



Is there an alkali earth cation or ammonium ion?

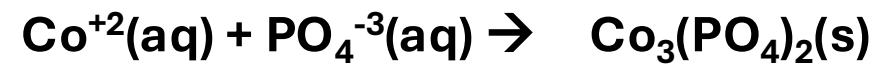
Yes

No

Soluble

Is there HCO₃⁻, ClO₄⁻, ClO₃⁻, NO₃⁻, NO₂⁻ or C₂H₃O₂⁻?

cobalt(II) chloride + sodium phosphate



Yes

No

Soluble

Is there Cl⁻, Br⁻, I⁻?

Yes

No

Is there Ag⁺, Cu⁺, Pb⁺², Hg₂⁺²?

Is there SO₄⁻²

Yes

No

Insoluble

Soluble

Yes

No

Is there Ca⁺², Ba⁺², Sr⁺², Pb⁺², Hg₂⁺²?

Is there OH⁻ or S⁻²?

Yes

No

Insoluble

Soluble

Yes

No

Insoluble

Is there Ca⁺², Ba⁺², Sr⁺²?

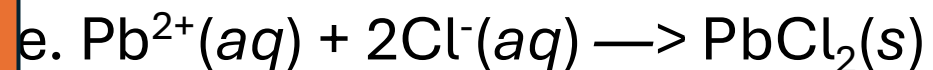
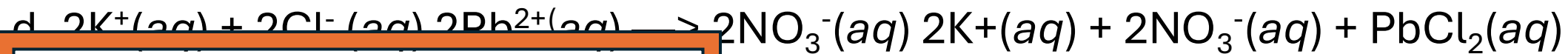
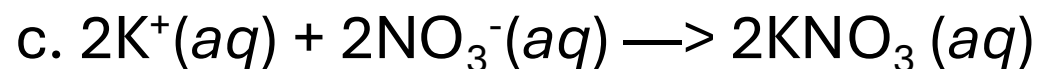
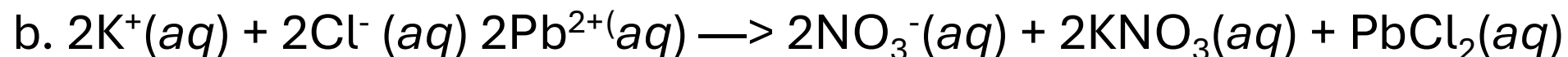
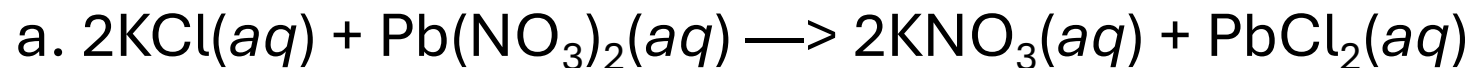
Yes

No

Soluble

Insoluble

1. Write the net ionic equation for the reaction that takes place between a solution of potassium chloride and a solution of lead(II) nitrate.



f. no reaction, the reactant(s) is/are insoluble

g. no reaction, the product(s) are soluble

Which of the following compounds are soluble in water?

I. NH_4OH II. FeSO_4 III. AgNO_3 IV. PbCO_3

a. I and III

b. II and IV

c. I, II, and III

d. IV only

e. All are soluble.

Barium hydroxide is soluble. What solubility rule determines this?

a. All hydroxides are insoluble

b. All hydroxides are insoluble except with Ca^{+2} , Ba^{+2} , and Sr^{+2}

c. Alkaline earth metal cations are always insoluble

d. Barium is always soluble except for hydroxides

e. None of these

What mass of barium sulfate (molar mass = 233 g/mol) is produced when 125 mL of a 0.150 *M* solution of barium chloride is mixed with 125 mL of a 0.150 *M* solution of iron(III) sulfate?

- a. 7.59g b. 3.65g c. 13.1g d. 18.8g e. 4.37 g

Solutions

- Solute = smaller amount of something that is dissolved in a solution
- Solvent = larger amount of something in the solution
- Water is a common solvent
- % solutions can be
 - w/w (g solute/100 g solution)
 - w/v (g solute/100 mL solution)
 - v/v (mL solute/100 mL solution)
- Molarity = moles solute/L solution

Molarity, M

Molarity is the moles of solute per liter of solution.

$$\frac{\text{Moles}}{\text{L}} = \text{M}$$

What is the molarity of a solution made by adding 25 grams of sodium chloride to 500 mL of water?

- A. 8.5×10^{-1} B. 5.0×10^{-2} C. 4.27×10^{-1} D. 2.9×10^1

$$25 \text{ g NaCl} \times \frac{1 \text{ mole NaCl}}{58.5 \text{ g}} \times \frac{1}{500 \text{ mL}} \times \frac{1000 \text{ mL}}{\text{L}} = 8.5 \times 10^{-1} \text{ M}$$

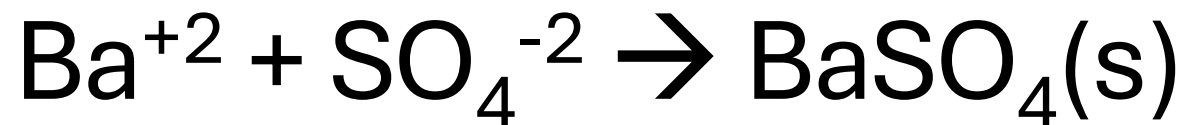
What mass of barium sulfate (molar mass = 233 g/mol) is produced when 125 mL of a 0.150 *M* solution of barium chloride is mixed with 125 mL of a 0.150 *M* solution of iron(III) sulfate?

1. Write the balanced net ionic equation
2. How many moles of barium ions are in 125 mL of 0.150M solution of Barium chloride? Convert into moles of product.
3. How many moles of sulfate ions are 125 mL of 0.150M solution of Iron(III) Sulfate? Convert into moles of product.
4. Which reactant is limiting? Use the moles of product for the next step.
5. Convert the moles of product into grams.

What mass of barium sulfate (molar mass = 233 g/mol) is produced when 125 mL of a 0.150 M solution of barium chloride is mixed with 125 mL of a 0.150 M solution of iron(III) sulfate?

a. 7.59 g b. 3.65 g c. 13.1 g d. 18.8 g

e. 4.37 g



$$\text{Moles Ba}^{+2} = 125 \text{ mL} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times \frac{0.150 \text{ moles}}{\text{L}} = 1.875 \times 10^{-2} \text{ moles Ba}^{+2}$$

$$1.875 \times 10^{-2} \text{ moles Ba}^{+2} \times \frac{1 \text{ mole BaSO}_4}{1 \text{ mole Ba}^{+2}} \times \frac{233 \text{ g}}{\text{mole BaSO}_4} = 4.37 \text{ g BaSO}_4$$

$$\text{Moles SO}_4^{-2} = 125 \text{ mL} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times \frac{0.150 \text{ moles}}{\text{L}} \times \frac{3 \text{ moles SO}_4^{-2}}{1 \text{ mole Fe}_2(\text{SO}_4)_3} = 5.625 \times 10^{-2} \text{ moles}$$

$$5.625 \times 10^{-2} \text{ moles SO}_4^{-2} \times \frac{1 \text{ mole BaSO}_4}{1 \text{ mole SO}_4^{-2}} \times \frac{233 \text{ g}}{\text{mole BaSO}_4} = 13.1 \text{ g BaSO}_4$$