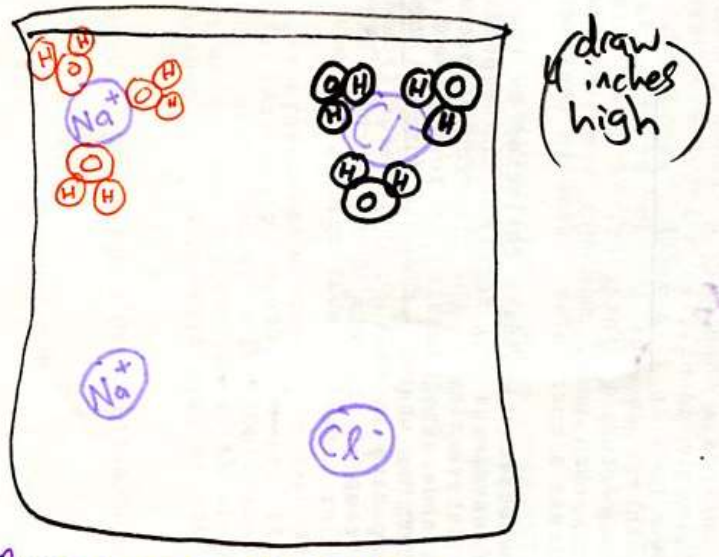
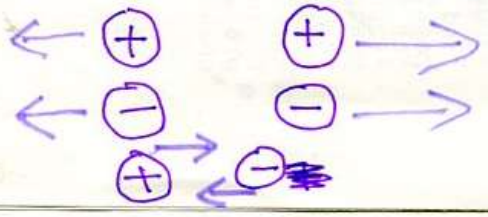
Purpose: What Directions Do Water Molecules Turn?

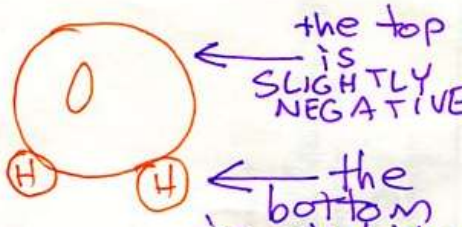
Warmup (copy):

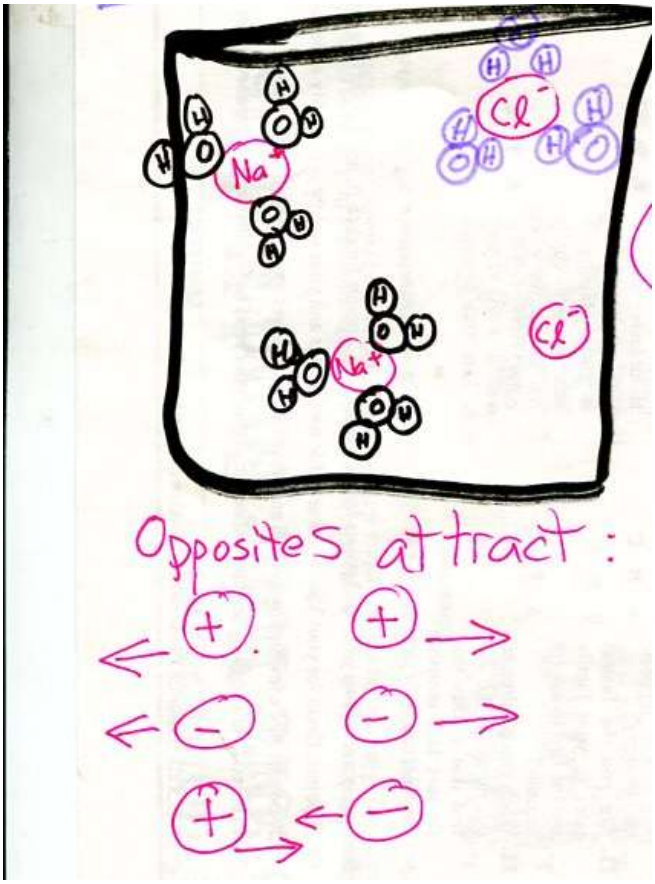


Opposites Attract
(Electric charges that are opposite attract each other)



Water has some electric charge




Na+
Cl-
Na+
Cl-
Opposites attract :

[redacted]

Name _____

Period _____

1. Circle the metallic element in each.

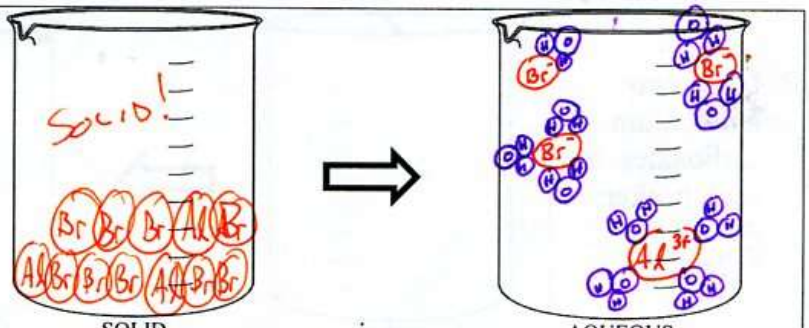
Circle any element that is a metal	This substance is...	When one of these dissolves, how many aqueous ions form?
$CuSO_{4(s)}$	ionic / molecular	2
$N_2O_{4(g)}$	ionic / molecular	1

Circle any element that is a metal	This substance is...	When one of these dissolves, how many aqueous ions form?
$Na_2C_2O_{4(s)}$	ionic / molecular	3
H_3PO_4	ionic / molecular	4

space to take lecture notes:

A substance is ionic if the left side starts with (1) METAL or (2) NH_4^+ or (3) H on the left.

2. Draw three aluminum bromides in the left beaker:
   $AlBr_{3(s)}$
   $AlBr_{3(s)}$
   $AlBr_{3(s)}$



3. **Draw a slash** through the molecule to show the half that would fall off. How many pieces will this fall apart into if made into an aqueous solution? (circle your choice)

KI	1? 2? 3? 4? 5?	$AlBr_3$	1? 2? 3? 4? 5?
K_2S	1? 2? 3? 4? 5?	$(NH_4)_2CO_3$	1? 2? 3? 4? 5?
$MgCO_3$	1? 2? 3? 4? 5?	$Ca(CH_3COO)_2$	1? 2? 3? 4? 5?
$Zn(NO_3)_2$	1? 2? 3? 4? 5?	CH_3OH	1? 2? 3? 4? 5?

4. True / False: Mark (T) true or (F) in each blank
   (a) ____ solutions are heterogeneous mixtures
   (b) ____ solutions are clear
   (c) ____ the dissolved substance will eventually settle out of a solution

5. For each, write a dissociation equation (something like "$A_{(s)} \rightarrow B_{(aq)} + C_{(aq)}$") . Include charges (+1, +2, etc) and phase notation (s, L, g, aq)

a. $K_2S_{(s)}$ dissolving. Show each ion separately.

$K_2S_{(s)} \rightarrow K^+_{(aq)} + K^+_{(aq)} + S^{2-}_{(aq)}$

b. $CO_{2(s)}$ dissolving.

$CO_{2(s)} \rightarrow CO_{2(aq)}$

c. $Zn(NO_3)_2$ dissolving. Show each ion separately.

$Zn(NO_3)_{2(s)} \rightarrow Zn^{2+}_{aq} + NO_3^-_{aq} + NO_3^-_{aq}$

d. $Mg(C_2H_3O_2)_{2(s)}$ dissolving. Show each ion separately.

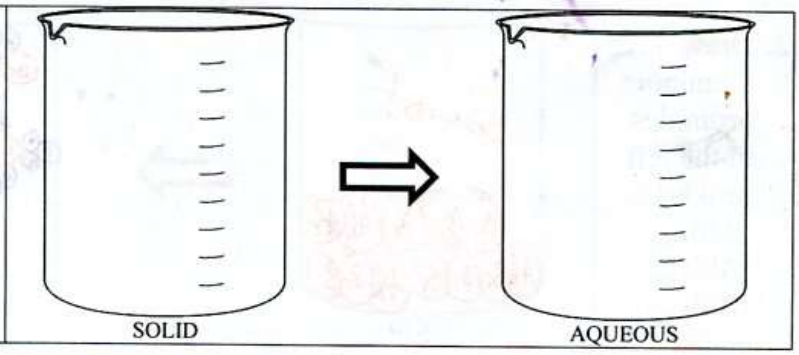
$Mg(C_2H_3O_2)_{2(s)} \rightarrow Mg^{2+}_{aq} + C_2H_3O_2^-_{aq} + C_2H_3O_2^-_{aq}$

e. $HC_2H_3O_{2(l)}$ dissolving. Show each ion separately.

_____ --> _____ + _____

6. Drawings!
   a. In the beaker on the left, draw the indicated solid, repeating the formula three times.
   b. In the beaker on the right, draw what the substance would look like with water added.

7. Draw two ammonium carbonates in each beaker:
   $(NH_4)_2CO_3$
   $(NH_4)_2CO_3$



8. For each molecule below circle a choice to indicate how many particles you would expect it to form in solution.

(a) C_2H_3OH	1 particle 2 particles 3 particles 4 particles 5 particles
(b) SO_3	1 particle 2 particles 3 particles 4 particles 5 particles
(c) Li_3PO_4	1 particle 2 particles 3 particles 4 particles 5 particles
(d) FeF_3	1 particle 2 particles 3 particles 4 particles 5 particles

9. Now try redoing your earlier anser with a coefficient in front of each particle. *For example, instead of writing Br- Br- Br- it is more common and esier to write a coefficient: 3Br-*
   a. $K_2S_{(s)}$ dissolving. Use a coeffiecient where appropriate.

   _____ --> _____ + _____

   b. $Zn(NO_3)_2$ dissolving. Use a coeffiecient where appropriate.

   _____ --> _____ + _____

PARTICLE DIAGRAMS & CONCENTRATION

Name ANSWERS
Period

1. Draw a particle diagram of each of these ionic substances in solution. Then calculate the molarity of each ion present in each of the following solutions.

a. 0.095 M $Na_2CO_3(aq)$

particle picture:

calculate the concentration of $Na^+_{(aq)}$ in the solution

$$0.095\,M\,Na_2CO_3 \times \left(\frac{2\ Na}{1\ Na_2CO_3}\right) = 0.19\ M\ Na^+$$

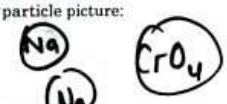
0.19 answer

calculate the concentration of $CO_3^{2-}{}_{(aq)}$ in the solution

$$0.095\,M\,Na_2CO_3 \times \left(\frac{1\ CO_3}{1\ Na_2CO_3}\right) = 0.095\,M\,CO_3$$

b. 0.7 M Na_2CrO_4

particle picture:



calculate the concentration of $Na^+_{(aq)}$ in the solution

$$0.7\,M\,Na_2CrO_4 \times \left(\frac{2\ Na}{1\ Na_2CrO_4}\right) = 1.4\,M\,Na^+$$

calculate the concentration of $CrO_4^{2-}{}_{(aq)}$ in the solution

$$0.7\,M\,Na_2CrO_4 \times \left(\frac{1\ CrO_4}{1\ Na_2CrO_4}\right) = 0.7\,M\,CrO_4^{2-}$$

c. 0.710 $Ca(OH)_2$

particle picture:

calculate the concentration of $Ca^{2+}{}_{(aq)}$ in the solution

$$0.710\,M\,Ca(OH)_2 \times \left(\frac{1\ Ca^{2+}}{1\ Ca(OH)_2}\right) = 0.710\,M\,Ca^{2+}$$

calculate the concentration of $OH^-{}_{(aq)}$ in the solution

$$0.710\,M\,Ca(OH)_2 \times \left(\frac{2\ OH^-}{1\ Ca(OH)_2}\right) = 1.42\,M\,OH^-$$