III — Vacuum Processing Techniques — III
Contd.

Abstract No. and References

Greaseless Stopcock for Use at Sub-Atmospheric Pressures 59/III

See Abstract No. : 35/II

39 — MISCELLANEOUS PROCESSES — 39

Rapid Heat Processing of Fluid Foods by Steam Injection 60/III

United States. In order to improve existing methods for short-time high-temperature heat processing and concentration of fluid foods, such as fruit and vegetable juices, a new type of equipment has been developed and the results of its operation on a pilot plant scale are described. The plant consists essentially of a pre-heater, a steam injection heater supplied with clean steam, a combination evaporator and a vapour liquid separator. The two main features of the equipment are the steam injection heater and the combination evaporator. The injection heater is made from a 12 inch length of 3/8th inch i.p.s. stainless steel pipe and consists essentially of the following components : product inlet tube, heater body fitted with a thermocouple, discharge orifice and product outlet tube. The steam is admitted to the heater body tangentially. This apparatus preheats or superheats the processed material before it enters the evaporator. The latter consists of a steam jacketted tube made from stainless steel ½ inch i.p.s. and 6 ft. long. The material reaching the evaporator is concentrated by evaporative cooling at a pressure below its vapour pressure at the temperature prevailing in the injection heater. The amount of water evaporated is proportional to the heat which has to be removed in order to cool the material down to its vapour-liquid equilibrium temperature in the separator. The combination evaporator and steam injection heater are operated as continuous processing units. For the pasteurisation of milk, raw milk was processed in the plant, *i.e.* it was heated to 245°F in the injection heater and cooled evaporatively to 80°F, the whole process not taking longer than 0.7 seconds. The raw milk was concentrated from 11.4% to 26.0% solids in a single pass through the combination evaporator with the injection heater operating at 244°F and the evaporator kept under low pressure. The enzyme phosphatase in raw milk was found to be inactivated by heating the milk to 185°F and cooling evaporatively to 95°F in a total time of 0.4 seconds. Results with other food materials are also given.

Article by A. H. Brown, M. E. Lazar, T. Wasserman, G. S. Smith & W. M. Cole
Industr. Engng. Chem. 43, Dec. 1951 2949-2954

Sommaire : Compte rendu des résultats obtenus par une installation d'essai d'un nouveau procédé de chauffage rapide, par injection de vapeur, de produits alimentaires fluides.

Inert Gas : Safeguard of Quality 61/II

United States. Nitrogen processing and packaging in the food industry is not new but its importance is still growing. Nitrogen gas can be used in processing and packaging of foods like edible oils, margarine, coffee, dried activated yeast, nut meats, sandwich meats, bacon, sausages, dehydrated potatoes, etc. The proper protection of food products depends essentially on the effectiveness with which oxygen can be kept out or removed from the container. The atmospheric air consists of about 1/5th of oxygen, the remainder is mainly nitrogen. This means that breaking back a vacuum with nitrogen does not reduce the amount of oxygen present and it is important therefore to use nitrogen of extreme purity only. If the product is unstable and persistently releases dissolved oxygen, packaging in vacuum or providing nitrogen head space is not the complete solution. For example, a product contains about 0.6 cm^3 of dissolved oxygen in every hundred cm^3 of liquid and the container is designed to allow for a head space of 10%. If packed with air in the head space the total oxygen content will be about 2.95 cm^3 per 100 cm^3 of liquid. Only by purging the head space with nitrogen or by nitrogen stripping can this figure be reduced to 0.8 cm^3. It is important to have accurate knowledge of the rate at which oxygen diffuses through a film used for packaging. Even if the film is free of pin holes and has good sealing properties oxygen can be transferred by diffusion due to the difference between the partial pressure of oxygen inside the package and the surrounding atmosphere. A product packed in vacuum may appear to be gas-tight but unless the film possesses an inherently low oxygen permeability, product deterioration by chemical absorption of diffused oxygen can occur without apparent change of pressure.

Article by T. W. Eselgroth
Food Engng. 23, Dec. 1951 72-75, 153 & 155

Sommaire : Discussion des diverses formes d'application d'azote dans l'empaquetage des produits alimentaires.

Frozen Concentrated Apple Juice 62/III

See Abstract No. : 31/III

Costs and Methods for Pie-Stock Apples 63/III

United States. The cost of supply of pie-stock apples to a distant market is influenced mainly by two considerations : weight and volume of the packaged product and the storage and transport conditions required. The Western Regional Research Laboratory have compiled cost estimates to provide an economic foundation on which to base laboratory work on improved processes. The Pacific States are growing more apples than can be consumed locally and are compelled to sell their surplus in Eastern markets. The article gives the relative costs of supplying Eastern markets with Western apples processed by various methods. The following processes are taken into account : (1) Dried. (2) Vacuum Dried. (3) Dehydrocanned. (4) Canned. (5) Dehydrofrozen.