

Answer on Question #54678 – Chemistry – General chemistry

Question:

A 8.18 g sample of copper is contaminated with 0.90 g of zinc. Suppose an atomic mass measurement was performed on this sample. What would be the measured atomic mass? Express your answer to four significant figures and include the appropriate units.

Ok so far the answer that I've been getting was 70.54 g, which isn't right according to my online homework. I got that answer by doing this: $(0.90 \times 63.55) / 8.18$, which got me 6.99. I then added this to 63.55 and got 70.54. What am I doing wrong?

Answer:

You didn't count the atomic mass of Zinc (65.38). The atomic mass of this mixture should fall down in the range from 63.55 (Cu) to 65.38 (Zn).

The measured atomic mass can be found:

$M = m/v$, where m – the mass of sample, v – the total number of moles of all components.

For our case: $v = v(\text{Cu}) + v(\text{Zn})$,

$$v(\text{Zn}) = m(\text{Zn})/M(\text{Zn}) = 0.9 \text{ g}/65.38 \text{ g mol}^{-1} = 0.01377 \text{ mol}$$

$$v(\text{Cu}) = m(\text{Cu})/M(\text{Cu}) = [m - m(\text{Zn})]/M(\text{Cu}) = [8.18 \text{ g} - 0.9 \text{ g}]/63.55 \text{ g mol}^{-1} = 0.11456 \text{ mol}$$

Thus,

$$M = 8.18 \text{ g}/(0.01377 \text{ mol} + 0.11456 \text{ mol}) = 8.18/0.12833 \text{ g/mol} = 63.74 \text{ g/mol}$$