Yoghurt and industrial fermenters

Student activity • observation and reasoning

YEAR 10 / LESSON 24 / BIOLOGY + SCIENCE (DOUBLE AWARD)

The question

Why do industrial cultures need controlled conditions?

Use the supplied examples, record your reasoning and correct it using evidence.

Equipment

- Student booklet, paper models, pencil and ruler

Paper, modelling and written reasoning only. No chemicals or biological samples are handled.

Course coverage: Shared Biology / Double Award: 5.7–5.8. Bacteria in food production and fermenter conditions.

Plan, model or apparatus sketch

Draw and label the apparatus or biological model; identify one limitation.

Method and reasoning

Read the whole sequence before starting

YEAR 10 / LESSON 24 / BIOLOGY + SCIENCE (DOUBLE AWARD)

1. Draw a labelled fermenter with a nutrient inlet, temperature sensor, cooling jacket, stirrer, pH sensor, sampling port and appropriate gas supply.

2. Explain how Lactobacillus converts milk sugar into lactic acid, lowering pH and changing milk proteins during yoghurt production.

3. Match each fermenter feature to its purpose: heat removal, uniform mixing, nutrient supply, pH control and reduced contamination.

4. Distinguish general fermenter design from a particular process: oxygen supply is required for aerobic cultures but is not a universal instruction for every fermentation.

5. Consider a scenario where temperature rises while cooling fails. Predict effects on growth and product formation and identify evidence needed before deciding the cause.

6. Explain why aseptic handling protects the product and culture. This lesson uses a diagram and scenarios; it does not prepare food for consumption.

Cleanup

- Return models and keep the corrected work.

Record your evidence

Blank spaces are for your own work

YEAR 10 / LESSON 24 / BIOLOGY + SCIENCE (DOUBLE AWARD)

Reference and task data

Yoghurt production commonly uses selected lactic-acid bacteria, including Lactobacillus. Industrial systems control conditions appropriate to the organism and product. Stirring distributes materials and heat; cooling removes metabolic heat. Aseptic precautions reduce contamination but do not justify assuming a culture is sterile without evidence.

Example / trial	Observation / evidence	Explanation / limit
Fermenter feature / purpose		
Yoghurt process sequence		
Fault scenario / evidence		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

YEAR 10 / LESSON 24 / BIOLOGY + SCIENCE (DOUBLE AWARD)

1. What happens to milk sugar during yoghurt production?

2. Why is temperature monitored?

3. Why is stirring useful?

4. Why might pH need control?

5. Must every fermenter be aerated?

6. Give a consequence of contamination.