**Measuring pH change during yoghurt production STUDENT**

**Introduction**

Fermentation of lactose in milk by bacteria such as *lactobacillus* lowers the pH of the culture and transforms milk to yoghurt. This process can be monitored over time by a pH probe connected to a data logger.

**Aim**

To use a pH meter and a data logger to record the changes in pH as milk is turned to yoghurt by bacterial action.

**Intended class time**

60 minutes total time: 30 minutes for the first session and 30 minutes for the last session.

**Chemicals**

|  |  |
| --- | --- |
| Milk  | No known hazard |
| Starter culture | No known hazard |

**Equipment (per group)**

* Data logger with pH probe
* Milk
* Starter culture of live yoghurt
* Spatula
* 250 cm3 Beaker
* Aluminium foil

**Health and Safety**

* The starting materials present no known hazard.
* Unless the incubation is carried out in a dedicated food technology area the end culture must be treated as contaminated and disposed of safely. The end product should not be eaten.

**Procedure**

*Note: by mixing a small volume of starter culture with a larger volume of milk you can create a culture of bacteria that will ferment the lactose in the milk, producing lactic acid and lowering the pH.*

*Note: fresh milk has a pH of approximately 6.6.*

1. Use the equipment provided to set up a bacterial culture producing yoghurt from milk. When deciding on your experimental set-up consider:
	1. ways to check the accuracy and whether you will need to recalibrate your pH probe
	2. ways to reduce the risk of contamination of your culture by other microorganisms
	3. where, at what temperature and for how long you will incubate the culture.
2. Use the pH probe and data logger to monitor the pH of the culture over time. Consider completing a short trial run to ensure you can successfully log data. Also be aware that the pH probe is delicate and should be handled carefully. Your teacher will give you guidance on the use of the pH probe.
3. At the end of the incubation period save your data file and analyse the results including:
	1. graphical presentation of the data
	2. calculations of the rate of pH change
	3. discussion of the results with reference to the data

**Extension questions**

1. Why is the product of this activity not fit for human consumption and what changes would need to be made so that it could be safely eaten?
2. What factors might contribute to the reduction, and eventual cessation, of the fall in pH over time?
3. Suggest ways in which you could investigate which of the factors identified in question 2 are most important in halting the fall in pH.

**To submit**

For this piece of work to count towards Practical Activity Group 10 of the Practical Endorsement, you need to have evidence of the data logging you have done, the graph with any annotations, your calculation(s) and discussion. You also need to consider the above questions as the answers to these questions will aid you in preparation for your written examinations.