Warm Up

Na_3PO_4

Calculate the mass of 0.905 moles of sodium phosphate.

$0.905 \text{ mol } Na_3PO_4 \times \frac{163.94 \text{ g } Na_3PO_4}{1 \text{ mol } Na_3PO_4} = 148 \text{ g } Na_3PO_4$

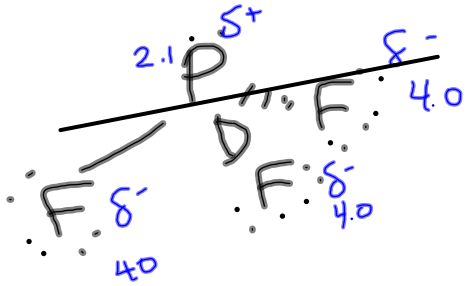
$Na_3PO_4 \rightarrow (3 \times 22.99) + (1 \times 30.97) + (4 \times 16.00)$

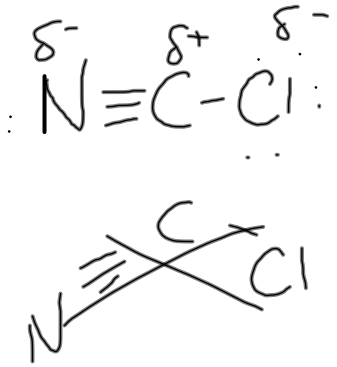
$= 163.94 \text{ g/mol}$

$Mm = \frac{m}{n}$

$\frac{163.94 \text{ g/mol}}{1} = \frac{m}{0.905 \text{ mol}}$

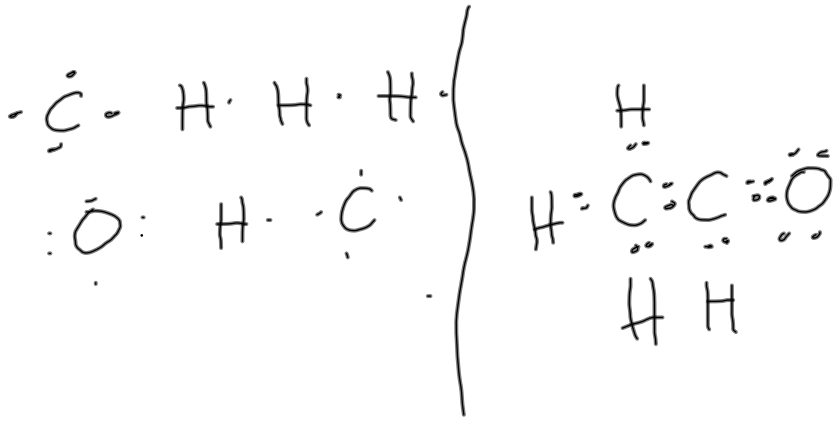
$(163.94 \text{ g/mol})(0.905 \text{ mol}) = m$

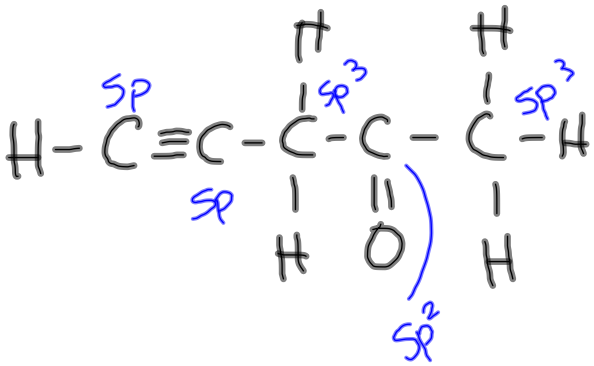




0.8 4.0
KF ~~polar~~ ionic

CH_3COH





Molar Mass Conversions

Once molar mass is established, a conversion can be made from grams to moles or moles to grams (depending on the measurement of the sample)

$$Mm = \frac{m}{n}$$

mass (g)

# of moles

Ex. How many moles are found in 90.5 g of H_2O?

Ex. What is the mass of 4.50 moles of $NaNO_3$?

Mole-Volume Relationship

22.4 L
1 mol
Cl_2

22.4 L
1 mol
He

Avagadro's Hypothesis
Equal volumes of gases at the same temperature and pressure contain equal number of particles.

Standard temperature and pressure (STP)
0.^{o}C and 101.3kPa

At STP, 1 mol (6.02 x10^{23} representative particles) of any gas contains 22.4 L.

V_m @ STP = 22.4 L/mol

Calculating Volume at STP

Ex. Determine the volume of oxygen gas will 0.375 mol occupy at STP.

$$0.375 \text{ mol } O_2 \times \frac{22.4 \text{ L } O_2}{1 \text{ mol } O_2}$$

Ex. Determine the number of moles of helium gas found in 21.8 L at STP.

$$21.8\ \text{L He} \times \frac{1\ \text{mol He}}{22.4\ \text{L He}} = 0.973\ \text{mol He}$$

Homework

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