

WORKSHEET: Net Ionic Equations

The key to writing correct net ionic equations is in knowing which substances to rewrite as ions and which substances to leave unchanged.

Strong electrolytes exist in solution as ions and must *always* be written as ions for reactions in solution

Strong Electrolytes: strong acids
strong bases
soluble salts

Weak and non electrolytes exist predominantly as molecules or formula units in solution and must *never* be broken up when writing equations for reactions in solution.

Weak Electrolytes: weak acids
weak bases

Non Electrolytes: insoluble salts and bases
gases
metals
diatomic molecules
all others not described above

Use the attached decision tree to decide whether to write formulas as ions or *not* as ions.

Decision Tree Practice:

Identify each of the following substances as strong acid, weak acid, strong base, weak base, insoluble base, soluble salt, insoluble salt, molecular liquid, molecular gas, or insoluble element. Then write each substance as ions or not as ions in accordance with the decision tree.

Ba(OH)₂ strong base Ba²⁺ and 2 OH⁻

CuCl₂ soluble salt Cu²⁺ and 2 Cl⁻

NH₃ weak base or other NH₃

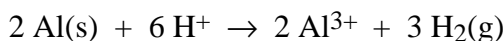
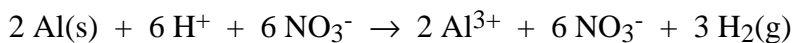
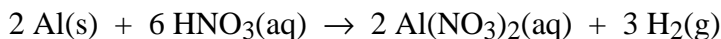
H ₂ SO ₄	strong acid	2 H ⁺ and SO ₄ ²⁻
H ₂	molecular gas	H ₂
KCl	soluble salt	K ⁺ and Cl ⁻
HC ₂ H ₃ O ₂	weak acid	HC ₂ H ₃ O ₂
Cu(NO ₃) ₂	<u>soluble salt</u>	<u>Cu²⁺ and 2 NO₃⁻</u>
BaSO ₄	<u>insoluble salt</u>	<u>BaSO₄(s)</u>
Pb(NO ₃) ₂	<u>soluble salt</u>	<u>Pb²⁺ and 2 NO₃⁻</u>
Pb(NO ₂) ₂	<u>soluble salt</u>	<u>PbCr₂O₇(s)</u>
H ₂ O	<u>molecular liquid</u>	<u>H₂O</u>
AgBr	<u>insoluble salt</u>	<u>AgBr(s)</u>
MgBr ₂	<u>soluble salt</u>	<u>Mg²⁺ and 2 Br⁻</u>
MgCO ₃	<u>insoluble salt</u>	<u>MgCO₃(s)</u>
CuS	<u>insoluble salt</u>	<u>CuS(s)</u>
CO ₂	<u>molecular gas</u>	<u>CO₂(g)</u>
HBr	<u>strong acid</u>	<u>H⁺ and Br⁻</u>
HF	<u>weak acid</u>	<u>HF</u>
Al	<u>insoluble element (metal)</u>	<u>Al⁰</u>
H ₃ PO ₄	<u>weak acid</u>	<u>H₃PO₄</u>
H ₂ S	<u>weak acid or molecular gas</u>	<u>H₂S</u>
LiHCO ₃	<u>soluble salt</u>	<u>Li⁺ and HCO₃⁻</u>
Fe(OH) ₃	<u>insoluble salt (or base)</u>	<u>Fe(OH)₃(s)</u>
CaSO ₄	<u>insoluble salt</u>	<u>CaSO₄(s)</u>

$\text{Fe}(\text{C}_2\text{H}_3\text{O}_2)_2$	<u>soluble salt</u>	<u>Fe^{2+} and $2 \text{C}_2\text{H}_3\text{O}_2^-$</u>
K_2SO_4	<u>soluble salt</u>	<u>2K^+ and SO_4^{2-}</u>
HNO_3	<u>strong acid</u>	<u>H^+ and NO_3^-</u>
H_2CO_3	<u>weak acid (decomposes!)</u>	<u>either H_2CO_3 or H_2O and CO_2</u>
ZnS	<u>insoluble salt</u>	<u>$\text{ZnS}(\text{s})$</u>

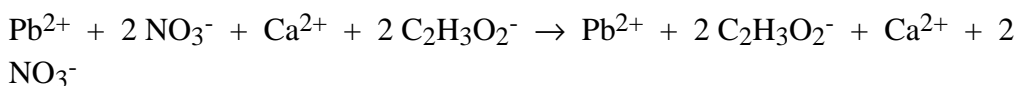
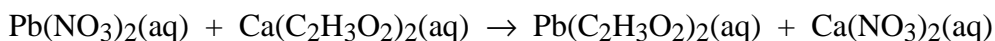
NOTE: When H_2CO_3 , H_2SO_3 or NH_4OH are formed as products, they do break down, though not into ions. They break down into H_2O and a gaseous substance.

For each of the following, write the molecular equation (balanced, of course), the total ionic equation (still balanced), and the net ionic equation (also balanced). If examination of the total ionic equation reveals that there is no net reaction, then for the net ionic equation write the words "No Reaction."

- Aluminum metal is added to nitric acid solution.

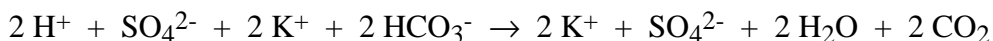
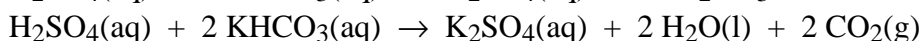
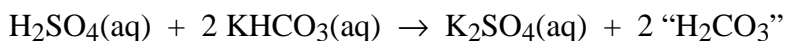


- A plumbous nitrate solution is added to a calcium acetate solution.

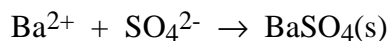
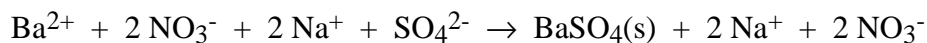
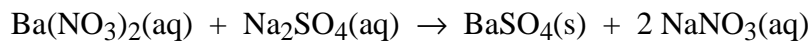


no net reaction

- A sulfuric acid solution is added to a solution of potassium hydrogen carbonate.



4. A barium nitrate solution is added to a sodium sulfate solution.



5. A sodium hydroxide solution is added to a phosphoric acid solution. Assume that 2 of the hydrogens in phosphoric acid react.

