Name:_____Period:_____Date:_____
Ms. Randall Marine Science
Lab activity: Temperature vs. [O_2] graph

Background:

Water is 96% of the ocean's water mass. Water exhibits many unique physical properties and can exist in 3 physical states within the temperature ranges found on earth. Its dipolar molecular structure and characteristic hydrogen bonds help make it an excellent solvent. Solids such as salts and minerals, gases, nutrient (inorganic) and carbon (organic) compounds are all dissolved in seawater; our drinking water contains essentially the same compounds, but has been treated to eliminate hazardous elements and minerals, pollutants and salts. There are a number of gases in the atmosphere including nitrogen (N2), oxygen (O2), carbon dioxide (CO2), argon (Ar), water vapor, neon, helium, krypton, xenon, hydrogen (H2), methane (CH4), and nitrous oxide (N2O); however nitrogen and oxygen make up approximately 99% of the total. The upper layers of the earth's oceans can take in or release gases (act as a "sink" or a "source") to reach equilibrium concentrations with the atmosphere. Carbon dioxide is one very important gas for which the ocean is generally a sink. It plays a major role in biological activity, carbon cycling and is a major greenhouse gas, predominantly because of human contributions to atmospheric CO2. There are several variables which affect the ocean's (or water's) ability to dissolve gases. A demonstration will be performed during the broadcast to illustrate that with continuous addition, solids will no longer dissolve in water; this is true as well for gases. Factors which can increase or decrease solubility of gases in water include temperature, salinity, and partial pressure. Solubility will increase with decreasing temperature, increasing pressure, and decreasing salinity.

bonds (forces that glue or join things together)
inorganic (not related to living things)
dissolved (mixed with and now part of a liquid)
pollutants (things that dirty the air, oceans, etc.)

argon (gaseous element)

equilibrium
steadiness/balance

dissolve (mix with and become part of a liquid)
demonstration (act of showing or proving)
solubility (ability to be dissolved in something)

Solubility (ability to be dissolved in something)

Key concepts : dependent and independent variables, plotting and interpreting data

Materials: Hydrolab data · graph sheets

Procedure:

Temperature and oxygen concentration data sets have been provided. Plot temperature and O_2 concentration. The dependent variable is O_2.

Data:

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

Analysis:

a) How does oxygen concentration in water vary with temperature?

b) Log on to a computer at your lab station as a group and answer the following questions:

- What concentration of dissolved oxygen is required to support aquatic life?

- What are some of the processes that increase dissolved oxygen concentration in natural bodies of water?

- What are some of the processes that decrease dissolved oxygen concentration in natural bodies of water?