

# Experiment 1

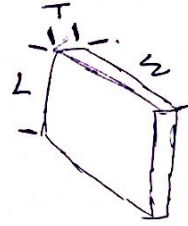
to identify the material

- Density & Distance between Atoms

Theory:

$$\text{Density} = \rho = \frac{M}{V} = \frac{\text{Mass}}{L \times W \times T}$$

Volume



- In Metal: atoms are spherical & identical  
= (lattice structure) <sup>plasma</sup>

Total number of atoms:

$$N = n N_a = \frac{M}{A_w} N_a$$

The Atomic mass of the Material

Avogadro's  $n^0$

or

$$N = \frac{M}{\rho a^3} \Rightarrow a = \sqrt[3]{\frac{A_w}{\rho N_a}}$$

now uncertainty in  $\rho$ :

$$\Delta \rho = \frac{\Delta M}{V} + \frac{M}{V^2} \Delta V$$

$$\frac{\Delta \rho}{\rho} = \frac{\Delta M}{M} + \frac{\Delta V}{V}$$

$\Delta M$ : estimated

$$\Delta V = W \Delta L + \Delta W T L + W \Delta T L$$

$$\approx \frac{\Delta V}{V} = \frac{\Delta L}{L} + \frac{\Delta W}{W} + \frac{\Delta T}{T}$$

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