

Counting Copper Atoms

Materials per group of 4 students: 1 density block (copper; item #WW46065M00 at sciencekit.com), calculators, Student Handout

Procedure:

1. Announce that everything today is for extra credit.
2. Read each sentence of the handout aloud in "super-observation" mode.
3. Have each group decide whose paper will represent their group, so you check fewer papers and to encourage cooperation.
4. Question One- Volume
 - Read the question aloud
 - Write $D=M / V$ on board
 - Whoever solves this in 2 minutes gets 3 bonus pts.
 - After 2 minutes, give a clue: $V= M / D$; now it's +2 pts. if you're done in 2 min.
 - After 2 more minutes, give final clue: 147g (copper) / 8.9 g/cm³ ; +1 once you solve this
5. Question Two-Number of Atoms
 - Read the question aloud
 - Set up the proportion on the board: $64 / 6.02 \times 10^{23} = 147 / x$
 - Draw a box around the exponent and tell students to not think about it until the end, and after finishing with the other numbers to put it on their answer
 - Whoever solves this in 2 min. gets +3 pts.
 - After 2 min., give a clue: $64x = 147 * 6.02$; now solve for +2
 - After 2 min., give final clue: $x = 884.94 / 64$; now solve for +1
6. To re-connect to the point of the activity, for homework or as starter the following day, write the answer out longways and try to imagine it.

Answers:

	Question 1 (g/ cm ³)	Question 2 (atoms)
Copper	16.5	$13.8 \times 10^{23} = 1.4 \times 10^{24}$
Aluminum	16.9	9.8×10^{23}
Brass	16.2	6.5×10^{23}
Steel	16.2	$13.5 \times 10^{23} = 1.4 \times 10^{24}$