CHM 1142

Exam 2

200 points total

TUD Department of Chemistry
Fall 2017

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

K Cr O

$FW = 2 \times 39.1 + 2 \times 52.0 + 7 \times 16.0 = 294.2\ g/mol$

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

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

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

40 points 3) Answer the following:

a) How many grams in 0.30 moles of $SOCl_2$

$$0.30\,mol\left(119\,g/mol\right) = 36\,g\,SOCl_2$$

b) How many moles in 23 g of $SOCl_2$

$$23\,g\left(\frac{1\,mol}{119\,g}\right) = 0.19\,mol\,SOCl_2$$

c) How many molecules in 5.0 g of $CHCl_3$

$$5.0\,g\left(\frac{1\,mol}{120.\,g}\right)\left(6.02\times10^{23}\,\frac{molec.}{mol}\right)$$

$$= 2.5\times10^{22}\,molecules$$

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

$$5\times10^{11}\,molecules\left(\frac{1\,mol}{6.02\times10^{23}\,molec.}\right)\left(120.\,g/mol\right)$$

$$= 1.0\times10^{-10}\,g$$

$$= 0.1\,ng$$

40 points 4) For the reaction:

$$N_2 + 3H_2 = 2NH_3$$

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

$$0.5\,mol\,NH_3\left(\frac{1\,N_2}{2\,NH_3}\right) = 0.25\,mol\,N_2$$

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

$$2.0\,mol\,H_2\left(\frac{1\,N_2}{3\,H_2}\right) = \frac{2}{3}\,mol\,N_2$$

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

$$1\,mol\,N_2\left(\frac{2\,NH_3}{1\,N_2}\right) = 2\,mol\,NH_3$$

$$0.5\,mol\,H_2\left(\frac{2\,NH_3}{3\,H_2}\right) = 0.33\,mol\,NH_3$$

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

$$2.0\,g\,H_2\left(\frac{1\,mol\,H_2}{2\,g}\right)\left(\frac{2\,NH_3}{3\,H_2}\right)\left(\frac{17\,g\,NH_3}{mol}\right) = 11\,g\,NH_3$$

30 points 5) Write formulas or names for:

$Cu(IO_4)_2$ copper (II) periodate

sulfuric acid H_2SO_4

sulfur dioxide SO_2

tin (IV) hydroxide $Sn(OH)_4$

potassium chlorite $KClO_2$

hydrobromic acid HBr

ferrous oxide FeO

TiO_2 titanium (IV) oxide

HNO_2 nitrous acid

$Ca(MnO_4)_2$ calcium permanganate

20 pts 7) Balance the equations:

$N_2 + 3H_2 = 2NH_3$

$6CO_2 + 6H_2O = C_6H_{12}O_6 + 6O_2$

$3Mg + N_2 = Mg_3N_2$

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

	a. copper (II) oxide
HCl J	b. cuprous oxide
PCl_5 P	c. chloric acid
CuO A	d. hydrobromic acid
$NaOCl$ N	e. iron (III) nitrate
Na_2CrO_4 O	f. ferrous nitrate
$NaNO_2$ K	g. sodium sulfite
$Fe(NO_3)_2$ F	h. sodium sulfate
CuO A	i. potassium pentachloride
Na_2SO_4 H	j. hydrochloric acid
$HClO_3$ C	k. sodium nitrite
	l. perchloric acid
	m. bromic acid
	n. sodium hypochlorite
	o. sodium chromate
	p. phosphorus pentachloride