**Salt Lake Community College, Chemistry Department**

**Chem 1110 Workshop 1**

**Topic: Number, Units and Conversions**

***Objective:***

* Review some simple math rules
* Physical Quantities: Units and Scientific Notation
* How to do Dimensional Analysis?
* Density

**Simple Math Rules Review:**

* Multiplication Rule (add the exponents): a1 x a1 = 102 x 103 = 102+3   a2, am x an = am+n

a × b = b × a (order is not important)

* Division (subtract the exponents): a4/ a2 = (a4-2) = a2 am/ an = am-n

**Prefixes used in the SI unit (Metric system):**

|  |  |  |
| --- | --- | --- |
| giga | G | 109 |
|
| mega | M | 106 |
| kilo | k | 103 |
| deci | d | 10-1 |
| centi | c | 10-2 |
| milli | m | 10-3 |
| micro | u | 10-6 |
| nano | n | 10-9 |



Example= 1 (Gm) gigameter = 1 x109 m

1 megameter= 1 x106 m

1 cm = 1 x 10-2 m or 1/100 m or 0.01 m

Note: In SI system all lengths units will be based on meter (m).

**How to do Dimensional Analysis?**

For calculations to yield the correct answers they MUST also yield the correct units.

* The best way to do dimensional analysis is to use CONVERSION FACTOR(S).
* Selection of a conversion factor:



**given unit x desired unit = desired unit**



**given unit**



**Conversion Factor**

**Density:**

The physical property that relates the mass of an object to its volume, mass per unit volume

**density = mass (g)**

**volume (cm3 or mL)**

**Volume Unit: 1 liter, L**

What is it?

1 L = 1000 cm3 (by definition)

But… using prefix milli, milliliter (mL) is… 1 L = 1000 mL therefore, 1 mL = 1 cm3

**Practice Problems:**

1. Do the following calculations (final answer in scientific notation):
   1. (6×10400) x (3×10700) **= 18 x 10400+ 700 = 1.8 x 101101**
   2. (48 x 101200) / (2 x 10-400) = **2.4 x 101601**
2. Convert 120 pounds (lb) to grams (g). Note: 1 lb = 453.6 g

**120 lb x 453.6 g/ 1 lb = 5.4 x 104 g**

1. Convert 120 milligrams (mg) to kilograms (kg).

**120 mg/ 10-3 x 10-3 g/ 1 mg x 10-3/ 1 g = 1.20 x 10-4 kg**

1. Convert the speed of 515 meters per second (m/s) to miles per hour (mi/hr).

1 mi= 1.6093 Km

**515 m/s x 1 km/103 m x 1 mi/ 1.6093 Km x 60 s/ 1 min x 60 min/ 1hr = 1.15 x 10 3 mi/hr**

5. The recommended adult dose of Ceftriaxone, an antibiotic, is 10.00 mg/kg of body

mass. Calculate the dose in milligrams for a 150-lb adult. 1 lb = 453.59 g.

**150 lb x 453.59 g/ 1 lb = 68,038.5 g x 1 kg/ 1000 g = 68.04 kg**

**10.00 mg/ kg x 68.041 kg = 680.4 mg**

1. An extra-strength aspirin contains 0.500 g of aspirin. How many grains is this? (1 grain = 64.8 mg).

**0.500 g x 1 mg/ 10-3 g x 1 grain/ 64.8 mg = 7.72 grains**

1. An object has a mass of 40.1 g and occupies a volume of 9.51 mL. The density of this object is…

**D= mass/volume (g/ mL)**

**= 40.1 g/ 9.51 mL = 4.22 g/mL**