lineweaver, A. A. Klose, and G. Alderton. Arch. Biochem. 16(2):311-313, Feb., 1948. Subtilin may be salted out of butanol extracts of B. subtilis culture by adding 60 g. of NaCl per liter of butanol and adjusting the pH of the aqueous phase to 5. The precipitate may be collected in the bowl of a Sharples continuous centrifuge which may be adjusted to remove separately the dehydrated butanol and the salt-water. Relatively little subtilin is lost in these liquid phases.

The molecular weight of lysozyme determined by the X-ray diffraction method. K. J. Palmer, M. Ballantyne, and J. Galvin. Jour. Amer. Chem. Soc. 70(3): 906-908, March, 1948. X-ray diffraction photographs of single crystals of air-dried lysozyme chloride grown at a pH of 4.5 show that the unit cell is tetragonal with a = 71.1 kX and c = 31.3 kX. This unit cell contains eight molecules. Density was determined by suspension in a toluene-ethylene bromide mixture. It was necessary to correct the observed density for adhering sodium chloride (1.27 percent). This gave a corrected value of 1.305 gm./cc. The corrected density has been used to calculate the weight per molecule in the unit cell. This latter value was then corrected for moisture (9 percent) and hydrochloric acid bound to the amino groups (2.45 percent) to give a value for the molecular weight of dry, chloride-free lysozyme of 13,900 ± 600.

Reaction product of gramicidin and formaldehyde and method of production. U. S. Patent No. 2,438,209 to H. L. Fraenkel-Conrat, H. Humfeld, J. C. Lewis, K. P. Dimick, and H. S. Olcott. Patented March 23, 1948. Gramicidin, an antibiotic, is reacted with formaldehyde to produce a derivative of decreased hemolytic and toxic properties.

Method of isolating lysozyme from its naturally occurring mixtures with other biologic materials. U. S. Patent No. 2,442,452 to G. Alderton and H. L. Fevold. Patented June 1, 1948. Describes process of isolating lysozyme, a proteinous substance having bacteriolytic properties, from natural sources thereof such as egg white. Process involves treatment of egg white with an adsorbent material such as bentonite followed by elutation of adsorbed lysozyme with an organic base, particularly pyridine.

Nutritional studies on subtilin formation by Bacillus subtilis. R. E. Feeney, J. A. Garibaldi, and E. M. Humphreys. Arch. Biochem. 17(3):435-445, June, 1948. Nutritional requirements for production of relatively high levels of subtilin by Bacillus subtilis in shallow-layer stationary cultures were found to be simple. In a medium properly balanced with respect to mineral salts, they were limited to an appropriate source of energy and to inorganic sources of N, P, and S. The quantitative requirements for the latter elements were determined.

Studies on the mineral nutrition of the subtilin producing strain of Bacillus subtilis. R. E. Feeney and J. A. Garibaldi. Arch. Biochem. 17(3):447-458, June, 1948. It was found that the elements potassium, magnesium, iron, manganese, and zinc are essential for formation of the antibiotic subtilin by culturing of Bacillus subtilis. The requirements of these elements for production of 500 mg. of dried pellicle per 50 ml. of culture were approximately (in ppm.): K, 125; Mg, 2.5; Fe, 1.2; Mn, 0.7; and Zn, 0.5.

MISCELLANEOUS

An adaptable staining schedule for plant tissues. R. M. Reeve. Stain Technol. 23(1):13-15, Jan., 1948. A general schedule for staining meristematic, maturing, and mature plant tissues is described. Treatment with a dilute aqueous solution of Delafield's hematoxylin is followed with staining in 0.1 percent safranin in 60 percent alcohol. Destaining of safranin may be partly accomplished in alcohol and completed by counterstaining with dilute fast green in a xylene and alcohol mixture. Various modifications and adaptations are briefly discussed.

Chromatographic separation of beta-carotene stereoisomers as a function of developing solvent. E. Bickoff. Analyt. Chem. 20(1):51-54, Jan., 1948. The relative eluting strengths of a number of solvents for beta-carotene and its stereoisomers have been quantitatively determined under standardized reproducible conditions. The relative efficiency of the solvents as developers for separating beta-carotene from its stereoisomers on a line chromatographic column has also been determined. Anethole and p-cresyl methyl ether were found superior to most of the more common developers.

Esters of lima bean pod and corn cob hemicelluloses. J. F. Carson and W. D. Maclay. Jour. Amer. Chem. Soc. 70(1):293-295, Jan., 1948. The acetate, propionate, butyrate, caprate, laurate, myristate, palmitate, and benzoate of corn cob xylan and the acetate, propionate, and butyrate of lima bean pod xylan were prepared. Fractionation of the lima bean pod xylan esters with organic solvents into soluble and insoluble fractions failed to accomplish an appreciable change in xylan content of the regenerated polysaccharides, which indicated that the non-pentosan part may be chemically combined with xylan.

Vitamin C content of walnuts (Persian) during growth and development. A. A. Klose, J. Poat, and H. L. Fevold. Plant Physiol. 23(1):133-141, Jan., 1948. The vitamin C content of four commercial varieties of Persian (English) walnuts was measured during the growing season of two consecutive years. On a moisture-free basis, the vitamin C in the growing walnut increased to a maximum of about 15 percent 40 days after blossoming, then decreased to 1 to 2 percent at maturity. The hulls contained 6 to 8 percent vitamin C, on a dry-weight basis, at maturity of the walnut.

*A rapid precipitate drier and solvent evaporator. I. R. Hunter. Analyt. Chem. 20(2):186, Feb., 1948. A drying apparatus constructed from fritted glass crucibles or Buchner funnels and standard taper joints is described. Air is passed through the device to remove adhering solvent from precipitates.

Test pear cannery waste for by-product values. E. F. Potter, A. Bevenue, and E. A. McComb. Fruit. Canner and Packer 40(4):56, April, 1948. A study was made of the composition of waste from a pear cannery in order to evaluate possibilities for its use. It was determined that the waste contained on a dry weight basis an average of 4 percent protein, 2 percent ash, 14 percent crude fiber, and 50 percent sugar.

Apparatus for measurement of vapor pressure. R. R. Legault, B. Makower, and W. F. Talburt. Analyt. Chem. 20(5):428-430, May, 1948. A compact, portable glass apparatus has been designed for determination of aqueous vapor pressure of dehydrated agricultural products. Includes a mercury manometer of the Dubrovin type, which has a sensitivity about seven times that of an ordinary U-tube mercury manometer. Apparatus will be found useful for vapor pressure measurements in general.

The thiocyanation of polysaccharide tosyl esters. J. F. Carson and W. D. Maclay. Jour. Amer. Chem. Soc. 70(6):2220-2223, June, 1948. Replacement of tosyloxy in the primary position by thiocyanate has been found to be applicable to several polysaccharide tosyl esters. When applied to potato starch, cellulose, and guar mannogalactan, reaction had approximately the same degree of specificity for replacement of the tosyloxy group in the primary position as iodination reaction. Both thiocyanation and iodination of the tosylate of water-soluble polysaccharide of guar indicate that approximately half of the primary hydroxyl groups are involved in linkages. Thiocyanation and iodination of a corn-cob hemicellulose tosyl ester and iodination of a lima-bean-pod hemicellulose tosylate yielded substitution to a greater extent than was expected, from the structure of these materials, indicating that possibly some secondary tosyloxy groups were replaced.