

**HW 2-2 – Chem Honors
Units & Density**

NAME Answer Key
Period _____ Date _____

Read pp. 33-39

- List the SI units of measurement for length, mass, time, and temperature.
meter, kilogram, second, kelvin
- What is the only base unit that has a prefix, and why is that unit used rather than the bare unit?
Kilogram; it is used instead of the gram because it is larger and easier to standardize.
- What is the difference between a base unit and a derived unit?
Base unit definitions are based on a physical object or process. Derived units use a combination of base units.
- What are some examples of derived units? What quantity do they measure?
m/s (speed); g/cm³ (density); cm³ (volume); m² (area); etc.
- Which of these samples have the same density? Show all calculations and all numbers must have units!

Density Data		
Sample	Mass	Volume
A	80 g	20 mL
B	12 g	4 cm ³
C	33 g	11 mL

B & C both have the same density

$$Density_A = \frac{80 \text{ g}}{20 \text{ mL}} = 4 \text{ g/mL}$$

$$Density_B = \frac{12 \text{ g}}{4 \text{ cm}^3} = 3 \text{ g/cm}^3 = 3 \text{ g/mL}$$

$$Density_C = \frac{33 \text{ g}}{11 \text{ mL}} = 3 \text{ g/mL}$$

- Density is an intensive property, meaning that it can be used to identify a material. From the table at right, determine the identity of an unknown metal if a sample with mass = 47.4 g increases the volume of water in a graduated cylinder from 8.50 mL to 13.85 mL. (Don't forget you can convert mL to cm³ for the metal's density.)

$$V = 13.85 \text{ mL} - 8.50 \text{ mL} = 5.35 \text{ mL}$$

$$D = \frac{M}{V} = \frac{47.4 \text{ g}}{5.35 \text{ cm}^3} = 8.86 \text{ g/cm}^3 \Rightarrow \text{Nickel}$$

Name	Density, g/cm ³
Aluminum	2.701
Iron	7.86
Nickel	8.90
Zinc	7.13
Lead	11.35

- What is the mass of an aluminum sample with a volume of 25.9 cm³? (see density above)

$$D = \frac{M}{V} \Rightarrow M = D \cdot V = 2.701 \text{ g/cm}^3 \cdot 25.9 \text{ cm}^3 = 69.96 \text{ g}$$

- What is the volume of a sample of lead with a mass of 194.8 g? (see density above)

$$D = \frac{M}{V} \Rightarrow V = \frac{M}{D} = \frac{194.8 \text{ g}}{11.35 \text{ g/cm}^3} = 17.16 \text{ cm}^3$$