OCR
RECOGNISING ACHIEVEMENT

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AS GCE APPLIED SCIENCE

G623/01/INSERT Cells and Molecules

PLAN FOR AN INVESTIGATION

INSERT

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INFORMATION FOR CANDIDATES

- The abstract on pages 2 and 3 of this insert is to give you some background information that you might find helpful in planning for the task that follows. Not all the information included will be directly relevant and you are expected to select the information that is relevant to the task.
- This document consists of **4** pages. Any blank pages are indicated.

Cheese making

Cheeseology

Cheese making has been practised for thousands of years, perhaps starting when herders stored milk in bags made from animals' stomachs and found that it created a tasty protein-based snack with a longer shelf-life than fresh milk. An enzyme called rennin obtained from the stomachs of mammals, causes the milk proteins to clump together into curds, leaving behind a watery liquid called whey.

The curdling is assisted by bacteria that turn milk sugars into lactic acid. Traditionally, these bacteria were naturally found in milk or on the cheese making equipment. Today, most cheese is made from milk that has been heat-treated, or pasteurised, to kill any harmful bacteria, and then mixed with starter cultures of carefully selected bacteria. Raw milk is still used for some artisan cheeses, leading to more complex flavours, according to aficionados.

The curds undergo various cycles of fermentation, pressing and maturation, or 'ripening'. Further cultures of bacteria or fungal spores may be added to give the cheeses their particular characteristics. Roquefort, for example, is ripened in certain caves in France. Brie has fungal spores sprayed on, while washed-rind cheeses are bathed in liquids such as brine or brandy to encourage the growth of specific microbes.

Remarkable rennet

Rennet contains a mixture of enzymes, produced in the stomachs of mammals. 'Chymosin' is the active proteolytic enzyme in rennet, which is used to make cheese. This coagulates (clots) the proteins in milk, forming solid curds (from which cheese is made) and liquid whey.

Makers of cheese (from cow's milk and sheep's milk) and tofu (from soya milk) may use edible acids, such as citric acid, if they do not want to use animal-derived rennet to separate the solid protein curds from liquid whey.

Curdled coffee

It is hard to ignore the growing number of soya products now available on supermarket shelves.

Everything from milk to bread, yoghurts, cereal and even pasta are now being marketed for the apparent health-giving properties of the soya bean. The soya bean and related soya products have been popular with vegetarians for years because of the protein they contain, a constituent often missing from the vegetarian diet. Soya milk has also become increasingly popular with people who are intolerant to lactose in cow's milk. In the past few years there have been claims that soya may also have other important health benefits relating to heart disease, the menopause and osteoporosis.

One problem associated with soya milk is curdling when used in coffee and tea. Coffee is acidic, generally more so than tea. When added to coffee, the solids and liquids in soya milk separate, which is similar to the process of making tofu. The pH required to make tofu from soya milk is around 5.7 to 6.4. Tea and coffee tend to be more acidic than this, explaining why soya often curdles in some teas and coffees.

Separating cow's milk into curds and whey requires a significantly lower pH in the region of 4.6. As this pH is more acidic than is usual for tea and coffee, curdling in coffee made from cow's milk is not common.