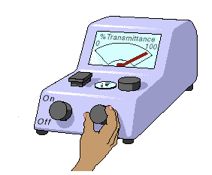
**Bell Ringer**: DPIP & Photosynthesis Practice FRQ

*AP Biology*



Answers must be written in essay form. Outline form or a bulleted list are not acceptable. Labeled diagrams are acceptable to supplement discussion, but in no case will a diagram alone suffice. It is important that you **read each question carefully and completely** before you begin to write. Write your answers on the pages provided.

A controlled experiment was conducted to analyze the effects of darkness and boiling on the photosynthetic rate of incubated chloroplast suspensions. The dye reduction technique was used. The chloroplast suspensions were created by blending spinach leaves with a cold phosphate buffer, and then straining the solids from the liquid portion. The resulting suspension was then mixed with DPIP. DPIP is an electron acceptor that changes from blue to colorless when it is reduced. To measure the amount of light that passes through a solution, a spectrophotometer was used. The spectrophotometer takes two measurements: absorbance and transmittance. Transmittance is the measure of how much light passes through a solution, which indicates how clear the solution is.

Each sample was placed individually in a spectrophotometer and the percent transmittance was recorded. The three samples were prepared as follows:

**Sample 1:**  Chloroplast suspension + DPIP

**Sample 2:** Chloroplast suspension surrounded by foil wrap to provide a dark environment + DPIP

**Sample 3:** Chloroplast suspension that has been boiled + DPIP

The experiment was run and the data that were collected are given below:

|  |  |  |  |
| --- | --- | --- | --- |
| Time  (in minutes) | Light, unboiled % Transmittance  Sample 1 | Dark, unboiled  % Transmittance  Sample 2 | Light, boiled  % Transmittance  Sample 3 |
| **0** | 28.8 | 29.2 | 28.8 |
| **5** | 48.7 | 30.1 | 29.2 |
| **10** | 57.8 | 31.2 | 29.4 |
| **15** | 62.5 | 32.4 | 28.7 |
| **20** | 66.7 | 31.8 | 28.5 |

1. On the axes provided, **construct** and **label** a graph showing the results for the three samples.
2. **Identify** and **explain** the control or controls for this experiment.
3. The differences in the curves of the graphed data indicate that there were differences in the number of electrons produced in the three samples during the experiment. **Discuss** how the electrons are generated in photosynthesis and why the three samples gave different transmittance results.