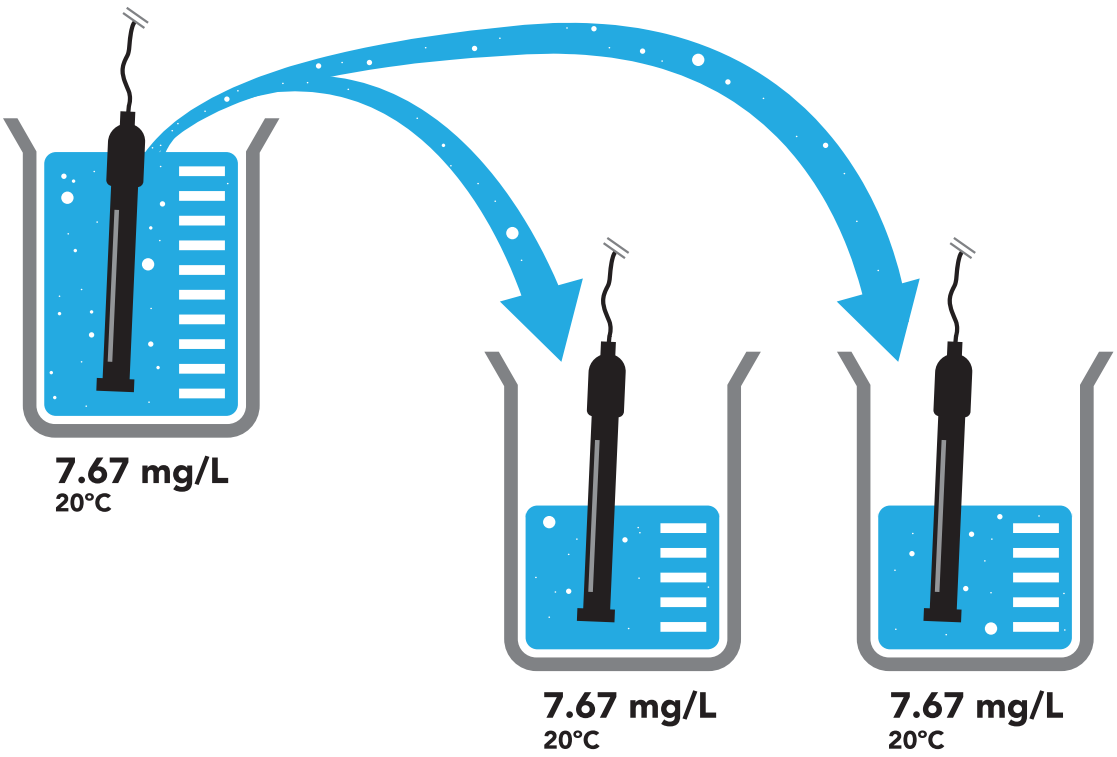
A practical guide for understanding Dissolved Oxygen readings

Dissolved Oxygen has two parameters we are concerned with. The actual Dissolved Oxygen *(expressed in mg/L)* and the percentage of saturation *(expressed as a percentage)*. Looking at just one component gives only a partial picture of what is happening.

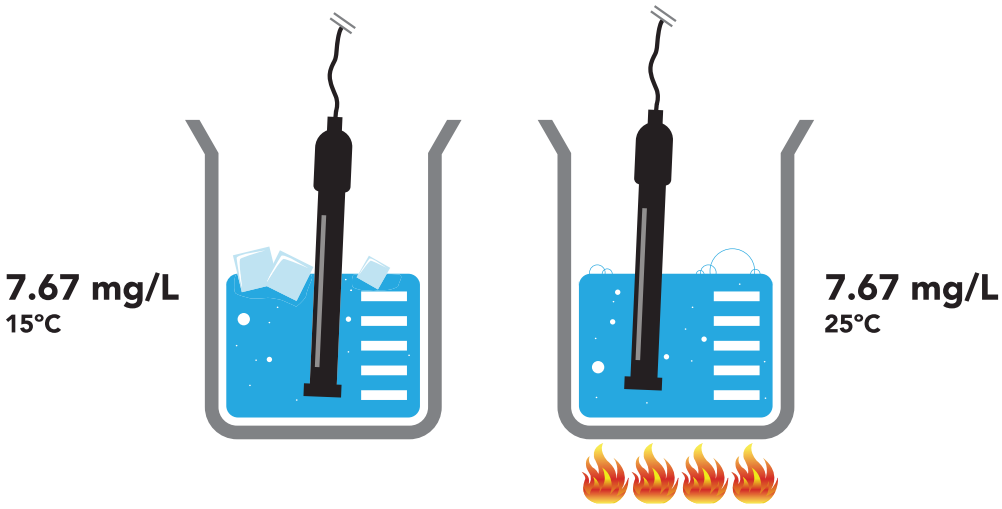
Mg/L

The actual Dissolved Oxygen *(expressed in mg/L)* is our foundation. This reading tells us, quite literally, how much oxygen is in the water we are reading. This reading *(assuming calibration was done correctly and the Dissolved Oxygen probe is operating normally)* will always be correct, no matter what.

If we were to take a sample of water and divide it up into two beakers, each beaker would have the exact same Dissolved Oxygen concentration.

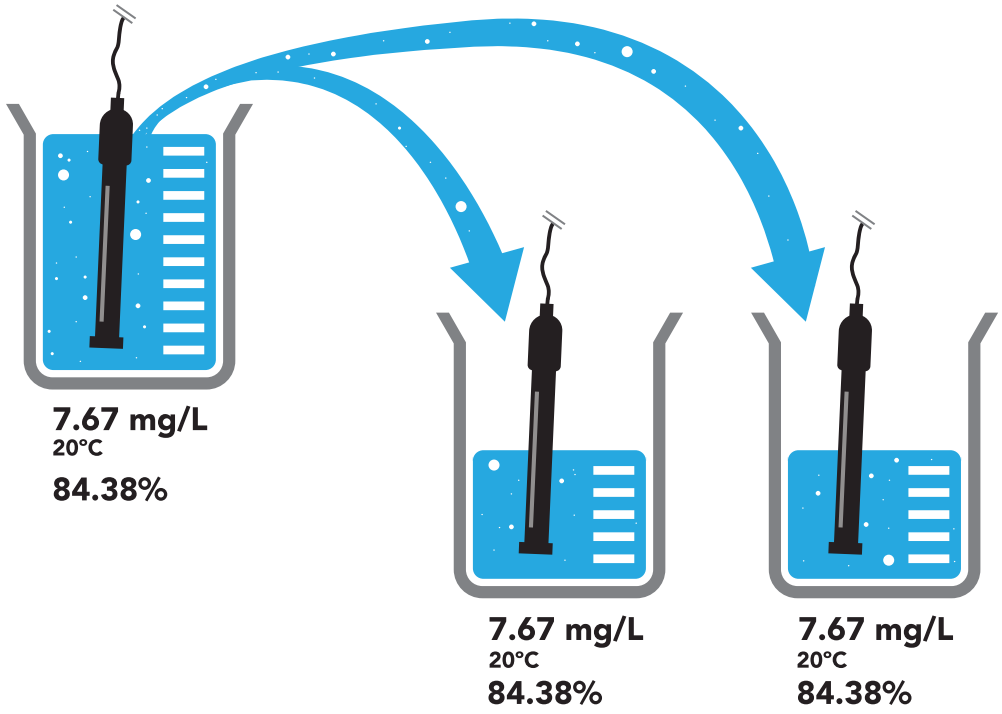


If we were to cool one and heat the other by 5 °C, we would see that the Dissolved Oxygen concentration has not changed. This is because the actual Dissolved Oxygen concentration will always be correct. **What has changed, is the percent saturation.**



Percent saturation

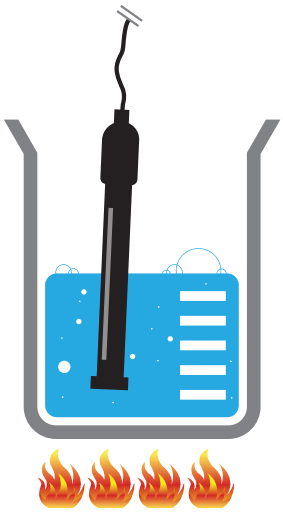
The original percent saturation was **84.38%**
This tells us that more oxygen could be dissolved into the water.



As we cool the water we see that the percent saturation goes down to **76.09%**.
This is because cold water can hold more oxygen than warm water.

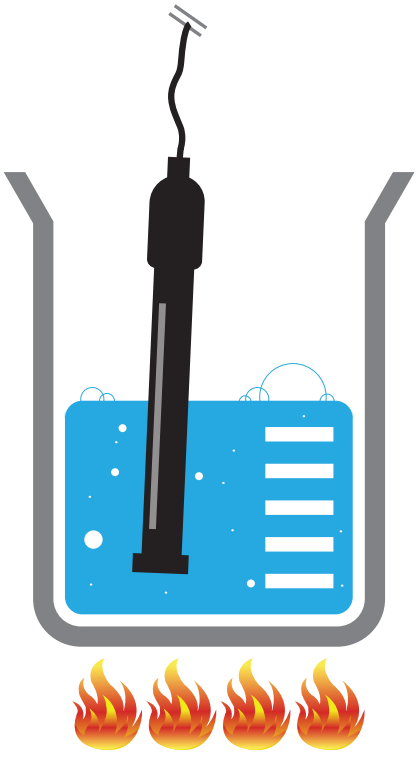
As we heat the water we see that the percent saturation goes up to **92.86%**.
This is because warm water can hold less oxygen than cold water.

7.67 mg/L
15°C
76.09%



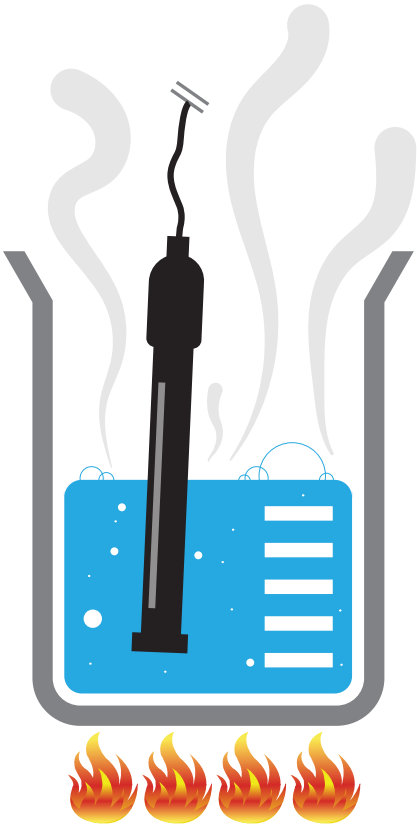
7.67 mg/L
25°C
92.86%

If we were to continue to heat the water, the percent saturation would reach **100%** at a temperature of **29.19 °C**



7.67 mg/L
29.19°C
100%

As we cross the **100%** threshold the water will have to reach an equilibrium. The Dissolved Oxygen in the water will have to drop. This will not happen instantly, and it would be common to see a percentage saturation above **100%**, as the oxygen is forced from the water.



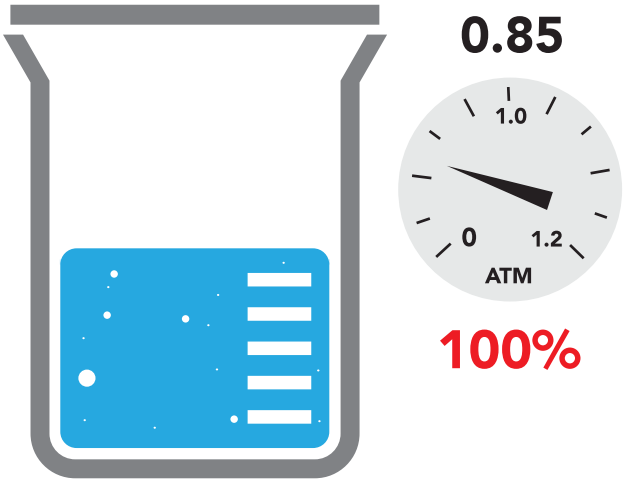
7.56 mg/L
30°C
101.46%

Pressure and salinity

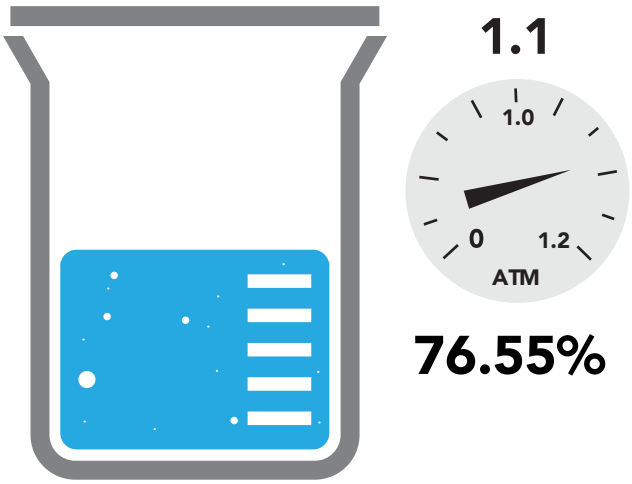
These two factors also have an effect on the percent saturation. Remember, until you cross the **100%** saturation mark, the actual Dissolved Oxygen content will not change.

Pressure

Lowering the atmospheric pressure will quickly decrease the water's ability to hold oxygen. The original water that was at **84%** saturation quickly goes to **100%** saturation if the atmospheric pressure drops to 0.85 atmospheres.

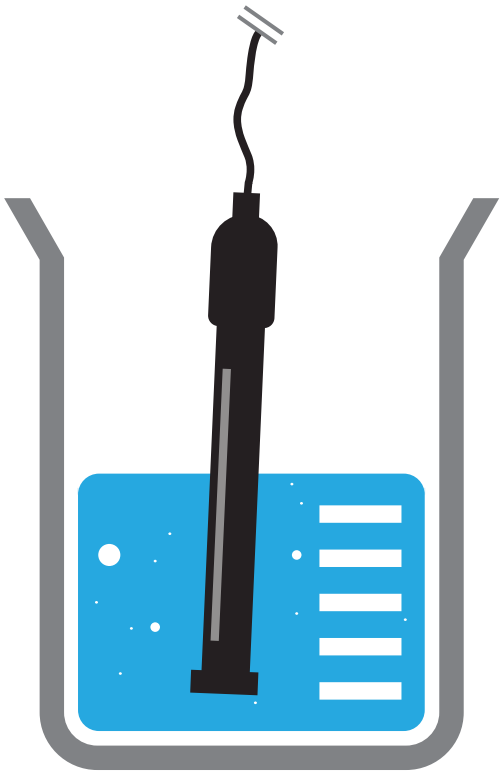


Raising the atmospheric pressure will quickly increase the water's ability to hold oxygen. At 1.1 atmospheres the saturation drops from **100%**, to only **76.55%**.

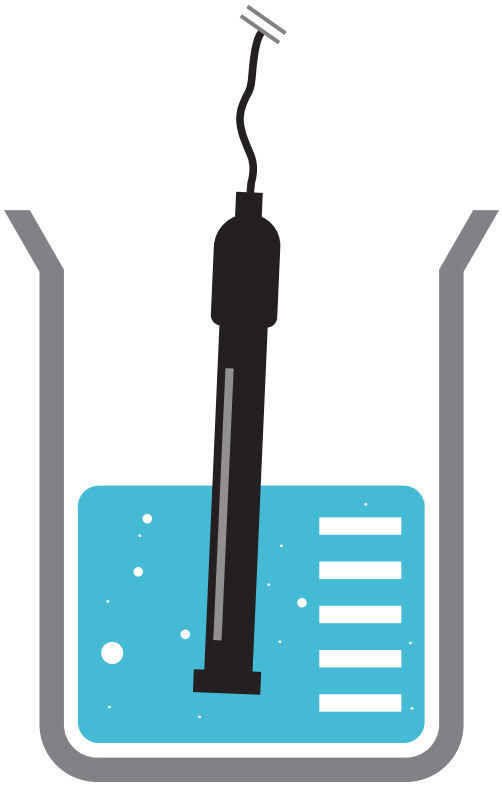


Salinity

Fresh water holds more oxygen than salt water. It's rather straightforward.



20°C
Fresh water
100% saturation = 9.08 mg/L



20°C
Salt water at 40 PPT
100% saturation = 7.17 mg/L