

Day 9—Radioactivity, Physical and Chemical Properties, Physical and Chemical Changes
And Analyzing graphs and data tables

Radioactivity: the spontaneous disintegration of the nuclei of certain element to produce other elements.

3 types of radioactive decay in order of increasing penetrating power!!

1. Alpha decay(α decay): An alpha particle is a helium nucleus(2 protons and 2 neutrons). THEREFORE there will be a change in the Mass # and Atomic #!!

--Least penetrating

2. Beta decay(β decay): A beta particle is an electron(NO MASS). THEREFORE, there will NOT be a change in Mass #.

3. Gamma decay(γ decay): A gamma particle is a high energy photon.

--Most penetrating

****Must know 2 things:**

1. Order of penetrating power!!!

2. Type of particle emitted and what it is!!

Nuclear Fission vs. Nuclear Fusion

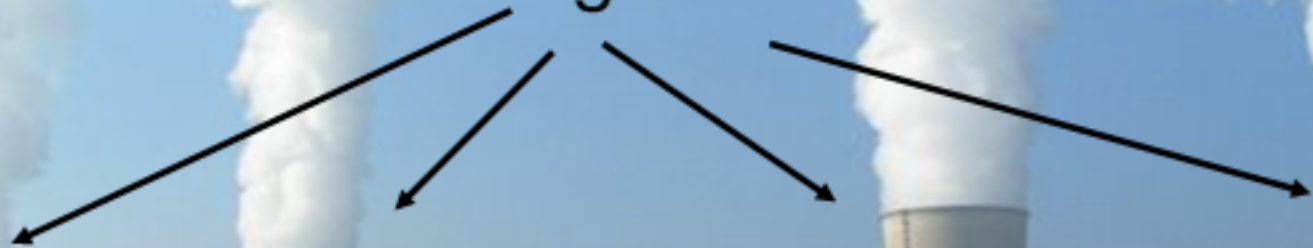
- Nuclear Fission—big to small
- Nuclear Fusion—small to big

- Both release large amounts of energy!!



**Most dominant feature of any Nuclear Power Plant.
Purpose is to cool the water to prevent "hot water"
from moving back into ecosystem!!**

Cooling Towers



Half-life: time required for 1/2 of the original substance to decay.

--can vary from seconds to years.

--Nuclear Waste!!!

--This is the MAJOR PROBLEM in dealing with nuclear energy.....

NUCLEAR WASTE!!!

I. Physical and Chemical Properties:

a. Physical Properties-properties of a substance that can be seen without changing the substance.

i. Physical Properties used in identifying substances:

1. Density—mass/volume
2. Specific Heat—heat required to change temperature
3. Melting Pt.
4. Boiling Pt.



Must be
unique!!

Chemical Properties-properties that describe how a substance can be changed into a new substance.(Discuss some—valence #, oxidation state, etc.)

I. Physical and Chemical Change-

a. Physical Change-New substance is NOT formed.

b. Chemical Change-New substance IS formed.

i. Indicators of Chemical Change:

1. Development of a gas(bubbles, but not CO₂ fizz in carbonated drinks. It is already dissolved in them!)
2. Formation of a precipitate(solid formed when 2 liquids combine).
3. Release/Absorption of Energy.

Density = Mass/Volume
 $d = m/V$



A hand-drawn red circle containing the density formula $d = m/V$. The letter 'M' is written above a horizontal line, and 'd/V' is written below it.

All Matter has density!!!

How is density related to floating?

--Things that are more dense than water sink!!

--Things that are less dense than water float!

Which liquid is the most dense?
Least dense?



- a.) 1.2 g/mL
b.) 1.4 g/mL
c.) 1.6 g/mL
d.) 2.8 g/mL

What is the density of an unknown metal that has a mass of 158 g and a volume of 20 ml?

$$m = 158 \text{ g}$$

$$V = 20 \text{ mL}$$

$$d =$$

$$d = \frac{m}{V} = \frac{158 \text{ g}}{20 \text{ mL}}$$

$$d = 7.9 \text{ g/mL}$$

A rock has a density of 20 g/ml and a mass of 5 g.
What is the volume of the rock?

$$d = 20 \text{ g/mL} \quad \cancel{V} d = \frac{m}{\cancel{V}} \cdot \cancel{V}$$

$$m = 5 \text{ g}$$

$$V = ?$$

$$V = \frac{m}{d}$$

$$V = \frac{5 \text{ g}}{20 \text{ g/mL}}$$

$$\left(\frac{m}{d/V} \right)$$

$$V = 0.25 \text{ mL}$$

A block of wood has a density of $.8 \text{ g/cm}^3$. Will the block float or sink in water (1 g/cm^3)?

Float, b/c less dense
than H_2O

If one took a sample of the block in problem 3, say 25 % of its volume, What would be the density of the sample?

density will Not change

Answer the following questions about the Data Table Below:

Room Temperature	
Time(min)	Temperature($^{\circ}$C)
0	16
5	17
10	19
15	20
20	20
25	20

- ___ 1. How many minutes did it take the room to heat up to its maximum temperature?
a) 0 b) 5 c) 15 d) 25
- ___ 2. What is the best guess of the temperature after 8 minutes?
a) 16 $^{\circ}$ C b) 17 $^{\circ}$ C c) 18 $^{\circ}$ C d) 19 $^{\circ}$ C
- ___ 3. If the data from the table is graphed, which would be the independent variable?
a) time b) temperature c) neither d) both
- ___ 4. If the data from the table is graphed, which would be the dependent variable?
a) time b) temperature c) neither d) both
- ___ 5. Which variable would be graphed on the x-axis?
a) time b) temperature c) neither d) both
- ___ 6. Which variable would be graphed on the y-axis?
a) time b) temperature c) neither d) both