

CHEM 1211
Practice Test

1.) Convert 263.0 yards to millimeters.

$$263.0 \text{ yards} \left| \begin{array}{c} 3 \text{ ft} \\ 1 \text{ yd} \end{array} \right| \left| \begin{array}{c} 12 \text{ in} \\ 1 \text{ ft} \end{array} \right| \left| \begin{array}{c} 2.54 \text{ cm} \\ 1 \text{ in} \end{array} \right| \left| \begin{array}{c} 1 \text{ m} \\ 100 \text{ cm} \end{array} \right| \left| \begin{array}{c} 1000 \text{ mm} \\ 1 \text{ m} \end{array} \right| = 2.40 \times 10^5 \text{ mm}$$

2.) Convert 62.3 μL to quarts.

$$62.3 \mu\text{L} \left| \begin{array}{c} 1 \text{ L} \\ 1 \times 10^6 \mu\text{L} \end{array} \right| \left| \begin{array}{c} 1.06 \text{ qt} \\ 1 \text{ L} \end{array} \right| = 6.60 \times 10^{-5} \text{ qts}$$

3.) An anion is formed when an atom gains an electron above the # of protons

4.) Isotopes are atoms that have the same # of protons but a different # of neutrons.

5.) The isotope cobalt 60 (^{60}Co) has how many protons, neutrons and electrons?

27 protons 27 electrons

$$60 - 27 = 33 \text{ neutrons}$$

6.) Naturally occurring chlorine is 75.53 percent ^{35}Cl , which has an atomic mass of 34.969 amu, and 24.47 percent ^{37}Cl which has an atomic mass of 36.966 amu. Calculate the average atomic mass of chlorine.

$$\begin{array}{ll} 75.53\% & 34.969 \text{ amu} \\ 24.47\% & 36.966 \text{ amu} \end{array}$$

$$\begin{aligned} \text{MW} &= (0.7553)(34.969) + (0.2447)(36.966) \\ &= 26.412 + 9.0456 \\ &= 35.46 \text{ amu} \end{aligned}$$

Carbon tetrabromide CBr_4

Copper (II) phosphide Cu_3P_2

Hydrochloric Acid HCl

Chlorite ion ClO_2^-

Calcium nitrate $\text{Ca}(\text{NO}_3)_2$

12.) What is the mass in grams of the following materials.

0.145 moles of potassium permanganate KMnO_4 MW = 158.04 g/mole

$$\frac{0.145 \text{ mol } \text{KMnO}_4}{1 \text{ mole}} \times 158.04 \text{ g } \text{KMnO}_4 = 22.9 \text{ g } \text{KMnO}_4$$

0.762 moles of phosphoric acid (H_3PO_4):

$$\frac{0.762 \text{ moles } \text{H}_3\text{PO}_4}{1 \text{ mole}} \times 97.994 \text{ g } \text{H}_3\text{PO}_4 = 74.7 \text{ g } \text{H}_3\text{PO}_4$$

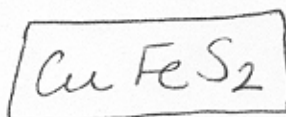
13.) Chalcopyrite is a mineral which contains 34.62% Cu, 30.43% Fe and 34.95% S.
What is the simplest formula for chalcopyrite?

Assume 100g

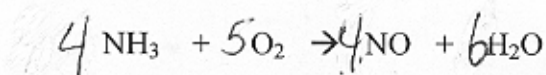
$$\frac{34.62 \text{ g Cu}}{63.55 \text{ g Cu}} \times 1 \text{ mole} = 0.5548 \text{ mol Cu} \quad \frac{0.5548}{0.5548} = 1 \text{ Cu}$$

$$\frac{30.43 \text{ g Fe}}{55.85 \text{ g Fe}} \times 1 \text{ mole} = 0.5548 \text{ mol Fe} \quad \frac{0.5548}{0.5548} = 1 \text{ Fe}$$

$$\frac{34.95 \text{ g S}}{32.07 \text{ g S}} \times 1 \text{ mole} = 1.0898 \text{ mol S} \quad \frac{1.0898}{0.5548} = 2 \text{ S}$$



14.) Consider the following reaction:

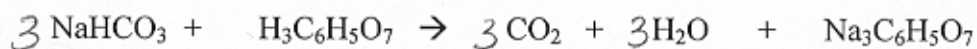


How many grams of NO would be produced if you started with 3.50×10^3 kg of NH_3 ? Be sure to balance the equation.

$$\frac{3.50 \times 10^3 \text{ kg NH}_3}{1 \text{ kg}} \times \frac{1000 \text{ g}}{1 \text{ kg}} \times \frac{1 \text{ mole NH}_3}{17.034 \text{ g NH}_3} \times \frac{4 \text{ mole NO}}{4 \text{ mole NH}_3} \times \frac{30.01 \text{ g}}{1 \text{ mole NO}} = 6.17 \times 10^6 \text{ g NO}$$

15.) The fizz produced when an Alka-Seltzer tablet is dissolved in water is due to the reaction between sodium bicarbonate, NaHCO_3 and citric acid, $\text{H}_3\text{C}_6\text{H}_5\text{O}_7$

In a certain experiment, 1.00 g of sodium bicarbonate and 1.00 g of citric acid are allowed to react. What is the limiting reagent? How many grams of carbon dioxide form? How much of the excess reactant remains after the limiting reagent is completely consumed? (Be sure to balance the reaction.)



16) In your own words, describe the experiments performed by J.J. Thomson, E. Rutherford, and R. Millikan. Why were they important?

$$\frac{1.00 \text{ g NaHCO}_3}{84.008 \text{ g}} \times \frac{1 \text{ mole}}{1 \text{ mole}} = 0.0119 \text{ moles} \leftarrow \text{need 3 times as much so this is limiting}$$

$$\frac{1.00 \text{ g H}_3\text{C}_6\text{H}_5\text{O}_7}{192.124 \text{ g}} \times \frac{1 \text{ mole}}{1 \text{ mole}} = 0.00524 \text{ moles}$$

$$\frac{0.0119 \text{ moles NaHCO}_3}{3 \text{ mol NaHCO}_3} \times \frac{3 \text{ moles CO}_2}{1 \text{ mole CO}_2} \times \frac{44.01 \text{ g CO}_2}{1 \text{ mole CO}_2} = 0.5237 \text{ g CO}_2$$

$$\frac{0.5237 \text{ g CO}_2}{44.01 \text{ g CO}_2} \times \frac{1 \text{ mole CO}_2}{1 \text{ mole CO}_2} \times \frac{1 \text{ mole H}_3\text{C}_6\text{H}_5\text{O}_7}{3 \text{ moles CO}_2} \times \frac{192.124 \text{ g}}{1 \text{ mole H}_3\text{C}_6\text{H}_5\text{O}_7} = 0.762 \text{ g H}_3\text{C}_6\text{H}_5\text{O}_7$$

$$1.00 \text{ g} - 0.762 \text{ g} = 0.238 \text{ g leftover}$$