EXTRUDED PRODUCTS

Extrusion cooking is one of the most promising techniques in the field of food technology developed in the recent times. Its advantages are many, which have been well documented in the literature. However, practice of this technology, has remained more an art than the science. Knowledge and database on extrusion cooking is however growing fast. Extrusion cooking is associated with partial or complete gelatinisation of the starch, complex formation, transformation and interactions involving bio-polymers.

Of the two types of extruders (single screw and twin-screw), twin-screw extruder permits a greater flexibility of operation to achieve the desired time, temperature, and shear range for the processed material because of an additional independent variable, viz., screw configuration.

Understanding the extruder behaviour and material flow during extrusion cooking is essential to the design of automation and control systems. Some models have adapted from plastic extrusion with modifications that account for the differences of foods from plastics.

Cereal grains lend themselves as good raw material for preparation of ready to eat snack foods and other products on account of high starch content in them. Extensive work has been reported on extrusion of corn (maize), in comparison to that for wheat and rice. The latter is of significance to India and other Asian countries.

Rice is a popular, nonallergic, gluten free source of carbohydrate, vitamins, and minerals with little fat. With an annual production of over 120 million tonnes of paddy, rice is the largest crop produced and consumed in India. It is the major supplier of energy, protein and other nutrients in the diet of more than half of the Indian population. Apart from being consumed as whole grain for table purposes in the form of raw milled rice or parboiled milled rice, a considerable quantity of paddy is also converted into many traditional products. Extrusion cooking could give products similar to the traditionally prepared expanded or puffed rice products with advantage of being more hygienic and economic process. However, literature on twin-screw extrusion cooking of rice is rather scanty.

PREPARATION OF EXTRUDED PRODUCTS

Extrusion is a process that combines several unit operations including mixing. kneading, shearing, heating, cooling shaping and forming. It involves compressing, and working raw material eg. Flours, starches, proteins, salt, sugar and other minor ingredients to form a semi solid mass under a variety of controlled conditions and then forcing it to pass through a restricted opening such as a shaped hole or slot at a predetermined rate. Heat in applied directly by steam injection or indirectly through a heated barrel. The final process temperature in the cooking extruder can be high as 200°C but the time of exposure to heat is relatively short (10-60 seconds). The extrusion cooking is also called a high temperature short time (HTST) process.

Extruded products

Rice based extruded products include sevai, idiappam, murukku (chakli) rice based vadagam etc. Rice based noodles and noodles from fermented rice flour are popular in China, Japan and the orient.

Advantages of extrusion cooking

The extrusion cooking process has been used increasingly because of its higher efficiency in comparison with conventional methods involving batch processing and multistage operation. The main advantages of extrusion cooking over conventional processes such as baking, autoclaving, etc are briefly listed below

- Rapid high energy transfer into mass with H.T.S.T advantages
- High capacity with smaller investment and less space taken
- High energy efficiency because less drying required (low moisture cooking)
- Continuous and automated operation, less manpower requirement
- Precise control of residence time and temperature, uniformity of cooking
- No effluents
- Wide range of ingredients (size and consistencies) can be handled
- Diversity of product's shapes

Applications

Extrusion cooking technology has almost limitless applications in the processing of cereal-based foods and other materials, and is associated with partial or complete gelatinization of the starch, complex formation, transformations and interactions involving biopolymers. The technique may be used to precook, instantize and agglomerate food components.