

## Answer on Question #70207 - Chemistry / General Chemistry

Question:

A salt of copper and oxygen is 88.81% (by mass) copper. Determine empirical formula of the copper oxide salt.

Solution:

The relative atomic mass of copper  $A_{\text{Cu}}$  is 63.5, of oxygen  $A_{\text{O}}$  16.0.

Write the generic formula of copper oxide salt:  $\text{Cu}_x\text{O}_y$ . The molecular weight of it would be  $63.5*x + 16.0*y$ , and copper percentage is (mass of copper in molecule / total mass of molecule) \* 100% =  $(63.5*x / (63.5*x + 16.0*y)) * 100\%$ , and it is 88.81%.

So  $(63.5*x / (63.5*x + 16.0*y)) * 100 = 88.81$ .

We have to remember that x and y – are integer numbers, and we have to find the pair of smallest possible values. Assume  $y=1$  and find respective x. If x appears to be fractional, we simply multiply both x and y by consequent numbers until receive pair of integers.

Do the calculation:

$$y=1;$$

$$(63.5*x / (63.5*x + 16.0*1)) * 100 = 88.81;$$

$$63.5*x / (63.5*x + 16.0) = 0.8881;$$

$$63.5*x = (63.5*x + 16.0) * 0.8881 = 56.4*x + 14.2;$$

$$63.5*x - 56.4*x = 14.2;$$

$$7.1*x = 14.2;$$

$$x = 14.2/7.1 = 2.0$$

So for  $y=1$  we receive integer  $x=2$ .

The formula is  $\text{Cu}_2\text{O}$ .

**Answer:**

The formula is  $\text{Cu}_2\text{O}$ .