

PROBLEMS

1. Identify the following ionic compounds as soluble or insoluble.

a) Calcium Carbonate (CaCO_3)

b) Barium Sulfate (BaSO_4)

c) Calcium Phosphate ($\text{Ca}_3(\text{PO}_4)_2$)

2. Predict what happens when a potassium phosphate (K_3PO_4) solution is mixed with a Calcium carbonate (CaCO_3) solution.

a) balanced molecular equation

b) ionic equation

c) net ionic equation

3. Predict what happens when sodium sulfide and zinc chloride solutions are mixed.

a) balanced molecular equation

b) ionic equation

c) net ionic equation

4. Identify the following as a weak or strong acid or base.

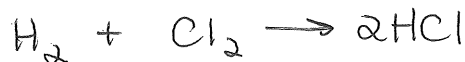
a) H_2SO_4

b) HF

c) NH_3

d) $\text{Ba}(\text{OH})_2$

5. On the redox reaction given below, write the half-reaction and identify the oxidizing and reducing agents.



6. Calculate the mass of KCl in grams required to prepare $5 \times 10^2 \text{ mL}$ of a 3.6 M solution.

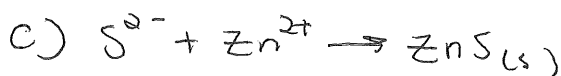
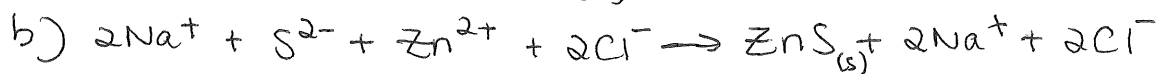
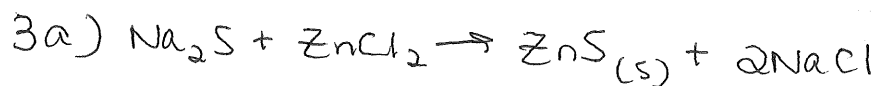
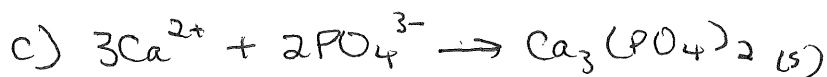
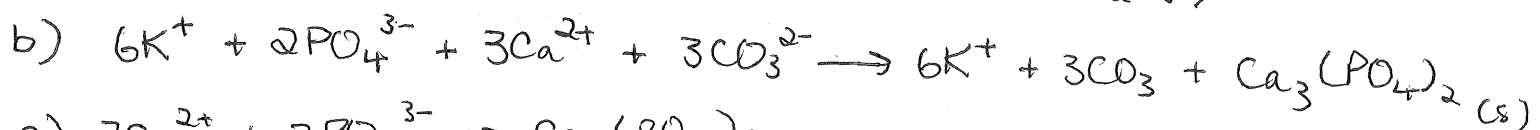
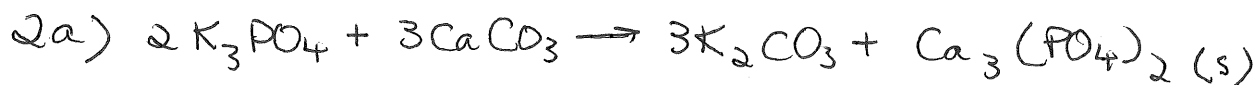
7. Calculate the molarity of the following solution: 14.4 g of calcium chloride in 2.4×10^2 mL of solution.
8. If you have 240 mL of a .6M HCl solution and you want to dilute it to exactly .24M, how much water should be added?
9. How many grams of KCl are required to precipitate most of the Ag^+ ions from 5×10^2 mL of .012M AgNO_3 solution? Write the net ionic equation also.
10. Periodate ion, IO_3^- oxidizes SO_3^{2-} in acidic solution,
Half reaction: $\text{SO}_3^{2-} + \text{H}_2\text{O} \rightarrow \text{SO}_4^{2-} + 2\text{H}^+ + 2\text{e}^-$
A 50mL sample of solution containing 2g of KIO_3 reacts with 36 mL of .3M Na_2SO_3 . What is the final oxidation state of the iodine after the reaction has occurred?
11. What is the oxidation number of I in IF_7 ?

ANSWERS

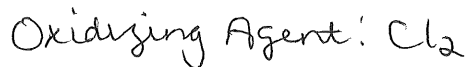
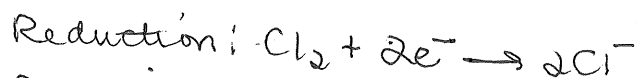
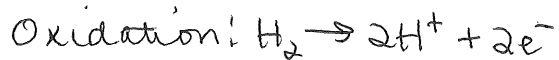
1a) soluble

b) insoluble

c) insoluble



4a) strong acid b) weak acid c) weak base d) strong base



6. Volume of solution = 5×10^2 mL

Molarity = 3.6 M molar mass of KCl = 74.5 g

$$\text{moles of KCl} = 500 \text{ mL} \times \frac{3.6 \text{ mol KCl}}{1000 \text{ mL solution}}$$

$$= 1.8 \text{ moles of KCl}$$

$$\text{Mass of KCl} = 1.8 \times 74.5 \text{ g} = \boxed{134.1 \text{ g}}$$

7. 14.4 g $CaCl_2$ in 2.4×10^2 mL of solution

Molar mass $CaCl_2$ = 108.98

$$\text{Moles } CaCl_2 = \frac{14.4 \text{ g}}{108.98 \text{ mol/g}} = .132 \text{ moles } CaCl_2$$

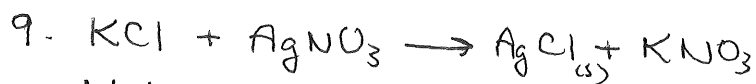
$$\text{Molarity} = \frac{.132 \text{ mol}}{.24 \text{ L}} = \boxed{.55 \text{ M}}$$

$$8. M_1 V_1 = M_2 V_2$$

$$V_2 = \frac{M_1 V_1}{M_2} = \frac{(1.6)(.24)}{.24} = .6 L = 600 \text{ mL}$$

600 mL is the final volume of the solution

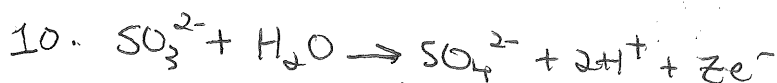
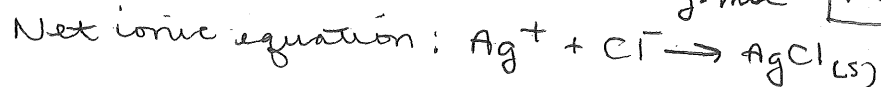
$$\text{Volume of water that should be added is } 600 - 240 = \boxed{360 \text{ mL}}$$



$$\text{Moles of AgNO}_3 = .012 \text{ M} \times \frac{5 \times 10^2 \text{ mL}}{1000 \text{ mL}} = .006 \text{ mol}$$

$$\text{Moles of KCl} = .006 \text{ mol}$$

$$\text{Mass of KCl} = .006 \text{ mol} \times 74.5 \text{ g/mol} = \boxed{.447 \text{ g}}$$



$$\text{Moles KIO}_3 = \frac{2.9}{214 \text{ g/mol}} = .009 \text{ mol}$$

$$\text{Moles Na}_2\text{SO}_3 = .3 \text{ M} \times \frac{36 \text{ mL}}{1000 \text{ mL}} = .0108 \text{ moles}$$

To find oxidation state

$$\text{SO}_3^{2-} = x + 3(-2) = -2$$

$$\Rightarrow x = -2 + 6 = 4$$

$$\text{SO}_4^{2-} = x + 4(-2) = -2$$

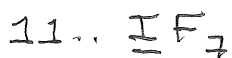
$$\Rightarrow x = -2 + 8 = 6$$

there is a loss of 2e⁻ gained by I

$$\text{IO}_3^- = x + 3(-2) = -1$$

$$\Rightarrow x = -1 + 6 = 5$$

$$\text{final oxidation state} = \boxed{+5}$$



$$x + 7(-1) = 0$$

$$x = \boxed{7}$$