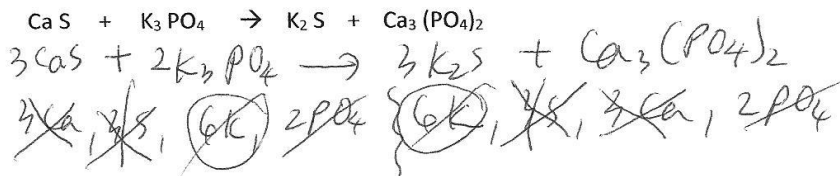


1. Balance the Chemical Reaction Below. Assume that the reaction goes to completion. (4 pts)



2. What is the formula weight for the compound K_3PO_4 (3 pts)

$$3(39.10) + 30.97 + 4(16.00) = 212.27$$

(Handwritten labels: K under 39.10, P under 30.97, O under 16.00)

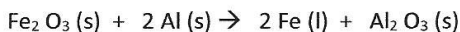
3. a) If I have 207.8 grams of H_2O , how many moles of water do I have? (molecular weight of H_2O is 18.02 grams / mol) (4 pts)

$$207.8 \text{ g H}_2\text{O} \times \frac{1 \text{ mol H}_2\text{O}}{18.02 \text{ g H}_2\text{O}} = 11.53 \text{ mol H}_2\text{O}$$

b) Out of 207.8 grams of H_2O , how many atoms of H do I have? (avogadro's number is 6.02×10^{23}) (4 pts)

$$207.8 \text{ g H}_2\text{O} \times \frac{1 \text{ mol H}_2\text{O}}{18.02 \text{ g H}_2\text{O}} \times \frac{2 \text{ mol H}}{1 \text{ mol H}_2\text{O}} \times \frac{6.02 \times 10^{23} \text{ atoms H}}{1 \text{ mol H}} = 1.398 \times 10^{25}$$

4. For the reaction below: (6 pts)



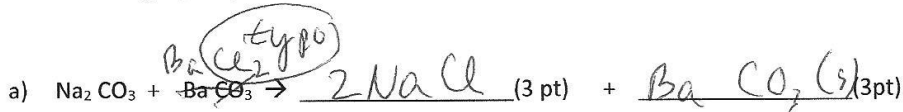
If I have 75.2 grams of the Fe_2O_3 , what is the theoretical yield of the Fe ? Show work. (FW $\text{Fe}_2\text{O}_3 = 159.7 \text{ g/mol}$) (FW $\text{Fe} = 55.9 \text{ g/mol}$)

$$75.2 \text{ g Fe}_2\text{O}_3 \times \frac{1 \text{ mol Fe}_2\text{O}_3}{159.7 \text{ g Fe}_2\text{O}_3} \times \frac{2 \text{ mol Fe}}{1 \text{ mol Fe}_2\text{O}_3} \times \frac{55.9 \text{ g Fe}}{1 \text{ mol Fe}} = 52.6 \text{ g Fe}$$

5. Is CaS (soluble) or (insoluble)] (circle one) in water? (4 pts)

CaS - exception to S^{-2} in soluble

1. Write out the product of the metathesis reaction below. (if get precipitate, the reaction goes to product. If do not get precipitate, the reaction does not go to product.) (12 pts)



b) Which one of the products comes out of solution as a precipitate? BaCO3 (6 pts)

2. Which of the following are strong acids? Circle all strong acids. (5 pts, 1 pt each)

H Br (circled) H F (circled) H2SO4 (circled) CH3COOH Li OH (circled) ← strong base

↑ weak acid

3. What is the oxidation state of the following? (8 pts, 2 pts each)

a. F2 Zero b. HF (ox state of F) -1 (group 7 - 8 = -1)

c. Ag Zero d. N in NO2 +4 (show work) $N + 2(-2) = \text{zero}$

4. In the reaction $2\text{HCl} + \text{Mg} \rightarrow \text{H}_2 + \text{MgCl}_2$

Handwritten notes: "2 (+1)" above H, "0" above Cl, "0" above H2, "+2" above Mg, "2" above Cl2. Arrows show electron transfer from Mg to H. "more + ox" circled next to Mg.

a. The element undergoing oxidation is Mg (EC, 1 pt) $\text{Mg} (0) \rightarrow \text{Mg}^{+2}$

b. The element undergoing reduction is H (EC, 1 pt) $\text{H}^+ \rightarrow \text{H} (0) + \text{e}^-$

c. If the H is lower in the activity series than the Mg, does the reaction go forward as written (yes/no) (circle one) (EC, 1 pt) no Mg is ox — H is reduction Mg higher

5. a. Molarity (M) of a solution made by dissolving 78.2 grams of Li Cl to make up 240.7 mL solution is 1.6 M
 (M = moles solute / L solution) (formula weight of Li Cl is 42.44 g/mol) (1000 mL = 1 L) (EC, 1 pt)

$78.2 \text{ g LiCl} \times \frac{1 \text{ mol LiCl}}{42.44 \text{ g LiCl}} = 1.84 \text{ moles}$

$240.7 \text{ mL} \times \frac{1 \text{ L}}{1000 \text{ mL}} = 0.2407 \text{ L}$

$\frac{1.84}{0.2407} = 7.64 \text{ M}$

b. If you have 25.2 L of a Na Cl solution of molarity 1.25 M, how many moles of Na Cl do you have? (EC, 1 pt)

$25.2 \text{ L} \times \frac{1.25 \text{ mol NaCl}}{1 \text{ L soln}} = 31.5 \text{ mol NaCl}$

Handwritten notes: "L soln" under 1 L, "NaCl soln" under 1.25 mol NaCl.