

Unit I: The Foundations of Chemistry

CHEMISTRY

- The study of the composition and structure of matter

Energy

- The ability to cause change or do work
(move mass over distance)
- Types of energy:
 1. Chemical
 2. Electrical
 3. Sound
 4. Light
 5. Mechanical
 6. Nuclear

Energy
THE
ABILITY TO DO WORK

CAN BE

CAN BE

KINETIC

CAN BE
CONVERTED

POTENTIAL

DEFINED AS

DEFINED AS

**ENERGY
OF MOTION**

**STORED
ENERGY**

EXAMPLES

EXAMPLES

CAN BE
CONVERTED

1. **ELECTRICITY**
2. **WATER FALLING**
3. **COMBUSTION**
4. **FOOTBALL THROWN FROM
PAYTON MANNING**

1. **FOSSIL FUEL (oil & coal)**
2. **GASOLINE**
3. **ORANGE JUICE**

Law of Conservation of Energy

- Energy can be converted from one form to another, but it cannot be created or destroyed in ordinary chemical or physical changes.

Factor Label/ Dimensional Analysis

**OUR PRIMARY PROBLEM
SOLVING METHOD**

**TRUST ME....
YOU'LL GROW TO
LOVE IT**

What can factor label do for me?

- Well..... It won't get you a date this weekend or improve your game but...
- **It allows conversions from one unit/dimension to another using known conversion factors.**

What the heck is a conversion factor??????

- Examples:
- $1\text{Kg} = 1000\text{ g}$ can be written as:
- 1000g or 1Kg

25 seconds equals how many
years?

Convert 2.75×10^{10} seconds to
centuries

A car going 85 miles per hour
will go how many feet in 12.5
hours?

$$\frac{72 \text{ mi}}{1 \text{ hr}}$$

**Equals how many inches per
Second?**

How do you get good at
this???

Practice!!!!

Metric System & Factor Label

BASES

Length **meter** **m**

Volume **liter** **L**

Mass **gram** **g**

PREFIXES

kilo K = 10^3

centi c = 10^{-2}

milli m = 10^{-3}

micro μ = 10^{-6}

nano n = 10^{-9}

Prefix + base = value base

kilometer = 10^3 meter

Km = 10^3 meter

Handout – using a metric prefix

Go to overheads – factor label and metric conversions

Practice

1. Convert 1.33 Km to m

2. Convert 2.34 Km to nm

More practice

3. Convert 3.66×10^{-12} cm to μm

4. Convert 2.05 nm to Km

Cubic Conversions

- Volume is often given in cubic length units

example: $(20\text{in} \times 10\text{in} \times 4\text{in}) = 800\text{in}^3$

To convert from one cubic volume to another the conversion factors must be cubed.

Example

$$1\text{ft} = 12\text{in}$$

$$1\text{ft}^3 = (12\text{in})^3 = 1728\text{in}^3$$

Definitely not the same!
DON'T FORGET TO CUBE THE
CONVERSION FACTOR

Examples:

1. 36 cm^3 converts to how many cubic Km^3

2. $3.62 \times 10^5 \text{ Km}^3$ converts to _____ [?] miles

3. A swimming pool that is 20 ft by 15 ft by 8ft is filled with water. What is the volume in liters? ($1\text{cm}^3 = 1\text{mL}$) ← **memorize this conversion factor**

Density

The density of a material is its mass divided by its volume, or its mass per unit volume

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$