

Name: _____ **KEY** _____ Date: _____

Experimental Procedural Analysis

Answers below are just the obvious errors. Students may be able to justify other errors.

Directions: Find six errors in the experimental procedure/experimental design. Identify them by circling or making a note next to each error/suggested fix.

What is the effect of light intensity on the rate of photosynthesis of elodea?

Procedure

1. **Cut the stem** of a bubbling elodea (water weed) which has been well illuminated to about 5cm. Place the cut surface upwards in a test tube containing sodium hydrogen carbonate solution.

What materials?

2. Gather all materials.

How much water?

3. Place the test tube in the beaker of water and **note the temperature**. The beaker of water acts as a heat filter or heat shield, so its temperature should be checked at intervals to ensure that it is constant throughout the experiment; the water should be renewed if necessary.

At what point is it necessary?

4. **Darken** the laboratory by turning off as many lights as possible.

Needs to be more specific.

5. Attach the **gas-collecting apparatus**, if any.

Needs to be more specific.

Does not make sense given the order.

6. Repeat steps **four and five**, with **increasing distances** away from the light source e.g. 20 cm, 30 cm, 40 cm and 50 cm. Light intensity is inversely proportional to the square of the distance, so as the distance is increased the light intensity decreases. Note that doubling the distance does not half the intensity, rather quarters it.

7. **Place lamp away** from the beaker. Allow the plant to equilibrate or adjust to the light intensity for **two-three minutes**.

Needs to be more precise.

Needs to be more specific.

8. When the rate of air bubbles is **regular and an adequate**, place the capillary tube/test tube over the cut tip of the elodea and then **measure the volume**. OR, **count the number of bubbles**. This should be done **for while**. Average the results.

Needs to be more specific.

9. Record results in a table, then **plot a graph** of volume of oxygen/minute OR number of bubbles/minutes against the distance between the lamp and the plant.

Identify the Independent and Dependent variables in the scenario above.

IV - Distance from light source DV - Number of Bubble or Volume of Oxygen