# Composition of Sea Water: Constructing a Graphic Model

Although sea water is made up mostly of water, there are other important ingredients dissolved in the water. In this activity, you will construct a graphic model that illustrates the composition of sea water. All you will need to do this activity are a protractor and a pencil or pen.

Solid material that is dissolved in sea water is referred to as salts. Salts make up about 3.5% of the mass of sea water. The following chart lists the major dissolved salts that are present in sea water and identifies the number of grams of each salt contained in 100 grams of water.

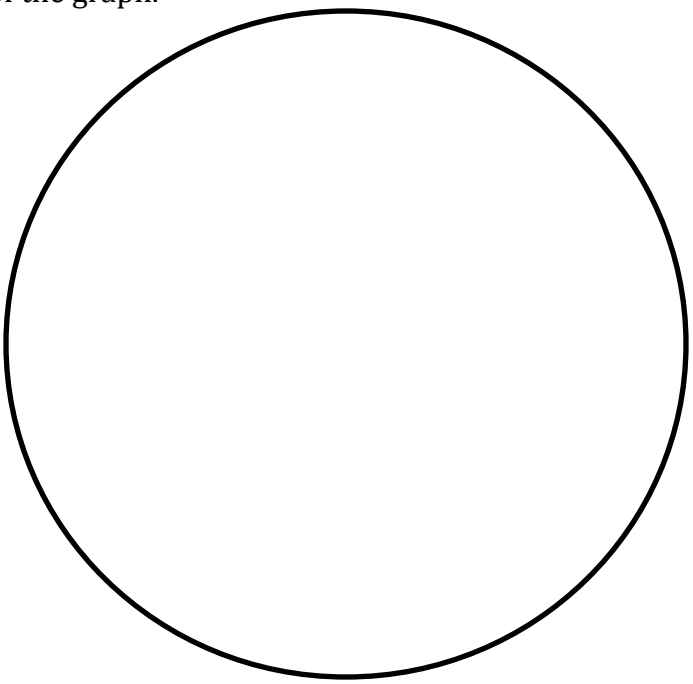
| Dissolved Salts | Approximate Mass (in grams per 100 grams of sea water) |
|---|---|
| Sodium chloride, NaCl | 2.72 |
| Magnesium chloride, $MgCl_2$ | 0.38 |
| Magnesium sulfate. $MgSO_4$ | 0.17 |
| Calcium sulfate, $CaSO_4$ | 0.13 |
| Potassium sulfate, $K_2SO_4$ | 0.08 |
| Calcium carbonate, $CaCO_3$ | 0.01 |
| Magnesium bromide, $MgBr_2$ | 0.008 |

1. Use the following equation and the information contained in the chart to calculate the percentage that each dissolved salt represents of the total mass of dissolved salts found in sea water. Enter your data in the appropriate space in the data table.

   Percentage of the total mass of dissolved salts = $\frac{\text{mass of dissolved salts (grams)}}{\text{3.5 (grams)}}$ x 100

| Dissolved Salts | Percentage of Total Mass of Dissolved Salts | Number of Degrees on Circle Graph |
|---|---|---|
| Sodium chloride, NaCl | | |
| Magnesium chloride, $MgCl_2$ | | |
| Magnesium sulfate. $MgSO_4$ | | |
| Calcium sulfate, $CaSO_4$ | | |
| Potassium sulfate, $K_2SO_4$ | | |
| Calcium carbonate, $CaCO_3$ | | |
| Magnesium bromide, $MgBr_2$ | | |

2. In the graphic model you will construct, $360^0$ on the circle graph will equal 100% of the composition of dissolved salts in sea water. Therefore, 1% of dissolved salts will equal $3.6^0$ on your graph. Convert each of the percentage values you calculated in the previous step to the appropriate number of degrees and enter your data in the spaces provided on the data table.
3. Using your protractor and the information from the data table, construct a graph in the circle that illustrates the composition of dissolved solids in sea water. Label each section of the graph.



After you have completed your graph, answer the following questions.

1. a) Sea water is actually about 96.5% water. If you were going to construct a circle graph to illustrate the composition of sea water, how many degrees on the graph would be needed to represent water?
   b) On such a graph, how many degrees would be needed to represent the total of all of the dissolved salts contained in sea water?
2. If erosion continues to carry more and more dissolved salts into the oceans, after many thousands of years, how would you expect the composition of sea water to be different than it is today?
3. Many animals that live in the ocean use some types of dissolved salts to build their shells. What would happen to the composition of sea water if the number of these animals were to decrease drastically?