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Dissolved Oxygen Measurements (Winkler's Method)

Amal Almuhanha
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* Factors Affecting Oxygen Levels

1) Oxygen is removed from the water by chemical reactions, the decay process and respiration.

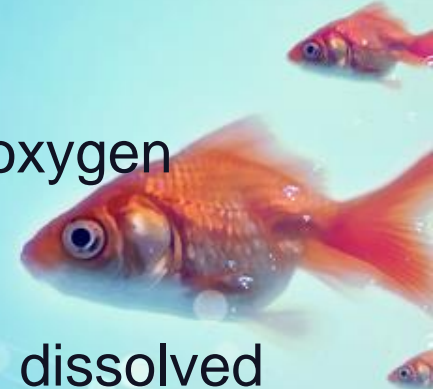
2) Water temperature and atmospheric pressure affect oxygen concentration in water.

3) Cold water at high atmospheric pressure holds more dissolved oxygen than warm water at low atmospheric pressure.

4) Degree of light penetration (turbidity, color and water depth) and the degree of water turbulence or wave action also affect oxygen concentrations.

✓ Dissolved oxygen (D.O.) is reported as milligrams of oxygen per liter of water (mg/L) .

✓ Aquatic plants produce oxygen by photosynthesis during daylight hours but they also use oxygen for respiration.



* Introduction

- * Both plants and animals depend on dissolved oxygen for survival.
- * lack of oxygen can kill aquatic plants and animals.
- * Measuring dissolved oxygen is probably the most significant water quality test **to determine the suitability of a stream for fish and many other aquatic organisms.**



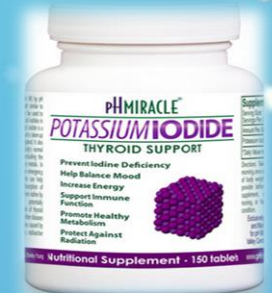
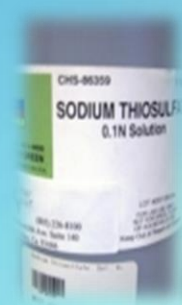
* Principles of Winkler's Method

- Oxygen combines with **Mangnous hydroxide** to form higher hydroxides, which on acidification liberate iodine equivalent to that of oxygen fixed.
- This iodine is titrated by **standard Sodium thiosulfate** solution using starch as an indicator.



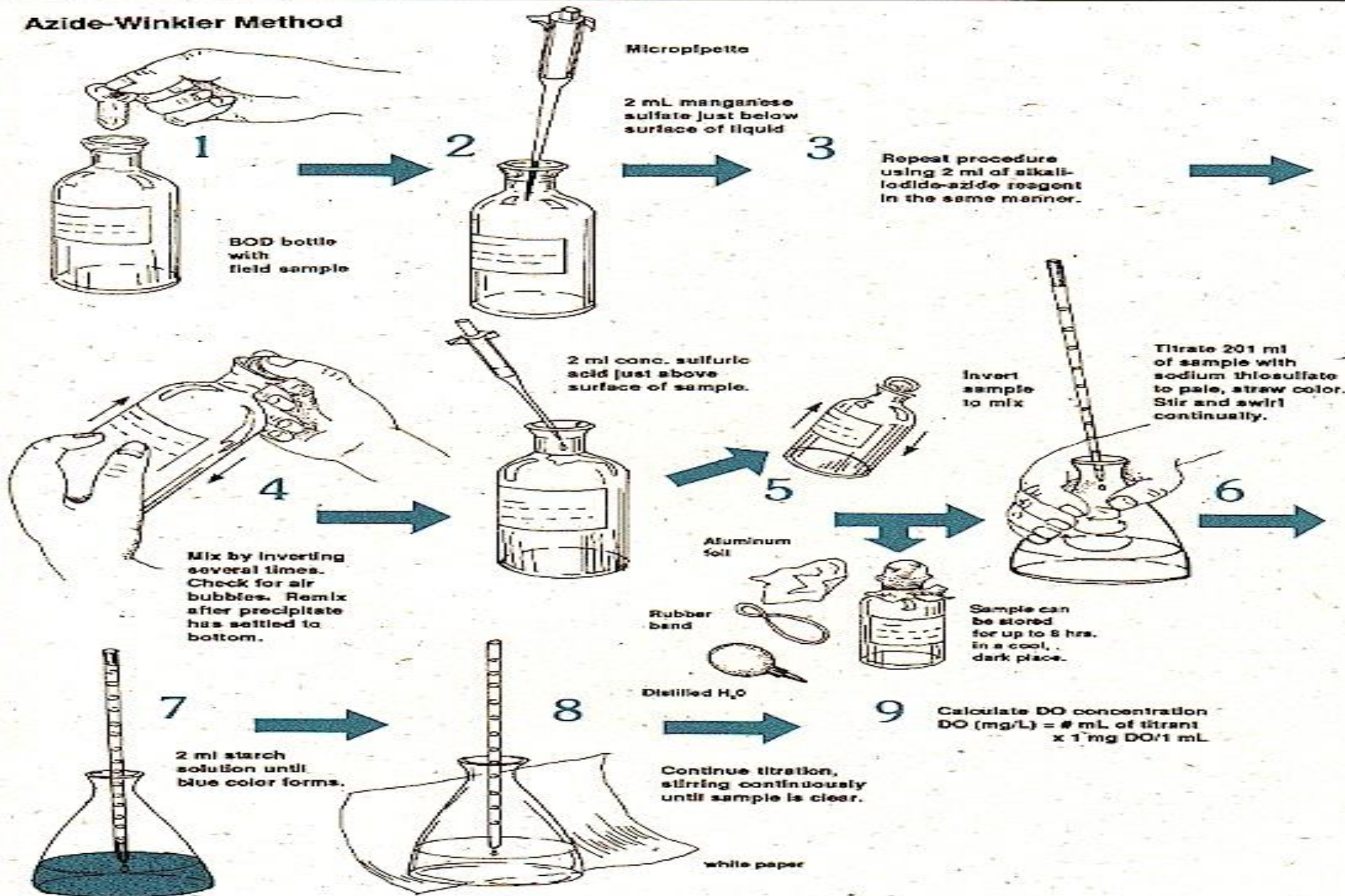
* Materials

- 1) Water Samples.
- 2) Sodium thiosulfate titrant (0.025).
- 3) Narrow mouth 250 ml BOD bottles.
- 4) Sulfuric acid (concentrated)
- 5) Starch indicator.
- 6) Manganous sulfate solution
- 7) Alkaline- potassium iodide
- 8) Pipettes, Flasks



* Procedure

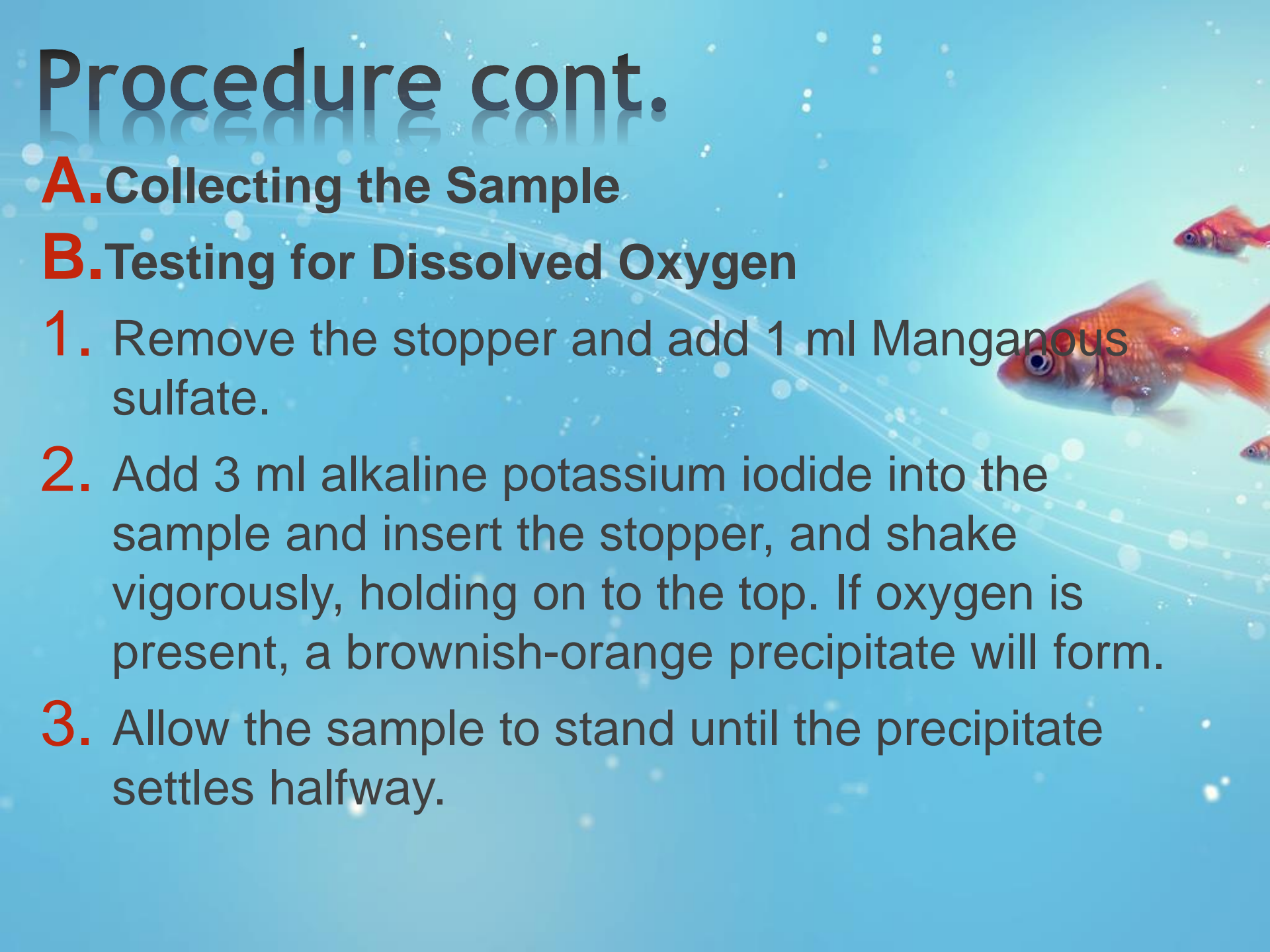
Azide-Winkler Method



Procedure cont.

A. Collecting the Sample

B. Testing for Dissolved Oxygen

1. Remove the stopper and add 1 ml Manganous sulfate.
 2. Add 3 ml alkaline potassium iodide into the sample and insert the stopper, and shake vigorously, holding on to the top. If oxygen is present, a brownish-orange precipitate will form.
 3. Allow the sample to stand until the precipitate settles halfway.
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4) Remove the stopper and slowly add 2 ml sulfuric acid. Insert the stopper and shake vigorously to dissolve the precipitate.

5) Shake and wait until all the precipitate is dissolved. The yellow color is from iodine.

6) Take a suitable aliquot 200 ml in a flask and titrate with Sodium thiosulfate solution till the colour changes to very light yellow.

7) Add 3ml of starch solution.

✓ The prepared sample will turn blue from the added starch solution.

8) Continue adding drops and mixing until the prepared sample turns from blue to colorless (the end point



*Results Analysis

Sample no.	ml of Sample	ml of titrant used	D.O. mg l ⁻¹
1-			
2-			
3-			
4-			
5-			
6-			
7-			



*Calculation

- ✓ Science 1 ml of 0.025 N sodium thiosulfate is equivalent to 0.2 mg oxygen.

$$\text{D.O. mg l}^{-1} = \frac{(8 \times 1000 \times N)}{V} \times v$$

Where:-

V= volume of sample

v= volume of titrant used (ml)

N= normality of the titrant

Result. Express D.O. in mg l⁻¹





THANK

YOU!