Answer on Question #61823 - Chemistry – General Chemistry

Question:

I have a block of pure copper that is 5.5 cm x 3.0 cm x 1.5 cm. How many atoms of copper do I have?

Answer: 2.10×10^{24}

Block volume:

$$V = 5.5 \text{ cm} \times 3.0 \text{ cm} \times 1.5 \text{ cm} = 24.75 \text{ cm}^3$$

Copper density:

$$d = 8.96 \text{ g/cm}^3$$

Block mass:

$$m = V \times d = 24.75 \text{ cm}^3 \times 8.96 \text{ g/cm}^3 = 221.76 \text{ g}$$

Copper atomic weight:

$$A = 63.55 \text{ g/mol}$$

Chemical quantity of copper in block:

$$n = m / A = 221.76 \text{ g} / 63.55 \text{ g/mol} = 3.49 \text{ mol}$$

Avogadro constant:

$$N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$$

Number of atoms:

$$N = n \times N_A = 3.49 \text{ mol} \times 6.02 \times 10^{23} \text{ mol}^{-1} = 2.10 \times 10^{24}$$