Dissolving

Name: _____

One way to visualize the sequence (in kind of a comic form) is described and illustrated below:

- First panel: A beaker of water, with some water molecules drawn in. Beside the beaker is a NaCl crystal (alternating small and large circles, with charges drawn in).
- Second panel: The solid is placed in the water. It sinks to the bottom of the beaker.
- Third panel: A few water molecules are interacting with a few ions, pulling the ions away from the surface of the crystal.
- Fourth panel: More water molecules have carried away ions.
- Fifth panel: No solid remains. All ions are surrounded by water molecules, and the crystal has dissolved.

1) Consider magnesium chloride, $MgCl_2$, another soluble ionic compound.
a) Draw a five-panel sequence (on paper) showing what happens when magnesium chloride is placed in water. Below, write a caption for your sequence, making specific reference to the attractive forces involved. Look at the example above for help.

2) Chalk ($CaCO_3$) is not soluble in water.
a) Draw a five-panel sequence showing what happens when chalk (calcium carbonate) is placed in water. Write a caption for your sequence, making specific reference to the attractive forces involved.

3) Another way to represent chemical and physical processes is by writing and interpreting chemical equations. For example, the following equation represents dissolving table salt in water:

$$NaCl\ (s) \rightarrow Na^{+1}\ (aq) + Cl^{-1}\ (aq)$$

a) What do the symbols *(s)* and *(aq)* mean?

b) Write a sentence that interprets this chemical equation in words.

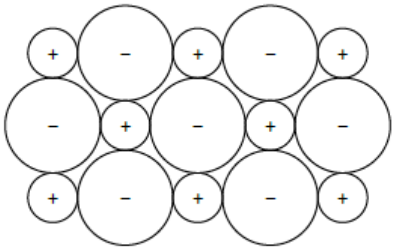
c) Water is not shown as a reactant or a product in this equation. How do you know, based upon this equation, that water is part of the process?

4) The following equations show the interactions between chalk and water:

$CaCO_3\ (s) \nrightarrow Ca^{+2}\ (aq) + CO_3^{-2}\ (aq)$ $\qquad$ $CaCO_3\ (s) \rightarrow Ca^{+2}\ (aq) + CO_3^{-2}\ (aq)$

a) Notice the arrows. Which would better indicate that chalk does not dissolve in water? Why?

5) Suppose the following 2-D drawing represents ions in a sodium bromide (NaBr) crystal:



a) Magnesium ions (Mg^{+2}) are smaller than Na^{+1} ions, and sulfide (S^{-2}) ions are smaller than Br^{-1} ions. Next to the drawing above, draw a 2-D representation of MgS that shows relative sizes and ion charges, compared to the NaBr crystal depicted above.

b) Would you predict MgS to be more or less soluble in water than NaBr? Use your model (and your notes) to explain your prediction with <u>two</u> reasons.