HOMEWORK PROBLEMS:

What are the Empirical Formulas for the two sulfur oxide compounds (in parts 3a and 3b) having the following compositions?

3a.) a 27.0 g sample that is 50% sulfur by mass.

Answers:

$$\frac{13.5\ g\ S}{}\times\frac{1\ mol\ S}{32.06\ g}=0.421\ mol\ S$$

$$\frac{13.5\ g\ O}{}\times\frac{1\ mol\ O}{16.0\ g}=0.844\ mol\ O$$

$$\frac{0.421\ mol}{0.421\ mol}=1.0$$

$$\frac{0.844\ mol}{0.421\ mol}=2.0$$

SO_2

OR, you can ignore the given mass and the have to consider the percentage. A quicker method is to simply take the percentages (that "should" add up to 100%) and make the percentages the mass for each element.

$$\frac{50\ g\ S}{}\times\frac{1\ mol\ S}{32.06\ g}=1.560\ mol\ S$$

$$\frac{50\ g\ O}{}\times\frac{1\ mol\ O}{16.0\ g}=3.125\ mol\ O$$

$$\frac{1.560\ mol}{1.560\ mol}=1.0$$

$$\frac{3.125\ mol}{1.560\ mol}=2.0$$

SO_2

3b.) a 78.0 g sample that is 60% oxygen.

Answers:

$$\frac{40\ g\ S}{}\times\frac{1\ mol\ S}{32.06\ g}=1.2477\ mol\ S$$

$$\frac{60\ g\ O}{}\times\frac{1\ mol\ O}{16.0\ g}=3.75\ mol\ O$$

$$\frac{1.2477\ mol}{1.2477\ mol}=1.0$$

$$\frac{3.75\ mol}{1.2477\ mol}=3.0$$

SO_3

3c.) Calculate the Empirical formula of a compound that contains 1.67 grams of cerium, Ce, and 4.54 grams of iodine.

Answers:

$$\frac{1.67\ g\ Ce}{} \times \frac{1\ mol\ Ce}{140.12\ g} = 0.01191\ mol\ Ce$$

$$\frac{4.54\ g\ I}{} \times \frac{1\ mol\ I}{126.91\ g} = 0.03577\ mol\ I$$

$$\frac{0.01191\ mol}{0.01191\ mol} = 1.0$$

$$\frac{0.03577\ mol}{0.01191\ mol} = 3.0$$

CeI_3

3d.) A synthetic rubber contains 0.556 grams of carbon and 0.0933 grams of hydrogen. Determine its Empirical Formula.

Answers:

$$\frac{0.556\ g\ C}{} \times \frac{1\ mol\ C}{12.01\ g} = 0.04629\ mol\ C$$

$$\frac{0.0933\ g\ H}{} \times \frac{1\ mol\ H}{1.008\ g} = 0.09256\ mol\ H$$

$$\frac{0.04629\ mol}{0.04629\ mol} = 1.0$$

$$\frac{0.09256\ mol}{0.04629\ mol} = 2.0$$

CH_2