Diffusion in agar: distance and time

Teacher / technician

YEAR 10 / LESSON 16 / BIOLOGY + SCIENCE (DOUBLE AWARD)

Staff preparation and answer guidance. Keep separate from student sheets. Chemical indicator front in non-living agar; not a direct measurement of transport through a cell membrane.

Coverage and delivery

Shared Biology / Double Award: 2.16–2.17. Factors and a non-living diffusion model.

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
Booklets / eye protection	2 of each per pair	30 of each
1 cm indicator-agar cubes	3 per pair	45 plus 5 spares
Beakers / forceps / rulers / timers	3 beakers and 1 of each tool per pair	45 beakers; 15 of each tool
0.1 mol dm^{-3} hydrochloric acid	90 cm^3 per pair	1.6 dm^3 including spare
Teacher sectioning stations	blade and stable tile; staff only	3–5 stations

Immediate safety

Wear eye protection and avoid splashes. Do not eat the agar. Students use pre-cut cubes; the teacher handles the blade for centre sections on a stable tile. Report spills or cuts immediately.

Preparation and delivery

Read alongside the student method

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1. Staff prepare indicator agar using the school's established dilute-alkali recipe and cut uniform 1 cm cubes. Check all reagent labels and local risk assessment; learners do not prepare hot agar or stock solutions.

2. Pilot the actual agar batch so the 2, 4 and 6 minute observations retain measurable boundaries where possible; adjust the shared times before class if needed and document them.

3. Provide enough acid to cover each cube fully and check safe staff-only sectioning capacity. Use 15 matched sets and pool repeats; do not treat different agar batches as identical.

Close of lesson

- Return acid and indicator residues to the labelled waste containers as directed.
- Place agar in solid waste, not the sink; rinse apparatus, clean the bench and wash 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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- Exposure time; the measured response is the colour-boundary depth.
- 3 mm.
- Cube dimensions, agar batch, acid concentration, acid volume, temperature or mixing.
- An off-centre cut gives a misleading core width and hence depth.
- Once the boundary reaches the centre, the cube cannot show any further penetration distance.
- The model contains no living cell membrane, active transport or metabolism; the indicator front also depends on chemical reaction.

References and provenance

Pearson Biology specification

Practical Biology: agar diffusion model

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.