

Must Show Calculations! No Work, No Credit!

Molar Mass:

- 1.) Calculate the molar mass of ethanol. $\text{CH}_3\text{CH}_2\text{OH}$ (10 points)

C	2	x	12	=	24	
H	6	x	1	=	6	
O	1	x	16	=	16	

Ethanol = 46 g/mol $\text{CH}_3\text{CH}_2\text{OH}$

- 2.) Calculate the molar mass of ammonium nitrate. NH_4NO_3 (10 points)

N	2	x	14	=	28	
H	4	x	1	=	4	
O	3	x	16	=	48	

Ammonium nitrate = 80 g/mol NH_4NO_3

Percent Composition:

- 1.) Calculate the percent composition for the elements in ethanol. $\text{CH}_3\text{CH}_2\text{OH}$ (8 points)

C	24	÷	46	x	100	=	52.17% C
H	6	÷	46	x	100	=	13.04% H
O	16	÷	46	x	100	=	34.78% O

- 2.) Calculate the percent composition for the elements in iron III nitrate. $\text{Fe}(\text{NO}_3)_3$ (8 points)

N	28	÷	80	x	100	=	35.00% N
H	4	÷	80	x	100	=	5.00% H
O	48	÷	80	x	100	=	60.00% O

Empirical Formula:

- 1.) Find the empirical formula for Vanilla, a flavoring derived from orchids, which contains 63.15% C, 5.30 % H, and 31.55% O. (11 points)

C	63.15 grams	1 mol							
		12.0 grams	=	5.263	mol /	1.972 =	2.67	x 3 =	8
H	5.30 grams	1 mol							
		1.0 grams	=	5.300	mol /	1.972 =	2.69	x 3 =	8
O	31.55 grams	1 mol							
		16.0 grams	=	1.972	mol /	1.972 =	1	x 3 =	8

Formula is: $\text{C}_8\text{H}_8\text{O}_3$

2.) A strong oxidizer contains 25.94% N and 74.6% O. Calculate its empirical formula. **(5 pts)**

N	$\frac{25.94 \text{ grams}}{14.0 \text{ grams}}$	$\frac{1 \text{ mol}}{14.0 \text{ grams}}$	=	1.853	mol /	$1.853 = 1$	$\times 2 = 2$
O	$\frac{74.60 \text{ grams}}{16.0 \text{ grams}}$	$\frac{1 \text{ mol}}{16.0 \text{ grams}}$	=	4.663	mol /	$1.853 = 2.5$	$\times 2 = 5$

Formula is: N_2O_5

Molecular Formula:

1.) Phenolphthalein, an acid base indicator, has an empirical formula of $\text{C}_{10}\text{H}_7\text{O}_2$ and a molar mass of 318.32 g/mol. Calculate its molecular formula. **(3 pts)**

$$\text{C}_{10}\text{H}_7\text{O}_2 = 10(12) + 7(1) + 2(16) = 159 \text{ g/mol}$$

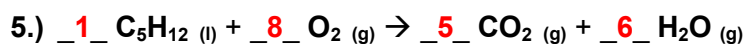
$$318.32 \text{ g/mol} \div 159 \text{ g/mol} = 2 \quad \rightarrow \quad \text{C}_{20}\text{H}_{14}\text{O}_4$$

2.) An ingredient, used by the food industry to produce fruity flavors, has an empirical formula of $\text{C}_2\text{H}_4\text{O}$ and a molar mass of 132 g/mol. Calculate the molecular formula of this compound. **(3 pts)**

$$\text{C}_2\text{H}_4\text{O}_1 = 2(12) + 4(1) + 1(16) = 44 \text{ g/mol}$$

$$132 \text{ g/mol} \div 44 \text{ g/mol} = 3 \quad \rightarrow \quad \text{C}_6\text{H}_{12}\text{O}_3$$

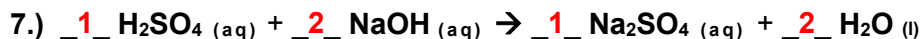
Chemical Reactions: **(6 points balancing; 6 points for types)**



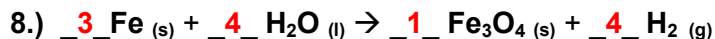
Type: Combustion



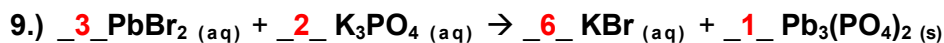
Type: Synthesis



Type: Neutralization



Type: Single Rep.

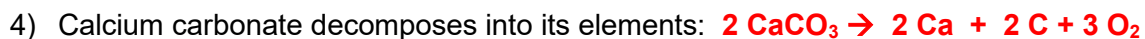
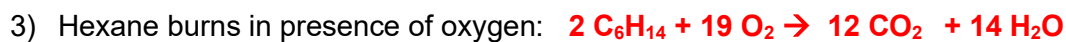


Type: Double Rep.



Type: Decomposition

Predict the Products & Write a Balanced Equation **(16 pts formulas; 4 points balancing)**



Activity Series

potassium	most reactive	K
sodium		Na
calcium		Ca
magnesium		Mg
aluminium		Al
carbon		C
zinc		Zn
iron		Fe
tin		Sn
lead		Pb
hydrogen		H
copper		Cu
silver		Ag
gold		Au
platinum	least reactive	Pt

