AP Chemistry Summer Practice/Review Problems

Properties of Matter Practice Problems

Directions: Identify the following changes as physical or chemical changes

1. Baking soda reacts with vinegar to produce carbon dioxide. — Chemical
2. The copper sheath on the Statue of Liberty turns green. — chemical
3. Addition of salt melts ice on the highway. — physical
4. Steam condenses on the windowpane. — physical
5. Epoxy resin cures and hardens. — physical
6. Sugar dissolves in a cup of coffee. — physical
7. Natural gas burns in a furnace. — chemical

Sig Fig Practice Problems

Directions:
How many significant figures are in the following numbers? Write your answer in the space provided. Additionally, put each number in scientific notation making sure to retain the correct number of sig figs.

Example: 5,280 = 3 sig figs, 5.28×10^3

1. 2,000 = (1) 2×10^3
2. 15 = (2) 1.5×10^1
3. 6,589,000 = (4) 6.589×10^6
4. 70,400,000,000. = (11) $7.04000000000 \times 10^{10}$
5. 0.00263 = (3) 2.63×10^{-3}
6. 0.00589 = (3) 5.89×10^{-3}
7. 0.006 = (1) 6×10^{-3}
8. 0.400 = (3) 4.00×10^{-1}
9. 0.08060 = (4) 8.060×10^{-2}
10. 500,000. = (6) 5.00000×10^5
11. 0.0000000105 = (3) 1.05×10^{-8}
12. 0.006087 = (4) 6.087×10^{-3}

Directions:
Evaluate the following expressions. Express the answers in scientific notation with the correct number of significant figures and the correct units.

13. 0.0045 in + 1.0098 in + 0.987 in + 23.08 in =
= 25.0813 ⇒ 25.08 in = 2.508×10
14. $(3.5\ cm^3 \times 2.0\ g \cdot cm^{-3}) + (7.33\ cm^3 \times 1.67\ g \cdot cm^{-3})$ =
= 19.2411 = 19.2 g = 1.92×10^1
15. 2.703 g / (1.376 cm x 2.45 cm x 3.78 cm) =
= 0.212144192 ⇒ 0.212 = 2.12×10^{-1}

Dimensional Analysis (Unit Conversions) Practice Problems

Directions: Complete the following metric conversions using dimensional analysis. Show all work.

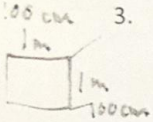
1. 8,768 mg into g

$8{,}768\ mg \times \frac{1\ g}{1000\ mg} = 8.768\ g$

2. 1342 mL into L

$1342\ mL \times \frac{1\ L}{1000\ mL} = 1.342\ L$

3. 400 cm^3 into m^3



$1\ m^3 = 1 \times 10^6\ cm^3$

$400\ cm^3 \times \frac{1\ m^3}{10^6\ cm^3}$

$= 4 \times 10^{-4}\ m^3$

4. 3.26×10^{-6} km into mm

$3.26 \times 10^{-6}\ km \times \frac{1000\ m}{1\ km} \times \frac{1000\ mm}{1\ m}$

$= 3.26\ mm$

5. 3600 sq. in. into sq. ft.

$1\ ft^2 = 144\ in^2$

$3600\ in^2 \times \frac{1\ ft^2}{144\ in^2} = 25\ ft^2$

6. If one pound is 453.59 grams, how many grams are there in one ounce? How many ounces are there in one kilogram?

$1\ oz \times \frac{1\ lb}{16\ oz} \times \frac{453.59\ g}{1\ lb} = 28.35\ g$

$= 30\ g$

$1\ kg \times \frac{2.2\ lb}{1\ kg} \times \frac{16\ oz}{1\ lb} = 35.2\ oz$

Subatomic Particles Practice

Directions: Use the information in the chart and a periodic table to complete the rest of the boxes

ELEMENT	ATOMIC #	MASS #	NEUTRONS	PROTONS	ELECTRONS
Beryllium	4	9 (9.01)	5	4	4
Nitrogen	7	14 (14.01)	7	7	7
Silver	47	108	61	47	47
Xenon	54	131 (131.29)	77	54	54
Oxygen	8	16 (15.99)	8	8	8
Zirconium	40	91 (91.22)	51	40	40
Calcium	20	40 (40.08)	20	20	20
Selenium	34	79 (78.96)	45	34	34
Chromium	24	52	28	24	24

Isotopes and Average Atomic Mass Practice

1. Which of the following atoms are isotopes of the same element? Identify the elements of these isotopes and describe the number of protons and neutrons in the nucleus for each of isotope.

$^{15}_{7}X$ $^{12}_{6}X$ $^{13}_{7}X$ $^{18}_{8}X$ $^{14}_{7}X$ $^{14}_{6}X$ $^{16}_{8}X$ $^{13}_{6}X$ $^{17}_{8}X$

$^{15}_{7}X$, $^{13}_{7}X$, $^{14}_{7}X$ $^{12}_{6}X$, $^{14}_{6}X$, $^{13}_{6}X$ $^{18}_{8}X$, $^{16}_{8}X$, $^{17}_{8}X$

2. There are three naturally occurring isotopes of neon:

Neon-20	Mass = 19.9924 amu	Abundance = 90.84%
Neon-21	Mass = 20.9940 amu	Abundance = 0.260%
Neon-22	Mass = 21.9914 amu	Abundance = 8.90%\

a. Without calculation, what is the approximate atomic mass of neon?

19.9924amu – Ne-20 has the largest % Abundance so the average will be skewed towards this mass

b. Calculate the actual atomic mass of neon using the data in the table.

(19.9924amu)(0.9084) + (20.9940amu)(0.00260) + (21.9914amu)(0.0890)

= 20.17amu

3. Uranium has an atomic mass equal to 238.0289 amu. It consists of two isotopes: uranium-235 with an isotopic mass of 235.044 amu and uranium-238 with an isotopic mass of 238.051 amu. Calculate the % abundance of the uranium-235 isotope. (Hint: use a system of equations...)

238.0289amu = (235.044)(x) + (238.051amu)(y)

238.0289 amu = (235.044)(x) + (238.051)(1-x)

-0.0221 = -235.044(x) - 238.051(x)

-0.0221 = -3.007(x)

x = 0.735% (U-235) 100 - .735 = 99.27% U-238

can't have x & y but x + y = 1, so y = 1 - x

Periodic Table Practice Problems

1. From amongst the elements sodium, chlorine, nickel, argon, calcium, uranium, and oxygen, select the alkali metal, the alkaline earth metal, the transition metal, the actinide, the halogen, the noble gas, and the chalcogen (Group 6A).

Sodium = alkali metal
Chlorine = halogen
nickel = transition metal
argon = noble gas
Calcium = alkaline Earth Metal
Uranium = actinide
Oxygen = chalcogen (6A)

Naming and Writing Practice Problems

1. Write the formulas for the ionic substances below:

   a. potassium bromide KBr

   b. calcium carbonate $CaCO_3$

   c. magnesium iodide MgI_2

   d. lithium oxide Li_2O

   e. aluminum sulfate $Al_2(SO_4)_3$

   f. ammonium chlorate NH_4ClO_3

   g. beryllium phosphate $Be_3(PO_4)_2$

2. Name the following ionic substances:

   a. $(NH_4)_2SO_4$ ammonium sulfate

   b. $Co_2(SO_4)_3$ cobalt (III) sulfate

   c. $NiSO_4$ nickel (II) sulfate

   d. $AlPO_4$ aluminum phosphate

   e. $KHCO_3$ potassium hydrogen carbonate

   f. $Ca(NO_3)_2$ calcium nitrate

3. Name the following binary molecular compounds of the nonmetals:

   a. CS_2 carbon disulfide

   b. SF_6 sulfur hexafluoride

   c. IF_5 iodine pentafluoride

   d. N_2H_4 dinitrogen tetrahydride

   e. PCl_5 phosphorus pentachloride

   f. Cl_2O_7 dichlorine heptaoxide

   g. $SiCl_4$ silicon tetrachloride

   h. GeH_4 germanium tetrahydride

   i. P_4O_{10} tetraphosphorus decaoxide

   j. S_4N_4 tetrasulfur tetranitride

4. What are the formulas for the following binary compounds?

a. Silicon dioxide SiO_2

b. boron trifluoride BF_3

c. xenon tetroxide XeO_4

d. dinitrogen pentoxide N_2O_5

e. bromine trifluoride BrF_3

f. carbon tetrachloride CCl_4

g. silicon carbide SiC

h. phosphorus tribromide PBr_3

i. disulfur dichloride S_2Cl_2

Writing and Balancing Equations Practice

1. Write balanced chemical equations corresponding to each of the following descriptions – make sure you use proper naming and writing rules to write the formulas for each substance!

a. Solid calcium carbide reacts with water to form an aqueous solution of calcium hydroxide and acetylene gas (C_2H_2).

$$CaC_2 + 2H_2O \rightarrow Ca(OH)_2 + C_2H_2$$

b. When solid potassium chlorate is heated, it decomposes to form solid potassium chloride and oxygen gas.

$$2KClO_3 \rightarrow 2KCl + 3O_2$$

c. Solid zinc metal reacts with sulfuric acid to form hydrogen gas and an aqueous solution of zinc sulfate.

$$Zn + H_2SO_4 \rightarrow H_2 + ZnSO_4 \quad \text{(balanced)}$$

d. When liquid phosphorus trichloride is added to water, it reacts to form aqueous phosphorous acid and aqueous hydrochloric acid.

$$PCl_3 + 3H_2O \rightarrow H_3PO_3 + 3HCl$$

e. When hydrogen sulfide gas is passed over solid hot iron (III) hydroxide, the resultant reaction produces solid iron (III) sulfide and gaseous water.

$$3H_2S + 2Fe(OH)_3 \rightarrow Fe_2S_3 + 6H_2O$$

f. Magnesium solid reacts with chlorine gas

$$Mg + Cl_2 \rightarrow MgCl_2 \quad \text{(balanced)}$$

g. Barium carbonate decomposes into barium oxide and carbon dioxide gas when heated.

$$BaCO_3 \rightarrow BaO + CO_2 \quad \text{(balanced)}$$

h. The hydrocarbon styrene $C_8H_{8\,(l)}$ is combusted in air

$$2C_8H_8 + 25O_2 \rightarrow 16CO_2 + 8H_2O$$

i. Silver oxide decomposes into silver metal and oxygen gas when heated.

$$2Ag_2O \rightarrow 4Ag + O_2$$

Formula Weights (Molar Mass) and Percent Composition Practice

1. Determine the formula weights for the following compounds.

a. HNO_3

$1.01 + 14.01 + 3(16.00)$

$= 63.02\ g/mol$

b. $KMnO_4$

$39.10 + 54.94 + 4(16.00)$

$= 158.04\ g/mol$

c. $Ca_3(PO_4)_2$

$3(40.08) + 2(30.97) + 8(16.00)$

$= 310.18\ g/mol$

d. Phosphorus trichloride PCl_3

$30.97 + 3(35.95)$

$= 137.32\ g/mol$

2. Find the percent composition of carbon in C_2H_2

$2(12.01) + 2(1.01) = 26.04\ g/mol$

$\frac{2(12.01)}{26.04} \times 100 = 92.24\%$

3. Find the percent composition of oxygen in $C_6H_8O_6$

$6(12.01) + 8(1.01) + 6(16.00) = 176.$

$\frac{6(16.00)}{174.14} \times 100 = 54.50\%$

4. What is the percent by mass of nitrogen in ammonium nitrate?

NH_4NO_3

$2(14.01) + 4(1.01) + 3(16.00)$

$= 80.06\ g/mol$

$\frac{2(14.01)}{80.06} \times 100 = 35\%$

Mole Conversions Practice

1. How many moles are present in 128 grams of sulfur dioxide?

$128\ g\ SO_2 \times \frac{1\ mol\ SO_2}{64.06\ g} = 2.00\ g$

2. What is the mass of 3 moles of oxygen gas?

$3\ mol\ O_2 \times \frac{32.00\ g\ O_2}{1\ mol\ O_2} = 96\ g \Rightarrow 100\ g$

3. If 5 moles of a metallic element have a mass of 200 grams, which element is it?

$\frac{200\ g}{5\ moles} = 40\ g/mol = Ca$

4. What is the molar mass of methane (CH_4)?

$12.01 + 4(1.01) = 16.05\ g/mol$

5. What is the mass of 9 moles of fluorine gas molecules?

$9\ mol \times \frac{38.00\ g}{1\ mol} = 342$ (F_2)

6. The mass of 6 moles of a particular gas is equal to 102 grams. What is its molar mass?

$\frac{102\ g}{6\ moles} = 17\ g/mol$

7. How many grams are there in one mole of benzene (C_6H_6)?

$1\ mol\ C_6H_6 \times \frac{78.12\ g}{1\ mol\ C_6H_6} = 78.12\ g$

8. How many molecules are there in 6 moles of TNT (tri-nitro-toluene: $CH_3C_6H_2(NO_2)_3$)?

$6\ moles \times \frac{6.02 \times 10^{23}\ molecules}{1\ mole} = 3.61 \times 10^{24} = 4 \times 10^{24}\ molecules$

9. What is the molar mass of TNT?

$7(12.01) + 5(1.01) + 3(14.01) + 6(16.00)$

$= 227.15\ g/mol$

10. How many grams are in 23 moles of iron?

$23\ moles \times \frac{55.85\ g}{1\ mol} = 1284.55\ g$

$= 1300\ g$

11. How many moles are in 24 grams of carbon?

$24\ g\ C \times \frac{1\ mol\ C}{12.0\ g} = 2.0\ moles$

12. What is the mass of 5.234×10^{30} silicon atoms?

$5.234 \times 10^{30} \times \frac{1\ mol}{6.02 \times 10^{23}} \times \frac{28.09\ g}{1\ mol}$

$= 2.442 \times 10^{8}\ g$

Empirical and Molecular Formulas Practice Problems

A compound was analyzed and found to contain 76.57% carbon, 6.43% hydrogen, and 17.00% oxygen by mass. Calculate the empirical formula of the compound. If the molar mass of the compound is 94.11g/mol, what is the molecular formula of the compound?

$76.57\text{g C} \times \frac{1\text{ mol}}{12.01\text{g}} = 6.3755 / 1.0625 = 6$

$6.43\text{g H} \times \frac{1\text{ mol}}{1.01\text{g}} = 6.36634 / 1.0625 = 6$

$17.00\text{g O} \times \frac{1\text{ mol}}{16.00\text{g}} = 1.0625 / 1.0625 = 1$

Emp: C_6H_6O

Molec. $\frac{94.11}{94.11} \times 2 = 1$ (same as emp.)

2. A compound was analyzed and found to contain 53.30% carbon, 11.19% hydrogen, and 35.51% oxygen by mass. Calculate the empirical formula of the compound. If the molar mass of the compound is 90.12 g/mol, what is the molecular formula of the compound?

$53.3\text{g C} \times \frac{1\text{mol}}{12.01} = 4.437968 / 2.219375 = 2$

$11.19\text{g H} \times \frac{1\text{mol}}{1.01} = 11.079208 / 2.219375 = 5$

$35.51\text{g O} \times \frac{1\text{mol}}{16.00} = 2.219375 / 2.219375 = 1$

Empirical: C_2H_5O

Molecular: $\frac{90.12}{45.07} = 2$ $C_4H_{10}O_2$

3. Find empirical and molecular formulas of caffeine, which contains 49.5% carbon, 5.15% hydrogen, 28.9% nitrogen, 16.5% oxygen. It has a molar mass of 195 g.

$49.5\text{g C} \times \frac{1\text{mol}}{12.01} = 4.12156 / 1.03125 = 4$

$5.15\text{g H} \times \frac{1\text{mol}}{1.01} = 5.09900 / 1.03125 = 5$

$28.9\text{g N} \times \frac{1\text{mol}}{14.01} = 2.062812 / 1.03125 = 2$

$16.5\text{g O} \times \frac{1\text{mol}}{16.00} = 1.03125 / 1.03125 = 1$

Emp: $C_4H_5N_2O$

Molec: $\frac{195}{97.11\text{g}} = 2$ $C_8H_{10}N_4O_2$

Stoichiometry Practice Problems

1. Hydrofluoric acid, $HF_{(aq)}$, cannot be stored in glass bottles because compounds called silicates in the glass are attacked by the $HF_{(aq)}$. Sodium silicate (Na_2SiO_3) for example, reacts as follows:

$$Na_2SiO_{3\,(s)} + 8\,HF \rightarrow H_2SiF_{6\,(aq)} + 2\,NaF_{(aq)} + 3\,H_2O_{(l)}$$

a. How many moles of HF are needed to react with 0.300 mole of Na_2SiO_3?

$0.300\text{ mol } Na_2SiO_3 \times \frac{8\text{ mol HF}}{1\text{ mol } Na_2SiO_3} = 2.40\text{ mol}$

b. How many grams of NaF form when 0.500 mol of HF reacts with excess Na_2SiO_3?

$0.500\text{ mol HF} \times \frac{2\text{ mol NaF}}{8\text{ mol HF}} \times \frac{41.99\text{g}}{1\text{ mol NaF}} = 5.25\text{g}$

c. How many grams of Na_2SiO_3 can react with 0.800 g of HF?

$0.800\text{g HF} \times \frac{1\text{ mol HF}}{20.01\text{g}} \times \frac{1\text{ mol } Na_2SiO_3}{8\text{ mol HF}} \times \frac{122.07\text{g}}{1\text{ mol } Na_2SiO_3} = 0.610\text{g}$

2. Several brands of antacids use Al(OH)3 to react with stomach acid, which contains primarily HCl:

$$Al(OH)_{3(s)} + 3\,HCl_{(aq)} \rightarrow AlCl_{3\,(aq)} + 3\,H_2O_{(l)}$$

a. Balance the equation above.

b. Calculate the number of grams of HCl that can react with 0.500 g of $Al(OH)_3$.

$$0.500\text{g } Al(OH)_3 \times \frac{1\text{mol } Al(OH)_3}{78.01\text{g}} \times \frac{3\text{ mol HCl}}{1\text{mol } Al(OH)_3} \times \frac{36.46\text{g}}{1\text{mol HCl}} = 0.701\text{g}$$

c. Calculate the number of grams of $AlCl_3$ and the number of grams of H_2O formed when 0.500 g of $Al(OH)_3$ reacts.

$$0.500\text{g } Al(OH)_3 \times \frac{1\text{mol}}{78.01\text{g}} \times \frac{3\text{mol } H_2O}{1\text{mol } Al(OH)_3} \times \frac{18.02\text{g}}{1\text{mol } H_2O} = 0.346\text{ g } H_2O$$

$$0.500\text{g } Al(OH)_3 \times \frac{1\text{mol}}{78.01\text{g}} \times \frac{1\text{mol } AlCl_3}{1\text{mol } Al(OH)_3} \times \frac{133.33\text{g}}{1\text{mol } AlCl_3} = 0.855\text{g } AlCl_3$$

3. A solid iron ore sample contains iron (III) oxide together with other substances. Reaction of the ore with carbon monoxide produces solid iron metal and carbon dioxide gas.

a. Write a BALANCED equation for this reaction.

$$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$$

b. Calculate the number of grams of carbon monoxide that can react with 0.350 kg of iron (III) oxide.

$$0.350\text{ kg } Fe_2O_3 \times \frac{1000\text{g}}{1\text{kg}} \times \frac{1\text{mol } Fe_2O_3}{159.7\text{g}} \times \frac{3\text{ mol CO}}{1\text{mol } Fe_2O_3} \times \frac{28.01\text{g}}{1\text{mol CO}}$$

$$= 184\text{g CO}$$

c. Calculate the number of grams of iron and the number of grams of carbon dioxide formed when 0.350 kg of iron (III) oxide reacts.

$$0.350\text{kg} \times \frac{1000\text{g}}{1\text{kg}} \times \frac{1\text{mol } Fe_2O_3}{159.7\text{g}} \times \frac{2\text{mol Fe}}{1\text{mol } Fe_2O_3} \times \frac{55.85\text{g}}{1\text{mol Fe}} = 245\text{g Fe}$$

$$0.350\text{kg} \times \frac{1000\text{g}}{1\text{kg}} \times \frac{1\text{mol } Fe_2O_3}{159.7\text{g}} \times \frac{3\text{mol } CO_2}{1\text{mol } Fe_2O_3} \times \frac{44.01\text{g}}{1\text{mol } CO_2} = 289\text{g } CO_2$$

Limiting Reactant and % Yield Practice

1. Hydrogen and oxygen gases react to form according to the reaction below:

$$2\,H_{2(g)} + O_{2(g)} \rightarrow 2\,H_2O_{(g)}$$

a. Determine the limiting reactant if 13 g of H_2 reacts with 80. g of O_2.

$$13\text{g } H_2 \times \frac{1\text{mol}}{2.02\text{g}} \times \frac{2\text{mol } H_2O}{2\text{mol } H_2} = 6.4\text{mol } H_2O$$

$$80.\text{g } O_2 \times \frac{1\text{mol } O_2}{32\text{g } O_2} \times \frac{2\text{mol } H_2O}{1\text{mol } O_2} = 5.0\text{mol } H_2O$$

O_2 limits

b. How many grams of water will be produced (see your answer above – only one of these is the correct one)?

$$5.0\text{ mol } H_2O \times \frac{18.02\text{g } H_2O}{1\text{mol } H_2O} = 90.\text{ g } H_2O$$

c. In a separate experiment, 12.5 g of water is produced from 23.1 g of hydrogen gas and 25.4 g of oxygen gas. What is the percent yield for this experiment?

O_2 limits

$$23.1\text{g } H_2 \times \frac{1\text{mol } H_2}{2.02\text{g}} \times \frac{2\text{mol } H_2O}{2\text{mol } H_2} \times \frac{18.02\text{g}}{1\text{mol } H_2O} = 206\text{ g } H_2O$$

$$25.4\text{g } O_2 \times \frac{1\text{mol } O_2}{32.00\text{g}} \times \frac{2\text{mol } H_2O}{1\text{mol } O_2} \times \frac{18.02\text{g}}{1\text{mol } H_2O} = 28.6\text{ g } H_2O \text{ theoretical}$$

$$\frac{12.5\text{g}}{28.6\text{g}} \times 100 = 43.7\%$$

2. Sodium hydroxide reacts with carbon dioxide as follows:

$$2\,NaOH_{(s)} + CO_{2(g)} \rightarrow Na_2CO_{3(s)} + H_2O_{(l)}$$

a. What is the limiting reactant when 1.85 mol of NaOH and 1.00 mole of CO_2 are allowed to react?

NaOH limits

$1.85\ mol\ NaOH \times \frac{1\ mol\ Na_2CO_3}{2\ mol\ NaOH} = 0.925\ mol\ Na_2CO_3$

$1.00\ mol\ CO_2 \times \frac{1\ mol\ Na_2CO_3}{1\ mol\ CO_2} = 1.00\ mol\ Na_2CO_3$

b. How many moles of Na_2CO_3 can truly be produced in part a?

0.925 moles

c. How many moles of the excess reactant remain after the completion of the reaction?

$1.85\ mol\ NaOH \times \frac{1\ mol\ CO_2}{2\ mol\ NaOH} = 0.925\ mol\ CO$ used

$1.0 - 0.925 =$ 0.0750 moles remain

3. 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 ($H_3C_6H_5O_7$):

$$3NaHCO_{3(aq)} + H_3C_6H_5O_{7(aq)} \rightarrow 3CO_2 + 3H_2O_{(l)} + Na_3C_6H_5O_{7(aq)}$$

a. In a certain experiment 1.00 g of sodium bicarbonate and 1.00 g citric acid are allowed to react. What is the limiting reactant?

NaHCO3 limits

$1.00g\ NaHCO_3 \times \frac{1\ mol\ NaHCO_3}{84.01g} \times \frac{3\ mol\ CO_2}{3\ mol\ NaHCO_3} = 0.0119\ mol\ CO_2$

$1.00g\ H_3C_6H_5O_7 \times \frac{1\ mol\ H_3C_6H_5O_7}{192.14g} \times \frac{3\ mol\ CO_2}{1\ mol\ H_3C_6H_5O_7} = 0.0156\ mol\ CO_2$

b. How many grams of carbon dioxide will form?

$0.0119\ mol\ CO_2 \times \frac{44.01g\ CO_2}{1\ mol\ CO_2} = 0.524\ g\ CO_2$

c. How many grams of the excess reactant remain after the limiting reactant is completely consumed?

$1.00g\ NaHCO_3 \times \frac{1\ mol\ NaHCO_3}{84.01g\ NaHCO_3} \times \frac{1\ mol\ H_3C_6H_5O_7}{3\ mol\ NaHCO_3} \times \frac{192.14g}{1\ mol\ H_3C_6H_5O_7}$

$= 0.762\ g\ H_3C_6H_5O_7$ used

$1.00 - 0.762g =$ 0.238 g $H_3C_6H_5O_7$ left over