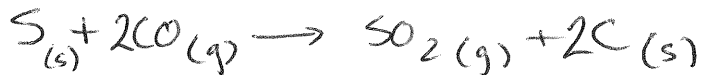


1) TRUE or FALSE

- a) In the equation, $\frac{3}{2}\text{H}_2 + \frac{1}{2}\text{N}_2 \rightarrow \text{NH}_3$, $\frac{1}{2}$ of a molecule of N_2 is required for a reaction to proceed. F
- b) 54.06 g of water contains 9 moles of atoms. T
 ↳ 3 mol H_2O
- c) 3.011×10^{23} I_2 molecules contains 1 mole of I atoms. T
- d) Uracil (an RNA base) has a formula of $\text{C}_2\text{H}_4\text{N}_2\text{O}_2$. This is both an empirical and molecular formula. F
 CH_2NO empirical
- e) The formula unit for ammonium iodite is NH_3IO_2 . F
 NH_4IO_2
- f) When nitrogen gas is a reactant it is always monoatomic nitrogen. F
- g) When a chemical system absorbs heat from the surroundings, no reaction has occurred. F
- h) NaCl and HCl are both strong electrolytes. T
- i) No reaction will occur when solid Al is added to an aqueous solution of SnCl_2 . F
- j) There are no ions present in a solution of a weak base F
 ↳ few

2) Solid sulfur reacts with gaseous carbon monoxide to produce gaseous sulfur dioxide and solid carbon.

a) Write the balanced equation for this reaction. Be sure to include states.



b) Does this reaction conform to any of the following types of reaction? Explain your answer.

- single replacement → yes, since sulfur swaps with carbon to become an oxide
- double replacement → no, no ionic compounds present
- decomposition → no, not 1 reactant
- combination → no, not 1 product

c) How many grams of sulfur are required to completely react with 25.5 g of carbon monoxide?

25.5 g CO	1 mol CO	1 mol S	32.06 g S	= 14.6 g S 1.46×10^1 g S
<hr/>	28.01 g CO	2 mol CO	1 mol S	
3 sf	4 sf	exact	4 sf	

d) If the actual yield of sulfur dioxide is 12.1 g, what is the % yield for this reaction?

25.5 g CO	1 mol CO	1 mol SO_2	64.06 g SO_2	= 29.1 g SO_2 Theoretical
<hr/>	28.01 g CO	2 mol CO	1 mol SO_2	
				$\frac{12.1}{29.1} \times 100\% = 41.5\%$

3) A solution of potassium acetate reacts and sulfuric acid are mixed.

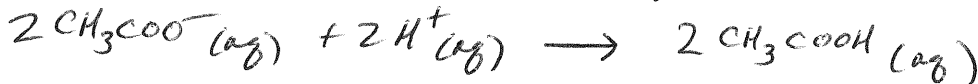
a) Predict the products.



b) Write the balanced conventional equation for this reaction. Be sure to include states.



c) Write the balanced net ionic equation. Be sure to include states.



d) What type of reaction is this? How do you know this?

double replacement: ionic solutions are combined

e) 10.0 g of potassium acetate and 10.0 g of sulfuric acid are combined. Determine the limiting reactant.

$$\frac{10.0 \text{ g } KCH_3COO}{1} \cdot \frac{1 \text{ mol } KCH_3COO}{98.15 \text{ g } KCH_3COO} = 0.1019 \text{ mol } KCH_3COO$$

$$\frac{10.0 \text{ g } H_2SO_4}{1} \cdot \frac{1 \text{ mol } H_2SO_4}{98.20 \text{ g } H_2SO_4} = 0.1018 \text{ mol } H_2SO_4$$

$$\frac{0.1019 \text{ mol } KCH_3COO}{2 \text{ mol } KCH_3COO} = 0.05095 \text{ L.R.}$$

$$\frac{0.1018 \text{ mol } H_2SO_4}{1 \text{ mol } H_2SO_4} = 0.1018$$

f) Choose one product and calculate its theoretical yield based on your answer in part e.

$$\frac{0.1019 \text{ mol } KCH_3COO}{1} \cdot \frac{2 \text{ mol } CH_3COOH}{2 \text{ mol } KCH_3COO} \cdot \frac{60.06 \text{ g } CH_3COOH}{1 \text{ mol } CH_3COOH} = 6.12 \text{ g } CH_3COOH \quad (6.12 \times 10^0 \text{ g})$$

g) If the % Yield is 67.4% calculate the actual yield.

$$0.674 \times 6.12 \text{ g} = 4.12 \text{ g} \quad (4.12 \times 10^0 \text{ g})$$

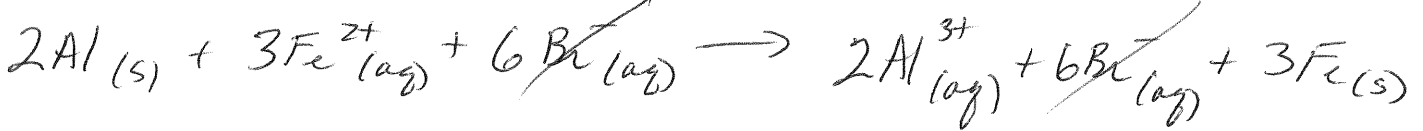
4) An aluminum rod is placed in a solution of iron(II) bromide.

a) Predict the products.



b) Write the balanced conventional equation for this reaction. Be sure to include states.

c) Write the balanced net ionic equation. Be sure to include states.



d) What type of reaction is this? How do you know this?

Single replacement: solid and aqueous metal species change positions.

e) You have 10.00 g of each reactant. Find the limiting reactant and the amount of excess reactant in grams.

$$\frac{10.00 \text{ g Al}}{1} \times \frac{1 \text{ mol Al}}{26.98 \text{ g Al}} = 0.3706_4 \text{ mol Al}$$

$$\frac{10.00 \text{ g FeBr}_2}{1} \times \frac{1 \text{ mol FeBr}_2}{215.65 \text{ g FeBr}_2} = 0.04637_1 \text{ mol FeBr}_2$$

$$\frac{0.3706_4 \text{ mol Al}}{2 \text{ mol Al}} = 0.1853$$

$$\frac{0.04637_1 \text{ mol FeBr}_2}{3 \text{ mol FeBr}_2} = 0.01546 \text{ LR}$$

0.04637	1
$0.04637_1 \text{ mol FeBr}_2$	2 mol Al
1	3 mol FeBr_2
0.03091_4 mol Al	26.98 g Al
1	1 mol Al
0.8341 g Al	<u>used</u>
$10.00 - 0.8341 =$	<u>9.17 g XS</u>