NEWS

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Edible Spread of Wide Plastic Range in Pilot Stage

NEW ORLEANS.—Development of an edible spread with an extremely wide range of plasticity for use by the armed forces has reached the pilot plant stage at the Northern Regional Research Laboratory with very promising results. This material was described as a "global spread" by H. J. Dutton at the American Oil Chemists' Society meeting here on May 4 to 6.

Mixtures of vegetable oils with relatively large proportions of saturated monoglycerides have been found to give solids which, although still spreadable at several degrees below freezing, do not melt at temperatures well above 100° F. Soybean, cottonseed, corn, and peanut oils may be used equally well, and hardened fats such as margarine oil may be added up to 20% without affecting plasticitity at low temperatures. Unsaturated monoglycerides do not function to give the plastic characteristics desired. Addition of butter oil, for supplying flavor characteristics, may be an additional possibility for new areas of application of dairy products. Since there is no water phase added salt must be in a finely divided state.

The equilibrium mixture of mono- and di-glycerides appears to be just as satisfactory as that with the monoglyceride alone.

Metal Inactivation by Stabilizers. Work done at NRRL on sulfur and nitrogen coordination compounds effective as edible oil stabilizers has been extended to include oxygen compounds, reported C. D. Evans. Of the oxydicarboxylic acids, diglycollic acid in 0.01% concentration has the best stabilizing value, and hydroxy or ether groups tend to give better results than keto groups. Mesaconic acid appears to be the best of the unsaturated dicarboxylic acids, and trimesic acid gives the best results among the aromatic acids. No effects greater than those of citric or tartaric acids were noted, however, among the 30 oxygenated compounds tested, Dr. Evans said.

Use of carboxymethylmercaptosuccinic acid for trace metal inactivation was also discussed by Dr. Evans. No effect was observed, he noted, when the chelating compound was added prior to deodorization of the oil, but marked stabilizing effect was evident when it was added following deodorization. No significant sulfur odors were evident after stabilization, and concentrations of the chelating agent as low as 0.0025% still gave maximum oxidative stability. Dr. Evans characterized carboxymethylmercaptosuccinic acid as one of the most important metal inactivators tested, with oxidation indices as high as 80. He mentioned also that the manufacturers report a very low order of acute toxicity for the compound.

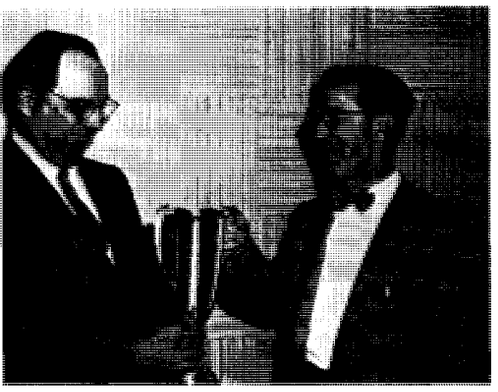
Photoactivation Effects on Lard Colors. Investigating the conditions which might lead to formation of the blue-black sludge occasionally noted in lard storage tanks, L. R. Dugan, Jr., American Meat Institute Foundation, found them to be associated with storage of lard treated with antioxidants containing propyl gallate, in iron vessels where moisture was present. There is apparently no relation between formation of this sludge and the solubility of antioxidant ingredients in the lard, he said.

Dr. Dugan also mentioned a new blue color due to photoactivation effect. When lecithin is present in iron-contaminated lard containing antioxidants such as butylated hydroxyanisole, propyl gallate, and citric acid, this photoactivated blue color appears.

Soybean Processing. Data obtained by John W. Dunning, V. D. Anderson Co., indicate that soybeans may be efficiently prepressed prior to solvent extraction at capacities as high as 65 tons of beans per day per expeller, yielding prepressed cakes containing 7% to 9% oil. Data on oil extraction and removal of solvent from the meal indicate, however, that prepressing is not economical as a means of increasing the capacity of existing soybean plants.

Application of the new filtration-extraction process developed by NRRL to the processing of soybeans was reported by H. L. E. Vix. Dr. Vix pointed out that this should be of particular interest to small and medium sized mills, especially those processing both cottonseed and soybeans. Best results were obtained by coarsely cracking the soy-

H. J. Dutton (left), and F. R. Senti, of NRRL, taste some of the new "global spread" developed at NRRL



Paul D. Cretien, Texas Testing Laboratory, left, receives the AOCS Smalley Cup for the third year in a row from R. W. Bates, Smalley committee chairman (Armour & Co.)

beans, removing some hulls, conditioning the cracked meats, flaking to approximately 0.010-inch thickness, cooking for 20 to 30 minutes at temperatures up to 225° F. with initial moisture content of 15 to 17% and final content of 10 to 12%, evaporative cooling, and screening and reforming the "overs" fraction. Extracted meal contained less than 1% residual lipids. Miscella for oil recovery contained 20% oil and 0.3% fines. A good quality oil resulted.

Oil Content of Flaxseed. Rapid determination of the oil content of flaxseed was described by W. H. Hunt, Production and Marketing Administration, USDA. Samples are ground in a special grinder-extractor in an oil solvent, the mixture filtered, and the solvent-oil mixture placed in the cell of a high-frequency oscillator. Measurement of dielectric properties is converted to oil content by use of a conversion table, with results on a single sample possible in about 20 minutes. Heating of flaxseed samples by infrared heat before grinding shortens analysis time and gives improved uniformity and accuracy of results.

Trans Isomer Formation during Glyceride Oil Hydrogenation. Animal fats do not develop large amounts of trans isomers, but vegetable oils, particularly under conditions favoring selective hydrogenation, develop significant amounts of these high-melting, less digestible isomers. Studies by R. J. Sims, Swift and Co., indicate that trans isomer formation is promoted by increased temperature, decreased agitation, and low concentration of catalyst. Use of platinum, a very nonselective catalyst, results in development of only small amounts of trans isomers. Palladium is as selective at 40° C. as reduced nickel catalysts are at 200° C., and while use of palladium catalysts above 40° C. does not increase selective action, it does increase tendency toward trans isomer formation. During hydrogenation the trans content of oils (increasing with higher initial iodine values) increases to a maximum and then drops to zero as the fat approaches complete saturation.

Rapid Treatment of Meat-Packers' Wastes for B.O.D. Reduction

Triple-effect evaporation of antibiotic spent beers offers lower costs and flexibility for adapting to fluctuating antibiotic production

WEST LAFAYETTE, IND.—Probably no paper at the eighth industrial waste conference held here at Purdue University last week excited more intense interest than the description of a pilot plant for accelerated—and more economical—treatment of packing-house wastes. The first pilot plant of this type was built about three years ago at the Austin, Minn., plant of Geo. A. Hormel & Co., and has been operated successfully in the treatment—by anaerobic decomposition—of 10,000 gallons per day of packing plant wastes. (In the absence of the authors, W. A. Fullen of Hormel and G. J. Schroepfer of the University of Minnesota, the paper was presented by A. J. Steffen of Wilson & Co. Wilson has recently set up its own pilot plant of a similar nature at Albert Lea, Minn.; a third installation is reportedly under development at Auckland, New Zealand.)

Crux of the new process is anaerobic digestion at elevated temperature, carefully controlled at 95° F. Anaerobic processes had previously been applied to the treatment of relatively strong wastes, containing 10,000 parts per million or more of volatile solids, but the Hormel adaptation permits treatment of wastes containing as little as 1000 to 2000 parts per million solids.

Raw wastes for the pilot plant feed are taken from a simple pretreating plant where grease and large solid particles are mechanically removed. The wastes are transferred to the digester, where they are agitated by continuous circulation at the rate of 20,000 gallons per day. Digestion temperature is maintained at 95° F. by circulating the digester liquor through an automatically controlled external heat exchanger. Evolved gas is collected at the digester's domed top, and metered out of the system at a controlled rate.

As the digestion is completed, the waste stream is passed through an evacuator; degassing of the liquor at this point eliminates troublesome flotation of part of the sludge by gas-lifting. Following evacuation, the waste is transferred to a sedimentation tank for the settling of the sludge. The settling rate can be greatly accelerated by the addition of fly ash, in an amount equal to the dry weight of the suspended sewage solids.

Removal of more than 95% of the waste stream's B.O.D. is common in this system, with loadings as high as 0.20 pound B.O.D. per cubic foot of digester tank volume per day, and with digester detention times as low as 10 to 12 hours. For equivalent B.O.D. removals, conventional aerobic processes (activated sludge and trickling filters) are restricted to much lower loadings.

The new anaerobic process has been demonstrated to be very rugged; it is able to withstand long periods of zero or greatly reduced feed rates, for instance, with no observable detrimental effect when full operation is resumed. And one of the system's chief advantages lies in its economic potential. According to a calculated estimate contributed by Wilson's Steffen, a plant for the treatment of 1.5 million gallons of waste per day, using this anaerobic system followed by a finishing trickling filter, would cost about $200,000 less than a conventional two-stage aerobic plant consisting of one large "rough" trickling filter and one light polishing filter.

Antibiotic Wastes. An entirely different approach to waste processing, embodying a triple-effect evaporator for the treatment of antibiotic spent beers, was described by K. H. Edmondson of the Upjohn Co. The deep vat fermentation of penicillin-type antibiotics, said Edmondson, yields a high B.O.D. waste containing up to 8000 to 12,000 parts per million. An economic comparison between evaporation and biological treatment was found to favor evaporation, since it offers lower stand-by costs, and provides flexibility that permits adaptation to fluctuating antibiotic production. In addition, waste beers from some antibiotics contain materials that are toxic to the microorganisms in trickling filters; efficiency of the biological treatment of such beers would naturally be limited. In the evaporative treatment, these toxic materials are destroyed, and give no further trouble in polishing filters.

The Upjohn system consists of a triple-effect evaporator abetted by a trickling filter; waste feed enters the evaporator's second stage, progresses successively through the third and first stages, and is discharged. Pressure is progressively reduced from the first to the third stages, so that the temperature is highest in the first stage where the waste stream tends to be most viscous. The higher temperature in the first stage aids materially in maintaining fluid flow of the concentrated waste stream.