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 _ _ k h dk □ d c m _ _ μ _ _ n _ _ p

1) 20.5 kg = __?__ dg

$\frac{20.5\ kg}{1} \cdot \frac{10000\ dg}{1\ kg}$ = 205,000 dg ; 2.05×10^5 dg

2) 430 mL = __?__ L *(Scientific Notation)*

$\frac{430\ mL}{1} \cdot \frac{1\ L}{1000\ mL}$ = 0.430L ; 4.30×10^{-1} L

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

$\frac{10.5\ atm}{1} \cdot \frac{760\ mmHg}{1\ atm}$ = 7980 mmHg ; 7.98×10^3 mmHg

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

$\frac{10.0\ L}{1} \cdot \frac{1\ mol}{22.4\ L}$ = 0.446 mol ; 4.46×10^{-1} mol

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

5) 5306 g = 4

6) 550 sec = 2

7) 48.0 L = 3

8) 20 mol = 1

9) 1.0×10^{-3} ms = 2

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.) 5.429×10^5 *(expressed in scientific notation)*

12) 0.07782 → (3 s.f.) 7.78×10^{-2} *(expressed in scientific notation)*

13) 140.85 → (2 s.f.) 1.4×10^2 *(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?

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

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

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

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 275.1 grams and a volume of 23.0 cm³. What is the student's experimental density of the metal?

$D = \frac{M}{V} \rightarrow D = \frac{275.1\ g}{23.0\ cm^3} \rightarrow D = 11.96\ g/cm^3 \rightarrow D = 12.0\ g/cm^3$ (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 → $Vol = V_f - V_i$ → (31.0 mL) − (25.0 mL) = 6.0 mL

$D = \frac{M}{V}$ → $D = \frac{27.9\ g}{6.0\ mL}$ → **D = 4.65 g/mL**

B. The accepted value of this solid is 4.5 g/mL *(1mL = 1cm³)*. What is the percent error?

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

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

Accepted Density of 4.5 g/mL = **Titanium (Ti)** Remember: 1 mL = 1 cm³

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?