

Edexcel A Biology A-Level

Core Practical 16

Investigate rate of respiration practically.



A respirometer is a piece of equipment which measures the **rate of respiration**. It works by the addition of a drop of coloured liquid to a length of tubing. As the organism respire and the volume of oxygen in the tube decreases, the **pressure also decreases**, and the liquid **moves down** the pressure gradient towards the respirometer.

Equipment

- Respirometer
- Actively respiring organisms
- Soda lime
- Coloured liquid
- Pipette
- Solvent
- Cotton wool
- Stop clock

Method

1. Assemble the respirometer.
2. Add 5g of one organism to the boiling tube and replace the bung.
3. Place a drop of **coloured manometer fluid** in the open end of the respirometer.
4. Use a **syringe** to draw the fluid as far from the respirometer as possible and record its starting position.
5. **Close the tap**. Start the stop clock.
6. After five minutes, open the tap. **Record the end position** of the coloured liquid.
7. Repeat the process for the other organism.

Risk Assessment

Hazard	Risk	Safety Precaution	In emergency	Risk Level
Broken glass	Cuts from sharp object	Take care when handling glass objects; keep away from edge of desk	Elevate cuts; apply pressure; do not remove glass from wound; seek medical assistance	Low
Soda lime	Corrosive	Wear eye protection; avoid contact with skin, keep away from edge of desk	Wash off skin immediately; flood eye/cuts with cold water	Low



Biohazard	Contamination	Use disinfectant; wash hands with soap after handling organisms	Seek assistance	Low
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Analysis

- Convert distance moved by the liquid in the time into volume of gas by using the πD formula with the diameter of the respirometers tube to produce a **cross-section** and then **multiplying by distance** moved.
- Convert volume into **rate** by dividing by **five minutes**.
- Convert rate into **rate per gram** of organism by dividing by **five grams**.

Conclusion

- **Soda lime absorbs carbon dioxide** that is given out during respiration, so any changes in volume are assumed to be only due to differences in **oxygen uptake**.
- Gas exchange due to **photosynthesis** is ignored and all of the gas is assumed to be oxygen.
- Different organisms have different rates of respiration - the **animals have a higher rate of respiration** per gram than the plants, as they have a **higher metabolic rate** and require much more energy to be released for movement/reproduction/etc.

