

AP Worksheet 4b (Equations and Solubility)

- Write balanced equations for the following reactions. Where possible include state symbols.
 - Carbon dioxide gas is bubbled into water to produce a solution of carbonic acid.
 - A solution of sodium hydroxide reacts with carbon dioxide gas to produce a solution of sodium carbonate and water.
 - Liquid phosphorous trichloride will react readily with chlorine gas to produce solid phosphorous pentachloride.
 - Solid iron(III) oxide can be reduced with carbon monoxide gas to yield carbon dioxide gas and molten (liquid) iron metal.
 - To make beer (fermentation), glucose ($C_6H_{12}O_6$) is converted (by a biological enzyme) to produce ethanol (C_2H_5OH) and carbon dioxide.
 - An aqueous solution of hydrogen peroxide can be broken down (by a catalyst) to produce oxygen gas and water as the products.
 - A deep yellow precipitate of lead(II) iodide is formed when lead(II) nitrate solution is reacted with a solution of potassium iodide. A solution of potassium nitrate is the other product.
 - Zinc metal can be oxidized to solid zinc oxide when it is heated in gaseous oxygen.
 - Calcium metal will react with water to produce calcium hydroxide and hydrogen.
 - Sodium acetate can be produced in a reaction between sodium hydroxide and acetic acid (CH_3COOH). Water is the other product.
 - Solid copper metal can be reacted with a solution of nitric acid to produce a solution of copper(II) nitrate, water and nitrogen monoxide gas.
 - A common way of precipitating silver chloride is to react solutions of sodium chloride and silver nitrate. A solution of sodium nitrate is the other product.
- Write a balance equation, with state symbols, to show the dissociation of each of the following ionic solids into their respective ions when they are dissolved in water.
 - K_2S
 - $Ni(NO_3)_2$
 - Na_3PO_4
 - $(NH_4)_2CO_3$
- Predict whether each of the following compounds is soluble or insoluble in water.
 - Magnesium phosphate
 - Silver nitrate
 - Barium carbonate
 - Iron(III) hydroxide
 - Calcium chloride
 - Aluminum sulfide
 - K_2SO_4
 - Li_2CO_3
 - $NaOH$
 - NH_4Br

4. Consider each of the following pairs of aqueous solutions being mixed.

On the basis of solubility rules,

Either

Write a full, balanced chemical equation for the double displacement reaction that takes place indicating the precipitate formed by adding the (s) state symbol in the equation, and using (aq) state symbols where appropriate, AND write the net ionic equation including state symbols.

or

If NO precipitate forms, write NO REACTION instead of a full, balanced chemical equation, AND DO NOT write a net ionic equation.

- a. potassium sulfide and barium chloride
 - b. lead(II) nitrate and ammonium chromate
 - c. sodium sulfate and lithium nitrate
 - d. silver nitrate and sodium sulfate
 - e. potassium phosphate and cobalt(II) nitrate
 - f. RbCl and BaCl₂
 - g. KOH and NaNO₃
 - h. Mg(NO₃)₂ and NH₄HCO₃
 - i. Na₂CO₃ and LiNO₃
 - j. Na₃PO₄ and CuCl₂
 - k. SrCl₂ and Li₂SO₄
5. Write the balanced equation for each of the following processes.
- a. Synthesis of lead(IV) iodide.
 - b. Decomposition of aluminum fluoride.
 - c. Dissolving of ammonium sulfate in water.
 - d. Zinc metal is placed in a solution of copper(II) chloride.
 - e. Solutions of silver nitrate and iron(III) iodide are mixed.
 - f. Ethane (C₂H₆) gas is burned in the presence of oxygen.
6. Give the net ionic equations for the reactions in number 5, letters d and e.