

200 points total

TUD Department of Chemistry

Fall 2017

Page 1 of 5

20 points 1) Calculate the %Cr in $K_2Cr_2O_7$.

$$FW = 2 \times \overset{K}{39.1} + 2 \times \overset{Cr}{52.0} + 7 \times 16.0 = 294.2 \text{ g/mol}$$

$$\%Cr = \frac{2 \times 52.0 \text{ g/mol}}{294.2 \text{ g/mol}} \times 100 = 35.4\%$$

20 points 2) KI is 23.6% K. How many grams of KI must you eat to consume 1.22 g of potassium?

$$1.22 \text{ g K} \left(\frac{100 \text{ g KI}}{23.6 \text{ g K}} \right) = 5.17 \text{ g KI}$$

200 points total

40 points 3) Answer the following:

a) How many grams in 0.30 moles of SOCl_2

$$0.30 \text{ mol} \left(\frac{119 \text{ g/mol}}{1 \text{ mol}} \right) = 36 \text{ g SOCl}_2$$

b) How many moles in 23 g of SOCl_2

$$23 \text{ g} \left(\frac{1 \text{ mol}}{119 \text{ g}} \right) = 0.19 \text{ mol SOCl}_2$$

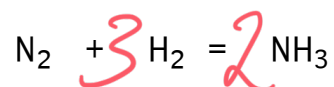
c) How many molecules in 5.0 g of CHCl_3

$$5.0 \text{ g} \left(\frac{1 \text{ mol}}{120. \text{ g}} \right) \left(\frac{6.02 \times 10^{23} \text{ molec.}}{1 \text{ mol}} \right) = 2.5 \times 10^{22} \text{ molecules}$$

d) what is the mass in grams of 5×10^{11} molecules of CH_3Cl

$$5 \times 10^{11} \text{ molecules} \left(\frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ molec.}} \right) \left(120. \text{ g/mol} \right) = 1.0 \times 10^{-10} \text{ g} = 0.1 \text{ ng}$$

40 points 4) For the reaction:



a) How many moles of N_2 reacted if 0.5 mole of NH_3 were formed?

$$0.5 \text{ mol NH}_3 \left(\frac{1 \text{ N}_2}{2 \text{ NH}_3} \right) = 0.25 \text{ mol N}_2$$

b) How many moles of N_2 are required to react with 2.0 moles of H_2 ?

$$2.0 \text{ mol H}_2 \left(\frac{1 \text{ N}_2}{3 \text{ H}_2} \right) = \frac{2}{3} \text{ mol N}_2$$

c) How many moles of NH_3 could be formed from 1 mole N_2 and 0.5 mole H_2 ?

$$1 \text{ mol N}_2 \left(\frac{2 \text{ NH}_3}{1 \text{ N}_2} \right) = 2 \text{ mol NH}_3$$

$$0.5 \text{ mol H}_2 \left(\frac{2 \text{ NH}_3}{3 \text{ H}_2} \right) = 0.33 \text{ mol NH}_3$$

d) How many grams of NH_3 could be formed from 2.0 g of H_2 and excess N_2 ?

$$2.0 \text{ g H}_2 \left(\frac{1 \text{ mol H}_2}{2 \text{ g}} \right) \left(\frac{2 \text{ NH}_3}{3 \text{ H}_2} \right) \left(\frac{17 \text{ g NH}_3}{\text{mol}} \right) = 11 \text{ g NH}_3$$

CHM 1142

Exam 2

TUD Department of Chemistry

Fall 2017

Page 4 of 5

200 points total

30 points 5) Write formulas or names for:

Cu(IO₄)₂ Copper (II) periodate

sulfuric acid H₂SO₄

sulfur dioxide SO₂

tin (IV) hydroxide Sn(OH)₄

potassium chlorite KClO₂

hydrobromic acid HBr

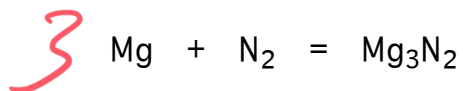
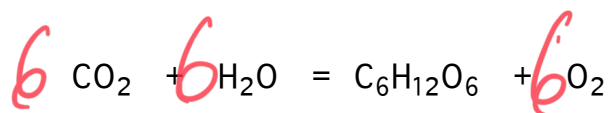
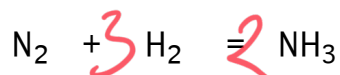
ferrous oxide FeO

titanium (IV) oxide
TiO₂ _____

HNO₂ nitrous acid

Ca(MnO₄)₂ Calcium permanganate

20 pts 7) Balance the equations:



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Exam 2

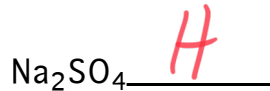
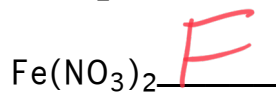
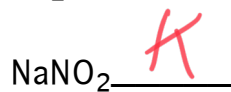
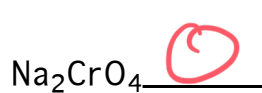
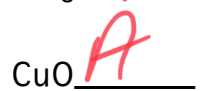
TUD Department of Chemistry

Fall 2017

Page 5 of 5

200 points total

30 points 6) Match the formula to the correct name,



a. copper (II) oxide

b. cuprous oxide

c. chloric acid

d. hydrobromic acid

e. iron (III) nitrate

f. ferrous nitrate

g. sodium sulfite

h. sodium sulfate

i. potassium pentachloride

j. hydrochloric acid

k. sodium nitrite

l. perchloric acid

m. bromic acid

n. sodium hypochlorite

o. sodium chromate

p. phosphorus pentachloride