Fermentation: conditions and evidence

Teacher / technician

YEAR 11 / LESSON 98 / CHEMISTRY ONLY

Staff preparation and answer guidance. Keep separate from student sheets. A fermentation setup is not a certified ethanol-production measurement; no tasting or isolated alcohol is permitted.

Coverage and delivery

Chemistry only: 4.32C–4.33C. Fermentation setup and observation; no distillation, tasting or chromium(VI) test.

Allow about 60 minutes. Follow the student sequence and use the answers to check reasoning.

Requisition • class of 30, working in 15 pairs

Item	Per pair / setup	Class total
Booklet / writing tools	1 per learner	30 sets
Flask / venting airlock	1 per pair plus control	16 sets; 30 eye protectors
Glucose / yeast	5.0 g / 1.0 g per pair	100 g / 20 g including spare/control
Warm water / monitored bath	50 cm^3 per pair	1 L water plus bath water

Immediate safety

Wear eye protection; no tasting, flames or sealed vessels. Keep the gas vent clear and follow the teacher's labelled storage/disposal plan.

Preparation and delivery

Read alongside the student method

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1. For 15 pairs prepare 75 g glucose and 15 g yeast; allow 100 g glucose, 20 g yeast and 1 L water including spare. Provide 15 clean 100 cm^3 flasks, venting fermentation airlocks, cylinders, labels and 30 eye protectors.

2. Prepare one additional no-yeast control with the same glucose/water and temperature. Check every airlock's escape path before use; leave headspace and never tightly seal a producing culture.

3. Use a monitored water bath near 30 °C, not direct flame. Prevent spills, inhalation of yeast dust and ingestion; no tasting, sniffing directly or beverage use.

4. Arrange labelled secure storage and a defined follow-up/disposal time. Do not retain unidentified contaminated cultures. Teacher handles any contaminated vessel under the school microbiology procedure.

5. Allow 15 minutes setup, 20 observation and 25 equations/evaluation. No ethanol flame test, distillation or dichromate test is included. Local setup trial remains required.

Close of lesson

• Leave labelled vessels only in the designated tray. Staff dispose of cultures under the school procedure; wash equipment and hands.

Check before teaching

Check the cards, reference data and quantities against this requisition. Keep the staff answer guide separate until the checking stage. Supplied numerical practice datasets are labelled examples; they are not class measurements.

Answers and teaching notes

Expected explanations • do not give as experimental observations

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- $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$.
- Yeast supplies enzymes catalysing fermentation.
- High temperature can denature enzymes and kill yeast; cold conditions slow their activity.
- Restricted oxygen supports anaerobic fermentation; CO_2 must escape to prevent pressure buildup.
- Whether observed activity depends on yeast under otherwise matched conditions; contamination and temperature still matter.
- Gas can arise in other processes; a separately validated test or analysis is needed to identify ethanol.

References and provenance

Pearson Chemistry specification

RSC fermentation background

Prepared 22 November 2026. Original wording, tables and questions. Sources inform the concepts and technique; the lesson scope and classroom quantities are explicitly described here. No laboratory trial or final school risk approval is claimed.