

Question:

A sample of compound weighing 83.5 g contains 33.4 g of sulfur. The rest is of oxygen. What is the empirical formula?

Solution:

Empirical formula: S_xO_y

There x:y - the simplest positive integer ratio of atoms present in a compound.

And $x:y=n(S):n(O)$,

$$n(S)=m(S)/M(S)=33.4/32=1.04\text{mol}$$

$$m(O)=m(\text{sample})-m(S)=83.5-33.4=50.1\text{g}$$

$$n(O)=m(O)/M(O)=50.1/16=3.13\text{mol}$$

$$n(S):n(O)=1.04:3.13=(\text{simplify ratio to integers})=1:3;$$

so our empirical formula of compound is SO_3

Answer: SO_3