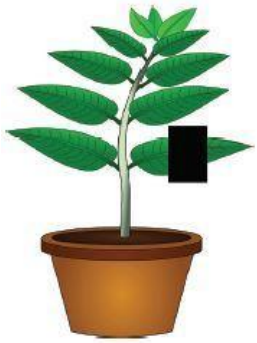
Life Science 11 Name: _____

Investigating Photosynthesis

Problem: How do different colours of light affect starch synthesis during photosynthesis?



Materials:

Scissors
Black construction paper
Potted plan
Tape
Blue, red and green cellophane
5 large test tubes
Alcohol
Hot plate
Glass marking pencil
Forceps
400mL beaker
5 petri dishes
Iodine solution
Paper towel

Design your experiment:

As a result of photosynthesis, new starch molecules (made of glucose) are synthesized and accumulate in leaves. Record your prediction of how keeping parts of a leaf in darkness will affect start synthesis:

Prediction:

1. Cut two pieces of black construction paper large enough to cover half of one leaf of a plant.
2. Sandwich half of the leaf between the pieces of black paper and tape the paper in place.
3. Develop a **hypothesis** that predicts how the colour of the light will affect photosynthesis. *Some research into how colours of light affect photosynthesis will be necessary.*

Independent Variable: _____

Dependent Variable: _____

Controls: _____

Hypothesis: If _____ (independent variable) then _____ (dependent variable) because

_____

_____

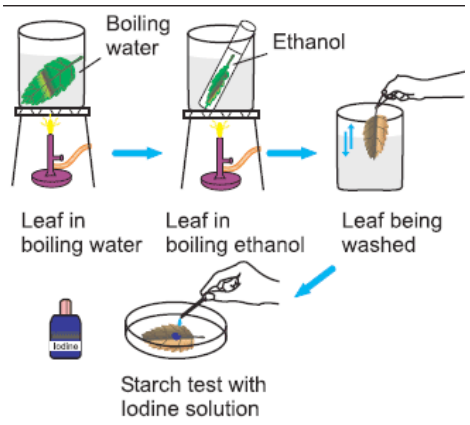
_____

(scientific reasoning)

4. Design a method to test your hypothesis. ***Things to think about:*** *how many leaves will you test, placement of the cellophane?*

Method:

5. Leave your plant in a sunlit area for at least 2 days
6. Bring a beaker of water to boil.
7. Cut off one leaf that was not treated as well as each of the experimental leaves, including the half covered leaf (with black paper on it).
8. Place each leaf in the hot water for 1 min (see diagram). **SAFTEY:** Use forceps when handing the leaf
9. Roll up each leaf and put it in a large test tube. Label each tube and petri dish with the treatment the leaf received.
10. **SAFTEY:** Put on your goggles and lab apron.
11. Before you test the leaves for starch, the chlorophyll must be removed from the leaves. Add alcohol to your test tubes and heat them in a hot water bath (see diagram).
12. When the colour has disappeared from each leaf (about 2 min), use forceps to swirl each leaf in a beaker of room temp water. Place it in a labelled petri dish.
13. Cover each leaf with iodine solution. Iodine solution stains starch blue or black. **CAUTION:** iodine is corrosive and irritating to the skin and can stain clothes and skin. Be careful not to spill it.
14. After 1 minutes, use forceps to gently swirl each leaf in a beaker of cold water and lay the leaf flat on a paper towel.
15. Observe each leaf and record your observations. **SAFETY:** Wash your hand before leaving the lab.
16. Return all materials to where you got them from. Rinse out petri dishes and dispose of liquids down the drain.



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Date table:

Leaf Treatment	Observations. Did the leaf section turn blue/black?	Was Starch produced?

Data Analysis (on a separate piece of paper):

1. Describe your results (from the data table) including scientific reasoning.

2. Was your hypothesis valid (shown to be correct)? Yes or no, why or why not?

3. List some positive aspects of the method (specifically about the variables, measurement and controls).

4. List some concern/negatives about the method (specifically about the variables, measurement and controls).

5. What would you do differently to get better results if you repeated the experiment?) Do not comment on your lab skills but on the steps of the method.

	Beginning	Developing	Accomplished	Exemplary
Hypothesis	No variables identified includes hypotheses in incorrect format	variables are partially identified or identified incorrectly includes hypothesis in "If…then…" format with limited reasoning	variables are correctly identified includes and describes hypothesis in "If…then…" format using scientific reasoning	variables are correctly identified includes and explains hypothesis in "If…then…" format using correct scientific reasoning
Method	Word commands for few steps of lab included. Word commands may not be in own words. Few diagrams	Clear word commands and/or diagrams for some steps of lab.	Clear word commands and diagrams for almost all steps of lab.	Clear, concise word commands and diagrams for all steps of lab.
Analysis Questions	Data is interpreted Validity of the hypothesis is stated Only 1-2 positives and negatives stated about the method. Improvements to the method are stated	Data is interpreted and results are explained Validity of the hypothesis is assessed and outlined using scientific reasoning. A minimal list of positives and negatives about the method Improvements to the method that would benefit the scientific investigation are outlined.	Data is accurately interpreted and results are explained using scientific reasoning Validity of the hypothesis is assessed and described using scientific reasoning. A list of positives and negatives about the method. Improvements to the method that would benefit the scientific investigation are described	Data is correctly interpreted and results are explained using correct scientific reasoning Validity of the hypothesis is assessed and explained using scientific reasoning. A detailed list of positives and negatives about the method. Improvements to the method that would benefit the scientific investigation are explained.