**Honors Chemistry PBL: Indigo Carmine Assay for Dissolved Oxygen**

**Question:** How can you develop a standard operating procedure (SOP) for using an indigo carmine assay to determine the amount of dissolved oxygen in an aquatic ecosystem?

**Background**: Generally, the determination of the concentration of oxygen dissolved in water depends upon colorimetric tests. In such tests, a reagent is added to the liquid being tested to react with the dissolved oxygen. If any oxygen is present in the water, the reagent reacts with the oxygen in a manner to produce a visible color. The amount of dissolved oxygen present can then be determined by noting the shading or the intensity of the color produced. Colorimetric tests such as the Winkler and others wherein a reagent is used, are generally satisfactory when the amount of gas dissolved in a liquid is relatively large. The indigo carmine method is a simple, rapid, accurate colorimetric procedure for determining small amounts of dissolved oxygen in water (0 to 50 ppm). A solution of reduced indigo-carmine dye added to a water sample is oxidized by the presence of any dissolved oxygen and changes color. The change in color of the dye is directly proportional to the amount of dissolved oxygen present in the sample. Dissolved oxygen (DO) is one of the most important indicators of water quality. It is essential for the survival of fish and other aquatic organisms. Oxygen dissolves in surface water due to the aerating action of winds. Oxygen is also introduced into the water as a byproduct of aquatic plant photosynthesis.

**Evidence**: Using the rudimentary document provided, you will need to design an experiment and write an SOP for using the indigo carmine colorimetric assay. We will then compare our values to accepted values obtained using probeware.

**Claim**: Write a claim based on the evidence you collected during the investigation. Please explicitly address the question.

**Reasoning**: Write your conclusion and SOP to explain how your claim is justified. How can you develop a standard operating procedure (SOP) for using an indigo carmine assay to determine the amount of dissolved oxygen in an aquatic ecosystem? As always, discuss sources of error and how you would improve the lab.

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