

Aim

To experimentally demonstrate that carbon dioxide is released during the process of respiration.

Principle/Theory

The process of respiration is biochemically carried out wherein food, glucose to be precise is oxidized and energy is released. In this experiment, gram seeds (moistened) are used. The purpose of using these seeds is that they release carbon dioxide and are respiring actively. The released carbon dioxide is consumed by the solution of KOH.

Material Required

- Soaked gram seeds
- U-shaped delivery tube
- Conical flask
- Blotting paper (moist) /cotton wool
- Thread
- Water
- Beaker
- Test tube
- Rubber cork with a single hole
- Freshly prepared KOH solution (20%)
- Vaseline

Procedure

- Germinate close to 25 seeds. This can be done by wrapping them in moist blotting paper or cotton wool for around 3 to 4 days
- Set up the [germinated](#) or sprouted seeds in the conical flask. Spray some water into the flask to dampen the seeds
- With the help of a thread, suspend the conical flask containing the test tube having a freshly prepared 20% KOH solution.
- Use the rubber cork to seal the opening of the conical flask.
- One edge of the U-shaped glass delivery tube present in the conical flask should be inserted through the hole in the rubber cork. The other edge should be placed into a beaker that is saturated with water
- All attachments of the set-up should be sealed. This can be done using vaseline to create an air-tight environment
- The initial water level present in the U-shaped delivery tube needs to be marked.
- Leave the experimental set-up uninterrupted for 1 to 2 hours. Observe the fluctuations in the water level in the tube.

Observation

Careful observation after a certain period of time reveals that the water level in the U-shaped delivery tube has risen in the beaker.

Conclusions

The rise in level water indicates that carbon dioxide is released as a result of germinating gram seeds during the process of respiration in the conical flask. The carbon dioxide that is released in the process is absorbed or consumed by the KOH solution that is suspended in the test tube in the conical flask, creating a vacuum or a void in the flask resulting in the upward water movement in the tube. Hence, the water level in the tube changes.

Precautions

- The seeds that are to be germinated needs to be moistened
- Air-tight environment for all the connections in the experimental set-up
- The KOH solution that is used needs to be freshly prepared
- Care needs to be taken to ensure that one end of the delivery tube is placed in the conical flask. The other edge is submerged in the water of the beaker
- The tube that contains the KOH solution needs to be suspended carefully