

MARY JANE WOOLY

MOLE LAB (Part II)
Data & Observations

ACCEPTED VALUES FOR ATOMIC RADIUS

- Aluminum 1.25×10^{-8} cm
- Iron 1.16×10^{-8} cm
- Copper 1.17×10^{-8} cm
- Zinc 1.25×10^{-8} cm

Calculate the percent error between your findings, which is known as the experimental value, and the accepted (actual) value. Use the formula below to calculate percent difference. Record these findings in the table.

$$\% \text{error} = \left(\frac{\text{Actual} - \text{Experimental}}{\text{Actual}} \right) \times 100\%$$

Calculations:

$$\frac{1.25 \times 10^{-8} \text{ cm} - 1.23 \times 10^{-8} \text{ cm}}{1.25 \times 10^{-8} \text{ cm}}$$

$$\frac{2 \times 10^{-10} \text{ cm}}{1.25 \times 10^{-8} \text{ cm}} = 0.016\%$$

$$\text{Fe} \rightarrow \left(\frac{1.16 \times 10^{-8} \text{ cm} - 1.09 \times 10^{-8} \text{ cm}}{1.16 \times 10^{-8} \text{ cm}} \right)$$

$$\frac{6 \times 10^{-10}}{1.16 \times 10^{-8}} = 0.052\%$$

$$\text{Cu} \left(\frac{1.17 \times 10^{-8} \text{ cm} - 1.09 \times 10^{-8} \text{ cm}}{1.17 \times 10^{-8} \text{ cm}} \right)$$

$$\frac{8 \times 10^{-10}}{1.17 \times 10^{-8}} = 0.068\%$$

$$\text{Zn} \left(\frac{1.25 \times 10^{-8} \text{ cm} - 1.12 \times 10^{-8} \text{ cm}}{1.25 \times 10^{-8} \text{ cm}} \right)$$

$$\frac{1.3 \times 10^{-9}}{1.25 \times 10^{-8}}$$

$$0.116\%$$

Element	Actual Value	Experimental Value	Percent Error
Aluminum (Al)	1.25×10^{-8} cm	1.23×10^{-8} cm	0.016%
Iron (Fe)	1.16×10^{-8} cm	1.10×10^{-8} cm	0.052%
Copper (Cu)	1.17×10^{-8} cm	1.087×10^{-8} cm	0.068%
Zinc (Zn)	1.25×10^{-8} cm	1.12×10^{-8} cm	0.116%

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Specimen	Mass of 1 mole	Atomic Mass	Description	Element's Identity	Molar Mass / (6.02 x 10 ²³ atoms) Mass of 1 Atom	(lwh) / (6.02 x 10 ²³ atoms) Atomic Volume	$\sqrt[3]{V}$ Volume Atomic Diameter	Diameter/2 Atomic Radius
A	65.66g	66g	Dull silver Heavy speckled Coloration	Zn Zinc	$\frac{65.66}{(6.02 \times 10^{23})}$ $1.091 \times 10^{-23} \text{cg}$	$\frac{5.5 \text{cm} \times 1.1 \text{cm} \times 1.1 \text{cm}}{(6.02 \times 10^{23})}$ $1.11 \times 10^{-25} \text{cm}^3$	$\frac{2.23 \times 10^{-8} \text{cm}}{2}$ $1.12 \times 10^{-8} \text{cm}$	$\frac{2.23 \times 10^{-8}}{2}$ $1.12 \times 10^{-8} \text{cm}$
B	27.20g	27g	Light silver shiny/smooth	Al Aluminum	$\frac{27.20}{(6.02 \times 10^{23})}$ 4.518×10^{-23}	$\frac{6.2 \text{cm} \times 1.25 \text{cm} \times 1.25 \text{cm}}{(6.02 \times 10^{23})}$ 1.2×10^{-23}	$\frac{(1.483 \times 10^{-8})}{2}$ 0.7415×10^{-8}	$\frac{1.457 \times 10^{-8}}{2}$ 0.7285×10^{-8}
C	55.81g		straggles Heavy Dull smooth Pentec color	Fe Iron	$\frac{55.81}{(6.02 \times 10^{23})}$ 9.277×10^{-23} $1.4 \text{cm} \times 1.2 \text{cm} \times 1.2 \text{cm} = (1.02 \times 10^{-23})$	$\frac{1.052 \times 10^{-23}}{(1.02 \times 10^{-23})}$	$\frac{2.19 \times 10^{-8}}{2}$	$1.09 \times 10^{-8} \text{cm}$
D	63.42g	64g	shiny Heavy mobile orange/brown	Cu Copper	$\frac{63.42}{(6.02 \times 10^{23})}$ 1.05×10^{-23}	1.028×10^{-23} cm^3/atom	$\frac{2.174 \times 10^{-8}}{2}$ $1.087 \times 10^{-8} \text{cm}$	$1.087 \times 10^{-8} \text{cm}$