

ANSWER KEY - HONORS

Unit 1 - Cumulative Practice

Name: _____

Conversions / Significant Figures / Density / % Error / Measurements

I. **CONVERSIONS (Metric & Non-Metric)** - Perform the following conversions by showing the FACTOR LABEL METHOD. Show units in answer! *G M kh dk □ d c m u n p*

1) 20.5 kg = ? dg

$$\frac{20.5 \text{ kg}}{1} \times \frac{10000 \text{ dg}}{1 \text{ kg}} = \boxed{205,000 \text{ dg}}$$

$$\boxed{2.05 \times 10^5 \text{ dg}}$$

3) 10.5 atm = ? mmHg (1 atm = 760 mmHg)

$$\frac{10.5 \text{ atm}}{1} \times \frac{760 \text{ mmHg}}{1 \text{ atm}} = \boxed{7980 \text{ mmHg}}$$

$$\boxed{7.98 \times 10^3 \text{ mmHg}}$$

2) 430 mL = ? L (Scientific Notation)

$$\frac{430 \text{ mL}}{1} \times \frac{1 \text{ L}}{1000 \text{ mL}} = \boxed{0.430 \text{ L}}$$

$$\boxed{4.30 \times 10^{-1} \text{ L}}$$

4) 10.0 L = ? mol (1 mol = 22.4 L)

$$\frac{10.0 \text{ L}}{1} \times \frac{1 \text{ mol}}{22.4 \text{ L}} = \boxed{0.446 \text{ mol}}$$

$$\boxed{4.46 \times 10^{-1} \text{ mol}}$$

II. **SIGNIFICANT FIGURES** - Determine the correct number of significant figures (sig figs) in each measurement below.

5) 5306 g = 4

8) 20 mol = 1

6) 550 sec = 2

9) 1.0×10^{-3} ms = 2

7) 48.0 L = 3

10) 6.02×10^{23} molecules = 3

III. **ROUNDING** - Round the following numbers to the indicated number of significant figures.

11) 542,923 → (4 s.f.) $\boxed{5.429 \times 10^5}$ (expressed in scientific notation)

12) 0.07782 → (3 s.f.) $\boxed{7.78 \times 10^{-2}}$ (expressed in scientific notation)

13) 140.85 → (2 s.f.) $\boxed{1.4 \times 10^2}$ (expressed in scientific notation)

IV. **DENSITY / % ERROR** - Show all of your work for full credit.

14) A. What is the density of a metal that has a mass of 36.8 grams and a volume of 4.00 cm³?

$$D = \frac{M}{V} \rightarrow D = \frac{36.8 \text{ g}}{4.00 \text{ cm}^3} \rightarrow \boxed{D = 9.20 \text{ g/cm}^3}$$

B. The accepted value of this metal is 8.90 g/cm³. What is the measurement's percent error?

$$\% \text{ Error} = \frac{|\text{Experimental} - \text{Accepted}|}{\text{Accepted}} \times 100 \rightarrow \% \text{ Error} = \frac{|9.20 \text{ g/cm}^3 - 8.90 \text{ g/cm}^3|}{8.90 \text{ g/cm}^3} \times 100 = \boxed{3.37\%}$$

C. What is the identity of this metal? (Hint: Look at your reference table)

Accepted Density of 8.90 g/cm³ → Nickel (Ni)

15) A student working in a laboratory recorded measurements of a piece of metal and reported that the metal had a mass of 275.1g and a volume of 23.0 cm³. What is the student's experimental density of the metal?

$$D = \frac{M}{V} \rightarrow D = \frac{275.1 \text{ g}}{23.0 \text{ cm}^3} \rightarrow D = 11.96 \text{ g/cm}^3 \rightarrow \boxed{D = 12.0 \text{ g/cm}^3} \text{ (3 sf)}$$

16) A. The water level in a graduated cylinder is 25.0 mL. When a solid is put into the graduated cylinder, the new volume is 31.0 mL. If the solid has a mass of 27.9 grams, what is its density?

* Water Displacement Volume $\rightarrow Vol = V_f - V_i \rightarrow (31.0\text{ mL}) - (25.0\text{ mL}) = \underline{6.0\text{ mL}}$

$$D = \frac{M}{V} \rightarrow D = \frac{27.9\text{ g}}{6.0\text{ mL}} \rightarrow \boxed{D = 4.65\text{ g/mL}}$$

B. The accepted value of this solid is 4.5 g/mL ($1\text{ mL} = 1\text{ cm}^3$). What is the percent error?

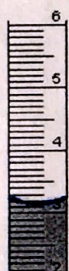
$$\% \text{Error} = \frac{|Exp - Acc|}{Acc} \times 100 \rightarrow \% \text{Error} = \frac{|4.65\text{ g/mL} - 4.5\text{ g/mL}|}{4.5\text{ g/mL}} \times 100 \rightarrow \boxed{\% \text{Error} = 3.33\%}$$

C. What is the identity of this solid? (Hint: Look at your reference table)

Accepted Density of $4.5\text{ g/mL} = \boxed{\text{Titanium (Ti)}}$ Remember: $1\text{ mL} = 1\text{ cm}^3$

V. **LAB MEASUREMENTS** – Record the following measurements to the correct number of significant figures (sig figs). Include proper units (mL or cm).

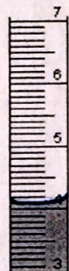
What is the reading in milliliters for each graduated cylinder?



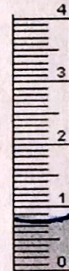
3.12 mL



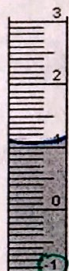
2.95 mL



4.10 mL



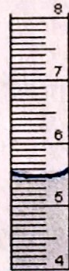
0.75 mL



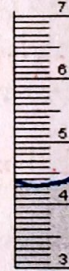
2.10 mL



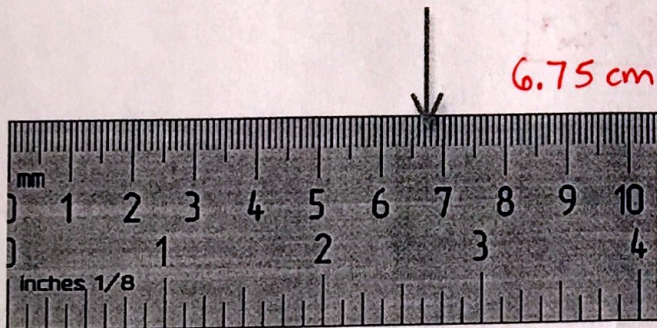
8.65 mL



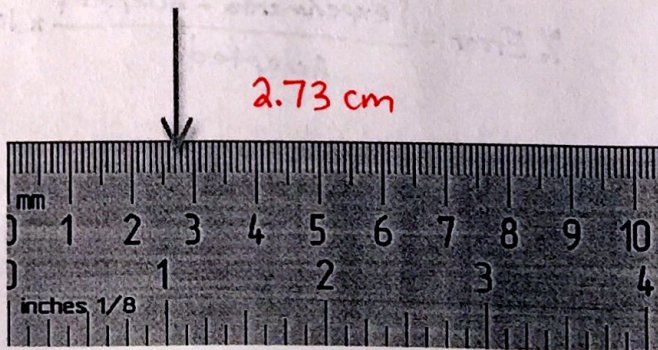
5.45 mL



4.30 mL



6.75 cm



2.73 cm