

Chemistry

Chapter 3 – Scientific Measurement Notes

Name _____

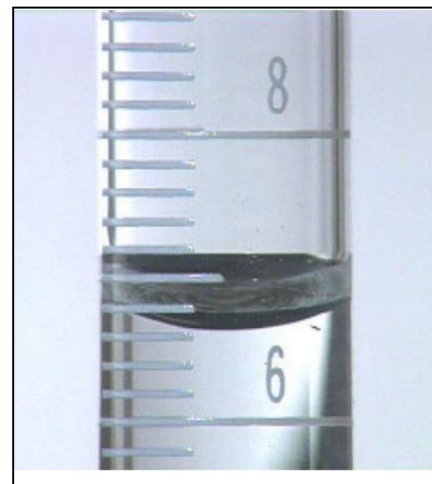
Date _____ Block _____

Observations

- Observations that describe physical or chemical properties or changes are considered _____.
 - *No numbers involved!*
- Observations that are recorded or measured data are considered _____.

Significant Figures

- Used by scientists to communicate how _____ and _____ a measurement is.
- A digit that must be _____ is called _____.
 - *A measurement always has some degree of uncertainty.*
- _____ identify those that are certain plus _____ extra _____ to the nearest _____ of the smallest unit of measure.
 - **Example:** *Which measurement best represents the volume of liquid in this graduated cylinder?*
 - **6 mL**
 - **6.6 mL**
 - **6.61 mL**
 - **6.611 mL**
 - Additional examples on worksheet.



Scientific Notation

- A way for scientists to more easily represent very large or very small numbers.
- **Examples**
 - Convert the following to scientific notation:
 - 0.005
 - 5,050
 - 0.0008
 - 1,000,000
 - 0.25

- Convert the following to standard notation:
 - 1.5×10^3
 - 3.75×10^{-2}
 - 1.2×10^{-4}
 - 2.2×10^5
 - 1.0×10^{-1}

Metric System & Conversions

- Common metric system units:
 - Length:
 - *Or centimeters, millimeters, kilometers*
 - Mass:
 - *Or milligrams, kilograms*
 - Volume:
 - *Or milliliters or cm^3 (anything³)*
- SI Prefixes
 - The following chart is listed from largest units to smallest units.
 - When converting, make a conversion that has “1” with the larger unit and “**exponent (ALWAYS POSITIVE)**” with the smaller unit.

SI Prefixes Common to Chemistry			
<u>Prefix</u>	<u>Unit Abbr.</u>	<u>Exponent</u>	<u>In other words...</u>
Mega	M	10^6	10^6 of base
Kilo	k	10^3	1000 of base
Hecto	h	10^2	100 of base
Deka	da	10^1	10 of base
[BASE]	-	10^0	-
Deci	d	10^{-1}	10 in base
Centi	c	10^{-2}	100 in base
Milli	m	10^{-3}	1000 in base
Micro	μ	10^{-6}	10^6 in base
Nano	n	10^{-9}	10^9 in base
Pico	p	10^{-12}	10^{12} in base

- **Examples**

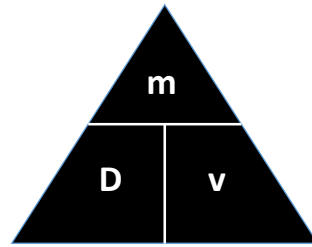
- 83 cm to meters (m)
- 459 L into milliliters (mL)
- 0.00378 kg to grams (g)
- 1.55 m into centimeters (cm)
- 22.5 km to millimeters (mm)
- 200 mg to kilograms (kg)
- 1.55 m to centimeters (cm)
- 0.00378 kg to milligrams (mg)
- 25 miles/hour to meters/second (1 km = 0.62 mi)
- 15 mm³ to m³

Temperature Conversions

- Temperature can be measured in _____, _____, or _____.
 - *In chemistry we will use the Celsius or Kelvin temperature scale.*
- To convert between Celsius & Kelvin use the following formulas:
 - **Kelvin = °C + 273**
 - **°C = Kelvin - 273**

Density

- A ratio of the _____ of an object to its _____.
- Formula:



- Depends on the _____ of the substance, not the _____.
- **Examples**
 - A copper penny has a mass of 3.1 g and a volume of 0.35 cm³. What is the density of copper?
 - A student finds a shiny piece of metal that she thinks is aluminum. In the lab, she determines that the metal has a volume of 210.0 cm³ and a mass of 567 g. Calculate the density. Is the metal aluminum, which has a density of 2.70 g/cm³?
 - The density of zinc is 7.14 g/cm³. What is the volume of a 75-g bar of zinc?