Pollution lab 1

MOHAMED SABBAR

Determination of dissolved oxygen (Winkler method)

Background Information

- **Dissolved oxygen (DO)** is the amount of oxygen that is in water and is essential to healthy streams and lakes. The dissolved oxygen be an indication of how polluted the water is and how well the water can support aquatic plant and life. Generally, higher dissolved oxygen (DO) level indicates better water quality. If dissolved oxygen levels are too low, some fish and other organisms may not be able to Survive.

Background Information

- Much of the dissolved oxygen in water comes from oxygen in the air that has dissolved in the water. Some of the dissolved oxygen in the water is a result of photosynthesis of aquatic plants. Other factors also affect dissolved oxygen (DO) levels such as on sunny days high dissolved oxygen (DO) levels occur in areas of dense algae or plants due to photosynthesis. Stream turbulence may also increase dissolved oxygen (DO) levels because air is trapped under rapidly moving water and the oxygen from the air will dissolve in the water.

Background Information

- The maximum amount of oxygen that can dissolve in to water is affected also by elevation of the water testing site (atmospheric pressure) and the salinity (saltiness) of the water, an increase in any of these results in lower concentrations of dissolved oxygen.

Dissolved oxygen (DO) levels in water

DO level (in ppm)	Water Quality
0 – 4 ppm	**Poor** some fish and macroinvertebrate population will begin to decline
4.1 – 8 ppm	**Fair**
8.1 – 12 ppm	**Good**
+12 ppm	**Retest** Water maybe artificially aerated

Underwater Dissolved Oxygen Cycle

INPUT: Mixing by wind, waves and currents add atmospheric oxygen to surface water

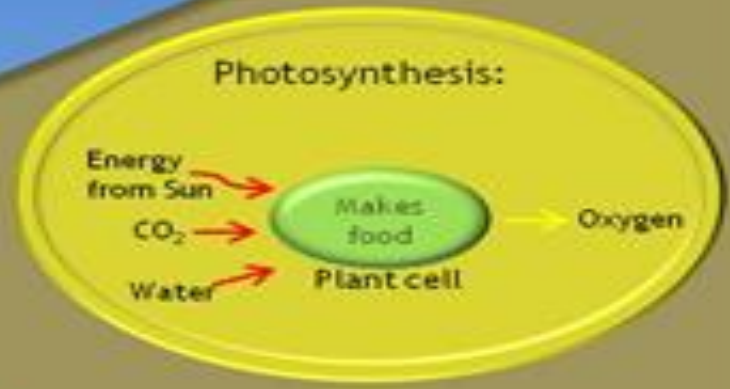
Phytoplankton

High oxygen

INPUT: Photosynthesis by sea grasses, seaweed and phytoplankton

Mixing with river or ocean water can raise or lower the amount of oxygen

REMOVAL: Respiration: breathing by animals



REMOVAL: Respiration: decay of organic matter on the bottom

Low oxygen

Organic matter: poop and dead phytoplankton cells, plants, and animals that have fallen to the bottom from the surface waters

Salmon image IWFS, IDAA

Background Information

- In addition, the amount of oxygen that can dissolve in water depends on temperature. Colder water can hold more oxygen in it than warmer water. A difference in Do levels may be detected at the test site if tested early in the morning when the water is cool and then later in the afternoon on a sunny day when the water temperature has risen. Deference in dissolved oxygen (DO) levels may also be seen between winter water temperature and summer water temperatures. Similarly, a difference in dissolved oxygen (DO) levels may be apparent at different depths of the water if there is a significant change in water temperature.

Temperature-Oxygen Solubility Relationship	
Temperature (°C)	Oxygen Solubility (mg/L)
0	14.6
5	12.8
10	11.3
15	10.2
20	9.2
25	8.6
100	0