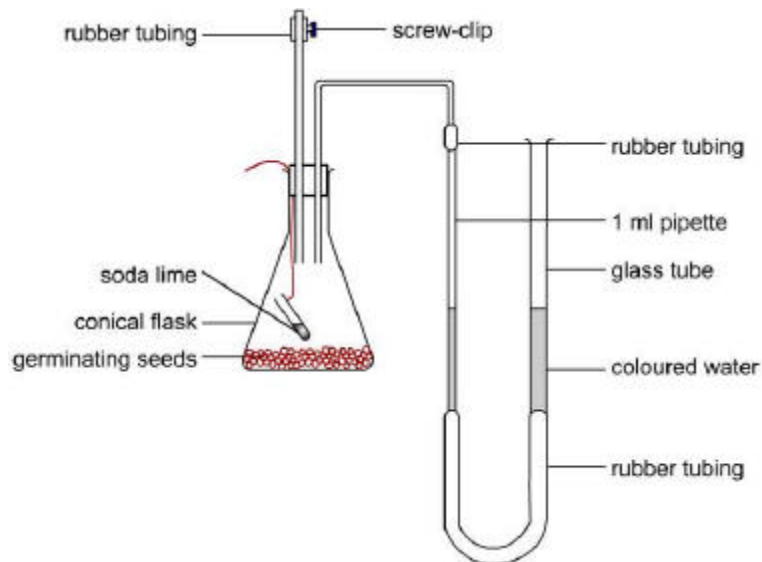


21. Determination of the rate of aerobic respiration

The respirometer as shown in the diagram is used to measure the uptake of oxygen by respiring seeds. Any other small living organisms (e.g. insect) could be used for this investigation. This is done simply by measuring the change in the volume of gas surrounding the seeds. It is therefore essential to eliminate volume changes that are caused by anything other than the uptake of oxygen by the respiring seeds.



As the seeds respire, they will produce carbon dioxide which is absorbed by soda lime (or pellets of sodium hydroxide). The volume of air in the flask decreases as oxygen is used up. Consequently the coloured water in the 1 ml pipette rises. After adjusting the pressure changes in the volume of air in the flask, the rate of oxygen uptake can be measured.

Procedure

1. Place the germinating mung beans (about 300 in number, and with seed coats removed) into a 250 cm³ conical flask. Set up the apparatus as

shown in the diagram.

(Apply vaseline to the joints to ensure that the system is air-tight.)

2. Allow a few minutes for the system to equilibrate.
3. Close the screw-clip. Take the initial reading of the coloured water level in the 1 ml pipette.
Record the time.
4. After 5-10 minutes, raise or lower the glass tube to equalize the liquid levels in the glass tube and the 1 ml pipette. Take the final reading of the water level in the 1 ml pipette. Calculate the volume change which has occurred in the 1 ml pipette. This is equivalent to the volume of oxygen uptake over the period of time.
Record the time.
5. Open the screw-clip. Repeat steps (3) and (4) to get a second reading.
6. Average the two readings. Calculate the rate of oxygen uptake (cm^3 oxygen per hour).