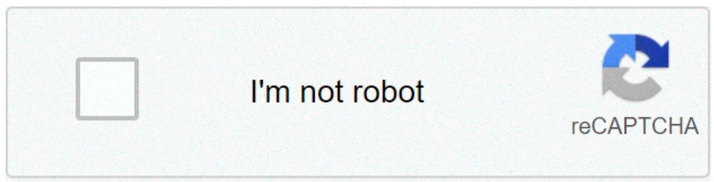

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Floating leaf disk photosynthesis lab conclusion

It may sound ridiculous at first, but it is quite possible. Since oxygen is one of the by-products of photosynthesis, we can measure the rate of photosynthesis in the leaves by observing the release of oxygen. Normally, this would be difficult. But when we sink sheets of leaves cut with a perforation hole in a baking soda solution, we can see the effect of producing oxygen gas: leaf plates begin to float. By measuring how many leaf plates float at regular intervals, we can estimate the agglomeration of photosynthesis. Although we are unable to measure the rate of origin of oxygen molecules, it takes a much more easily noticeable mooli rate of reaction to slithering leaves. Watch an excellent video explanation of the lab layout and implementation in Paul Andersen's Bozeman Science video. Photosynthesis is influenced by many variables, such as the amount and type of light providing energy to the reaction, the number of reagents available and even the type of photosynthesis of the plant. The data below compare the agglomerations of photosynthesis (through floating leaf plates) between two different types of plants. Use what you know about photosynthesis, fill in the questions below. If you want to know a little more about photosynthesis, keep reading before heading into action. There are three types of photosynthesis (which we know): C3, C4 and CAM. C3 is the oldest and most common of these three, used by 85% of the earth's plant species. C3 is prone to photorespiration, resulting in an inefficient carbon dioxide level during photosynthesis. C4 and CAM photosynthesis are (literally) more advanced processes. C4, which was only discovered in 1970, uses carbon dioxide more efficiently by performing photosynthetic cycles in different parts of the leaf to prevent rubis coscos from binding to oxygen instead of carbon dioxide. CAM (crassulacean acid metabolism) plants only open their stomata at night, which is especially useful in hot, dry climates and also allows them to prevent photorestore variation by inhibiting photosynthesis. Go to main contentskip navigation MnSTEP Educational activities collection > MnSTEP activities > Planning an experiment to test photosynthesis agglomerations This action allows students to measure the pace of the photosynthesis process. Students work in small groups to design an experiment with one independent variable and test this variable on spinach leaf boards. Perforated leaf plates initially sink into the test tube, but float when photosynthesis occurs. Students write a laboratory report that includes hypothesis, experimental design, data collection/analysis, and conclusions (observations). Students speculate on further research that could be done and discuss how quickly photosynthesis occurs is the survival of humans on the planet. This activity is designed for students: 1) to learn that the pace of photosynthesis is influenced by environmental factors that can be quantified 2) to understand the photosynthesis equation and how the structure of the magazine allows the required gas exchange through stomata 3) to properly plan the experiment with a single variable, analyze the results and report observations to the class Students use higher order thinking skills throughout this activity. They must use critical thinking to plan the experiment and analyze the data collected. They improve their observational, interrogation and communication skills. Students need to find out whether the question they have chosen is indeed testable. The teacher guides students to problem solving when they plan and modify the exam to assure them that only one independent variable will be tested during the experiment. During the activities, the student learns special concepts. Students learn that: 1) variables in light intensity, temperature, carbon dioxide and light quality all affect the amount of photosynthesis. 2) photosynthesis requires carbon dioxide to obtain the carbon needed to sweeten glucose. This carbon dioxide is supplied with sodium bicarbonate dissolved in water on plant leaf plates 3) the stomata opening is controlled by shield cells and that water, carbon dioxide and oxygen all pass through the stoma openings 4) animal and human food production on Earth depends on plants. By increasing the use of carbon dioxide in plants, it can help slow global climate change. Climate change (warmer in some areas, cooler in other areas) can affect different plant species in different ways. Glossary: -Photosynthesis -Stomata -Guard Cells -Wavelength of Light -Global Climate Change -Carbon Sequestration -Independent Variable -Dependent Variable -Qualitative Data -Quantitative Data This 2-3 hour laboratory activity could be used in high school or university. Ideally, the teacher would have no more than twenty-four students to prepare through this activity. The student has advance knowledge of the equation, which describes the photosynthythical process, as well as a basic understanding of the scientific method. The laboratory could be used in a unit, a scientific method, a unit of a photosynthic unit or a unit studying environmental problems (global climate change and its impact on plants). Subject: Biology:Cell biology:Cell processes:Metabolism:PhotosynthesisSourceType: Activities:Lab ActivityGrade Level: High School (9-12)Description and teaching materials Introduction: Teacher and students look at an equation describing photosynthesis. What types of organisms go through photosynthesis? The discussion includes thoughts that not all plants photosynthetize at the same rate. highlights possible possible and variables that affect photosynthesis. This could include, but is not limited to: plant species, habitat, height, water depth, temperature, available carbon dioxide, available water (desert, tundra, grassland), soil/water pH Prepared microscopic slides across leaf cross-sections. Leaf structures are named and the discussion associates these structures with photosynthesis processes that occur in each. Additional slides in the leaves of the desert plant, water lilies, shadow plants could be shown/used to compare and discuss plant adaptations. The teacher would now discuss/review the process of the scientific method. Now is the time to give examples of how some of the questions raised by researchers cannot be tested. Students should consider the question they raise about the photosynthesis experiment and whether the study can be designed to test their questions. The teacher can now check what the hypothesis is and how to write a specific, testable hypothesis. Basic materials needed for a laboratory group of 3-4 students: -Spinach leaves -4 mm nuclear borer (used to cut holes in cork knox, can be purchased in different sizes, use paper perforation of approximately sized size) or paper piercing (see mains source) syringe (plastic 10 + cc) -.2 % sodium bicarbonate solution (baking soda) -Test tube or plastic cup -Light source -Thermometer -Microscope -Prepared microscopic slides from leaf cross-cutters; plant in the sun, plant in shade, desert plant, water glue Any additional materials required according to the parameter selected for testing: -Different power of filament lamps - Different lamps (fluorescent, Glowing) -Colored cellophane (yellow, green, red, blue are typical colors that can be purchased)(change wavelength light plants get) -Meter stick -Baking soda -Different plant species (other than spinach) -Weak acids/weak bases to change the pH of the solution -Other materials as students plan experiments would prevent photosynthesis? (act as weaper killers?) The teacher is now presenting students with basic technology used to measure the frequency of photosynthesis. Students can follow the instructions in the summary/laboratory report together (see experimental design, steps 1-5 in the sample laboratory report in the evaluation section) The main focus of the study depends on whether students know how spinach leaf boards are made and how they immerse them in water. All students are directed to use this technique . They can now practice this technique (see experimental design and the following the process of selecting the variable in the experiment. Select the question that can be tested and answer during the test. Give students time to plan their experiment and take a test drive. helps coach students as they complete/modify experimental planning to include a question to be tested with only one variable. The final experimental design is written using diagrams/drawings to illustrate the settings. Students can now design/design a suitable data table . (includes appropriate units of measure, compartments, all markings) Finally, students take the exam, analyze and discuss the findings, and report observations to the class. Class discussion connects the laboratory to world affairs; access to food, global climate change. Teaching notes and tips 1) Use fresh spinach leaves, soak them in water overnight at about 4 degrees. This increases the pressure of the turgor and minimizes the lye leaves. Use only the firmed, dark green areas of the leaf. Avoid large tuts or damaged areas. 2) Do not vacuum leaf plates. Too little vacuum processing causes disks to sink, too much vacuum processing can kill cells. Assessment Two rubrics are used to evaluate the student laboratory report (the report sample below) and the student participation. The written exam examines whether the student is in the process of achieving the goals. Example of a student report (some areas are condensed here to save space) Student's name __ Photosynthesis research background: Where leaf is photosynthesis mainly found? How does carbon dioxide get into the paper? Where / how does oxygen leave a leaf? How does water get into the paper from the roots? Get a leaf cross-section (x-section) prepared slide. 100x allows you to make a sketch of what you see. Use a textbook or the Internet to mark the following tissues; Upper epiderus, lower epiderzz, palisade mesophyll, spongy mesophyll, vein (label both xylem and phloem), shield cells, stoma 1) Which of the markings does most photosynthesis appear? (hint; there are more chloroplasts here) 2) What structure does carbon dioxide get into the leaves so that photosynthesis can occur? 3) What is the functioning of watch cells? 4) What purpose does spongy mesophyll serve the leaf and photosynthesis process? 5) Through which marked structures does water get from roots to leaves? (6) Through which marking are blinds manufactured during photosynthesis transported to other parts of the plant where they can be used for energy or stored? 7) discuss variations/adaptations that desert plants, aquatic plants and plants that grow well in the shade have in their leaves, which allow them to survive in their specific environments. Enter a balanced equation for photosynthesis: Experimental design Your table designs an experiment to test how the selected variable affects the rate of photosynthesis. Follow the information below to make plant plates. You can measure how long (in seconds) the plates float float agglomeration of photosynthesis. Preparing leaf plates: 1) Use a cork borer (to cut the number of plates needed for the test). 2) Insert the floppy disks and suck 5 ml (5 ml) of 0.2% sodium bicarbonate (baking soda) 3) Place your finger on the end of the syringe, pull the piston back to the mark of about 35 copies (in a 60 cc syringe) and hold this position for 30 seconds. There should be air coming from the sides of the plates. When this is done, oxygen is removed from the spongy layer of the leaf and .2% sodium bicarbonate enters the spongy layer. This is the source of carbon dioxide that the plant needs photosynthesis 4) Gently inject .2% sodium bicarbonate. Absorb about 10 millilitres of water. Check if the plant plates sink into the water. If not, remove the water and try steps 2 and 3 again. 5) Select the sinking plates. Make sure that there are enough disks available to run the managed test correctly. They are now ready for use in your experimental facility. The plates float after producing a measured amount of oxygen through photosynthesis. The time required to float the plates is an indirect measure of the rate of photosynthesis on leaf plates. Descriptive title of the experiment: __ Purpose / Introduction hypothesis; (use if/ then shape) Explain the logic of the reported hypothesis Draft of the experimental design used. (the draft shall be sufficiently precise to reproduce the test exactly as established; it shall include all measurements, angles, etiquette materials/solutions used, power and type of filament lamps, etc.) Is the data collected qualitative or quantitative data? discuss the trial independent variable (manipulated) variable is __ The dependent variable (responding) in the experiment is __ How is the experiment controlled? Data table: (plan, title and fill in data)(you need to have enough data to make a chart) Chart of data (get chart paper, make an appropriate chart with title and properly marked, paste the chart into this laboratory report) Results/discussion/data analysis: Observations/Conclusion/List of Possible Sources of Error Application to Global Environmental Issues: (list of ideas created during the brainstorming session) List new questions that could be explored In Standards I History and Natural Sciences; Standard for scientific research; Planning and conducting scientific research 1) use scientific methods 2) qualitative and quantitative data 3) sources of error IV.A.5 Photosynthesis processes for energy flow, realities, products References and resources See more MnSTEP activities »