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A HEAT SHOCK PROCESS FOR THE

PUFFING OF DRIED FOOD GELS

Original Copy.

A Thesis presented in partial fulfilment of the requirements for the degree of Master of Food Technology in Food Chemistry and Engineering at Massey University of Manawatu, Palmerston North, New Zealand.

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S U M M A R Y

A number of traditional Asian foods which consist primarily of a dried starch gel containing various flavourings, puff when fried in hot fat. A study of this phenomenon has been undertaken and a theory put forward explaining the mechanism.

Factors affecting the puffing of starch gels such as moisture content, frying temperature, gel strength and method of heating were studied in detail. The puffing of a gelatine gel was also studied and it was shown that the puffing characteristics of each gel were basically similar.

Two major factors are considered to dictate the puffing characteristics of a gel. They are -

- (a) Internal steam pressure, and
- (b) Thermoplasticity of the gel.

These two factors are affected by such variables as moisture content, gel strength, frying temperature and rate of heating.

The postulate that "any polymolecular food gel will puff when fried under optimum conditions" is substantiated by experimental evidence, with the exception of non-reversible gels. These gels are formed by high energy primary chemical bonding and do not puff when fried. Sugar and fat were found to drastically modify puffing characteristics when added to a gel.

Three polysaccharide and three protein gels were satisfactorily puffed. All these gels were reversible and included wheat gluten, milk

protein, gelatine, starch, pectin and agar.

Some application of this process to the preparation of foods was made. It was applied to a number of raw materials and satisfactory puffing was obtained in such diverse materials as cheese, carrots and tapioca.

Both the market and product potential of products produced by this process are promising. It is suggested that the process may be suitable for the preparation of

- (a) "Instant" foods,
- (b) Snack foods,
- (c) Powdered flavourings.

Although still relatively unknown, this process could become an established food processing operation with a much wider field of application than at the present time.