

**Skill D: Evaluating**

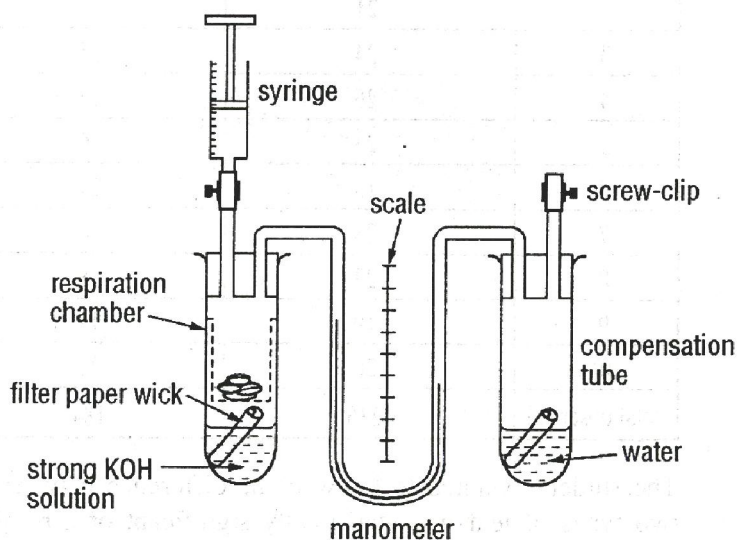
<b>Skill Assessed</b>	<b>D</b>
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**Experiment No. : DP4 (N02) Time: 50 mins**  
**Worksheet Title : Comparison of rate of respiration for different sized kidney bean seedlings.**

**Aim:** In this experiment you will be assessed on your ability to:

- identify sources of error and limitations
- suggest how the experiment could be improved

**Description:** You are provided with the following set up, called the respirometer.



Scale: Markings made at regular intervals on a cardboard.

You are also provided with germinating beans and strong potassium hydroxide solution. Potassium hydroxide absorbs any carbon dioxide present.

- Procedure:**
1. A respirometer was set up as shown. Potassium hydroxide solution has been placed inside the respiration chamber.
  2. Take one germinating mung bean and carefully remove and discard its testa.
  3. Place the seedling in the respiration chamber as shown.
  4. Replace the syringe and manometer.
  5. Leave it for 3 minutes and check that the manometer fluid is now moving smoothly. If it is not, wait until it does so.

6. Measure the movement of the manometer fluid for **1 minute** against the scale provided.
7. Repeat the experiment using a red bean seedling.
8. The results are provided in the table below.
9. Comment on the main sources of error and the limitations of the experimental procedure and/or measurements made.
10. Suggest how the errors/limitations could be overcome.
11. Suggest how the experimental procedure can be improved.

**Large kidney bean seedling**

Bean	Mass/ g	Movement of fluid in manometer/ no. of divisions
1	0.35	5
2	0.36	4
3	0.35	6
4	0.36	5
5	0.37	6
<b>Average</b>	0.36	5

**Small kidney bean seedling**

Bean	Mass/ g	Movement of fluid in manometer/ no. of divisions
1	0.11	1
2	0.13	3
3	0.13	2
4	0.11	2
5	0.12	2
<b>Average</b>	0.12	2