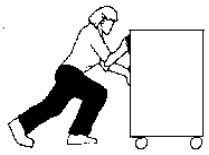
I WHAT IS ENERGY?:



A. Energy:

1. The ability to do _____.

2. Work is done when a _____ causes an object to _____ in the _____ of the force.

3. When one object does _____ on another, _____ is _____ from the 1st object to the 2nd object.

B. Kinetic Energy:

1. The energy of _____.

2. All _____ objects have kinetic energy.

3. Kinetic energy depends on _____ and _____

a) The _____ something is moving, the _____kinetic energy it has.

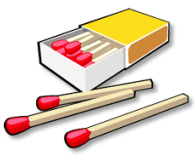
b) The _____ the mass of a _____ object, the _____its kinetic energy.

C. Potential Energy:

1. This is _____ energy due to

a) _____ of the object. ⇨

b) _____ of the object.



D. Mechanical Energy:

1. Both _____energy & _____ energy are kinds of mechanical energy.

E. Kinetic vs Potential:

1. When the pendulum is _____....

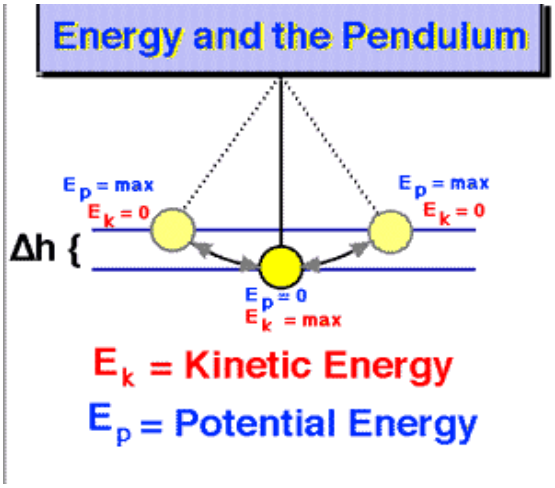
Potential energy is _____

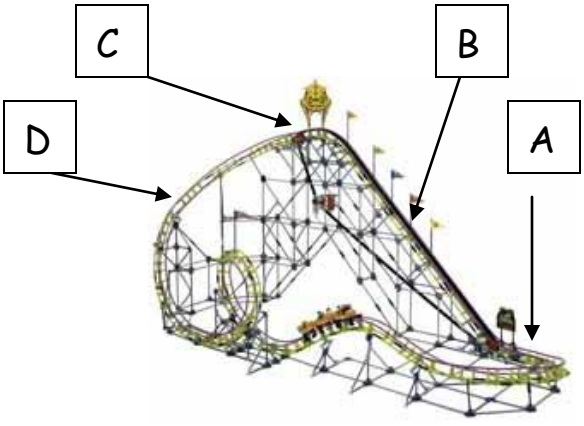
Kinetic energy is _____

2. When the pendulum is _____

Potential energy is _____

Kinetic energy is _____





When the roller coaster car is at..

A:_____

B:_____

C:_____

D:_____

F. Other Forms of Energy:

_____ _____ _____

_____ _____ _____

II ENERGY CONVERSIONS:

A. Candle:

_____ energy to _____ & _____

B. Light bulb :

_____energy to _____ & _____

C. Blender:

_____ energy to _____ & _____

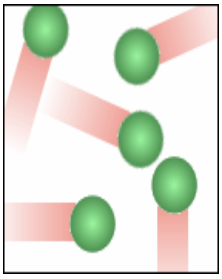
D. *Law of Conservation of Energy*: Energy _____ be

_____ or _____ but it can change _____

III TEMPERATURE:

A. What is it?

1. Temperature is the _____ of the average _____ energy of the _____ in an object.



2. All _____ is made up of _____ or _____ that are always _____, they have _____ energy.

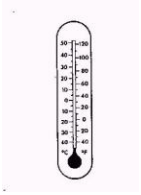
3. The _____ kinetic energy the _____ of an object have, the _____ the _____ of the object.

B. Average Kinetic Energy:

1. Particles in an object move at _____ speeds.
2. The _____ kinetic energy of _____ the particles is the object's _____.
3. Temperature depends on the _____ kinetic energy, NOT _____ _____ of it you have.

4. There is _____tea in the tea kettle, but the _____ of the tea in the _____ is the _____ as the temperature in the _____

C. Measuring Temperature:



1. When objects are heated, their _____ move _____ and _____ out.
2. Thermal _____ is the increase in _____ of a substance because of an increase in _____.
3. Thermometers use the *liquids* _____ or _____ because they _____ by _____ amounts.

4. Temperature Scales:

a) *Fahrenheit* – Freezing:_____ Boiling:_____

b) *Celsius* - Freezing:_____ Boiling:_____

c) *Kelvin** - Freezing: _____ Boiling:_____

* 0^0 K is _____ zero (-459^{0}F), all _____

stops. This is _____ possible, but we have been _____.

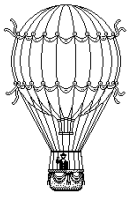
D. Thermal Expansion:

1. In *solids*:

a) Expansion joints on _____

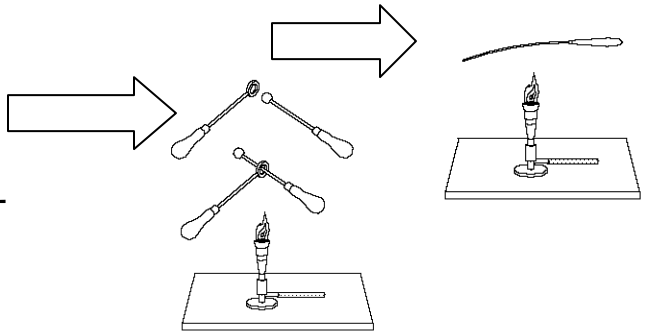
b) Cracks in _____

c) Bimetal strip found in _____



have

_____ and _____



d) Ball and ring demo

2. In *gases*:

a) _____ _____ balloons.

IV HEAT:

A. Thermal energy:

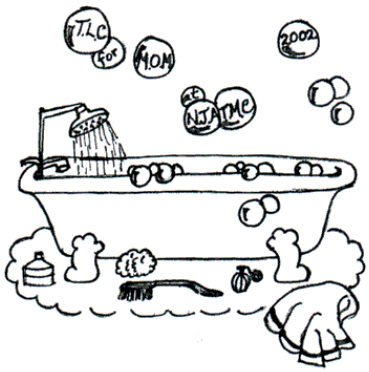
1. The _____ kinetic energy of the particles in the object.

2. Measured in _____.

3. The amount of thermal energy depends on two things:

a) the _____ of the object.

b) the _____ of the object.



4. A _____ full of 80^0 water has _____

thermal energy than a _____

of 80^0 water.

V HEAT TRANSFER:

A. Conduction:

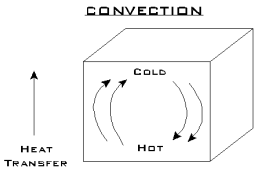
1. The transfer of _____ energy from _____ substance to _____ through _____ contact.
2. It can also occur _____ a substance, like a _____
3. Energy is transferred when particles _____.
4. *Conductors:* transfer heat energy very _____.
   a) _____ are good conductors of heat.
5. *Insulators:* do _____ conduct heat energy well.
   a) Examples: _____ _____ _____

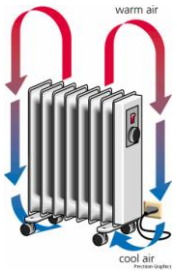
B. Convection:

1. The transfer of heat energy by the _____ of a _____ or a _____.
2. The molecules move from one _____ to another.
3. When you boil water in a pot, the …….
   a) water on the bottom gets hot by means of _____.
   b) water becomes less _____& _____
   c) at the surface, the water begins to _____
   d) the cooler water is more _____ & _____.

4. The *circular motion* of liquids or gases due to these density differences

is called a _____ _____.





5. Convection heats your room…

a) warm air is less _____so it _____

b) cool air is more _____ so it _____.

6. Large scale convection currents:

a)_____

b)_____

C. Radiation:

1. The transfer of energy by electromagnetic waves such as….

_____ and _____ waves.

2. It occurs _____ matter.

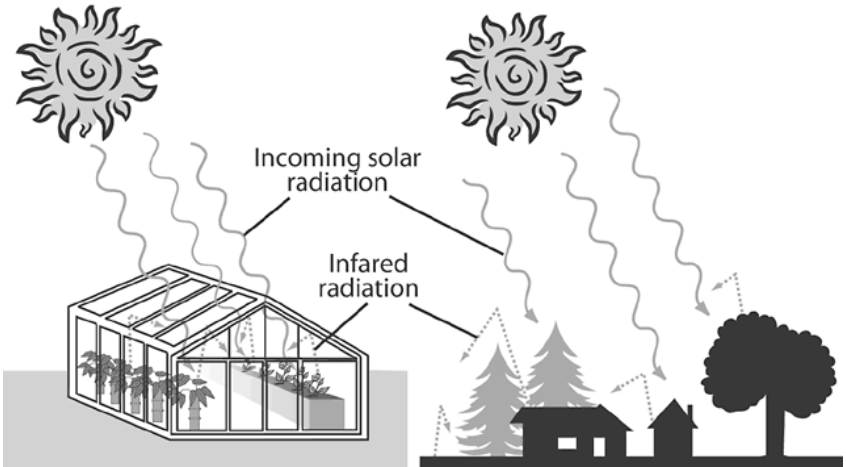
3. *Greenhouse Effect*:

a) Visible light passes _____ glass and gets _____.

b) Then it turns into _____ energy. (Infrared energy)

c) Heat is _____ by the glass.

d) Our atmosphere also _____ heat energy……with its _____, _____ and _____



4. _____ surfaces _____ radiation.

a) Example:_____ _____

D. Thermos: What type of heat transfer does each feature stop?

1) Airtight stopper:_____

2) Foam insulation:_____

3) Trapped air space:_____&_____

4) *Shiny* stainless steel bottle:_____

5) Plastic cap:_____& _____

6) Plastic outside:_____

7) Stainless steel *vacuum* bottle:_____&_____

VII HEAT AND CHANGES OF STATE:

A. States of Matter:

1. The state of a substance depends on:

   a) the _____ of its particles

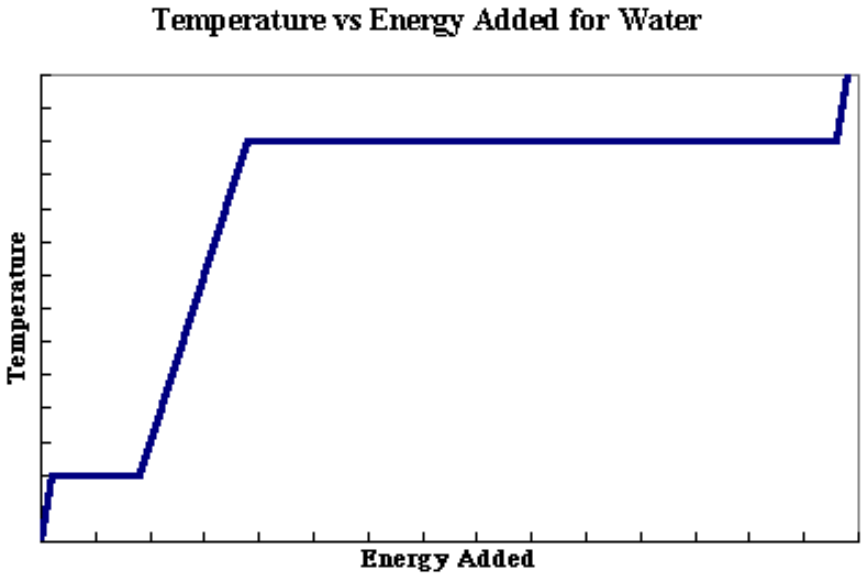
   b) the _____ between them

   c) the _____ around them.

2. A _____ has more _____ energy than a _____.

3. It takes _____ to break the _____ between particles.

B. Changes of State Graph:



1. As the _____ is heated, its temperature goes from _____ to _____

2. As the ice _____, the temperature remains at _____

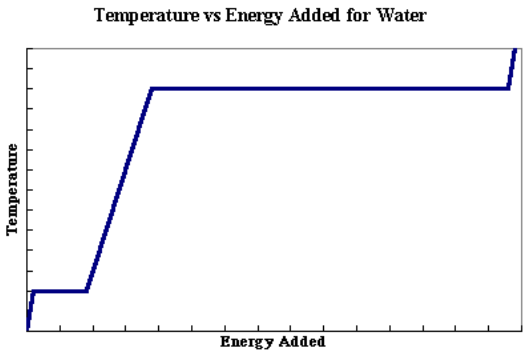
3. The temperature of the _____ remains the _____ until all of the _____ becomes _____ water.

4. The water's _____ then increases from _____ to _____

5. At _____, the water begins to change to _____

6. When all the _____ becomes _____, the temperature _____

C. Heat of Fusion:



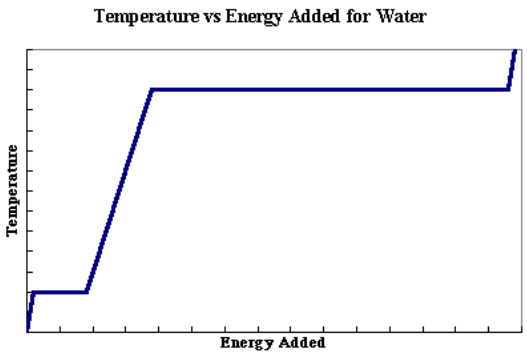
1. The _____ needed to_____ the forces of a _____ so it _____.

2. It takes _____ Joules of energy to _____ one gram of ice.

3. 1 gram of ice 0^0C 1 gram of water 0^0C

4. All the _____ goes into _____ the forces. The temperature does _____ go up.

D. Heat of Vaporization:



1. The _____ needed to _____ the _____ of a _____ so it can _____.

2. At _____, one gram of water absorbs _____ joules of energy to become a _____

3. 1 gram of water 100^0C 1 gram of steam 100^0C

4. All the _____ (_____J) goes into _____

the forces. The temperature does _____ go up

I RADIOACTIVITY:

A. Nuclear Radiation:

1. High-energy _____ and _____ that are _____ by the _____ of some atoms.

2. Radioactivity: the _____ by which some nuclei give off _____ radiation.

3. All elements above the atomic number of _____ are radioactive.

B. Radioactive or Stable?

1. Stable atoms: Number of _____ = Number of _____

7 N 14. 00

⇦ Atomic _____ Protons:_____

⇦ Atomic _____ Neutrons:_____

2. Radioactive Atoms (Unstable)

a) More _____ than _____ (if atomic mass is large)

85 At 210

_____ protons

_____ neutrons

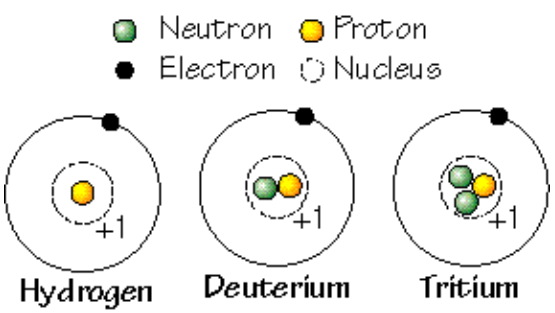
92 U 238

_____ protons

_____ neutrons

C. Isotopes: (see pages 321-323 for more info)

1. Atoms of the _____ _____ They have the same _____ _____ and a different atomic_____ .



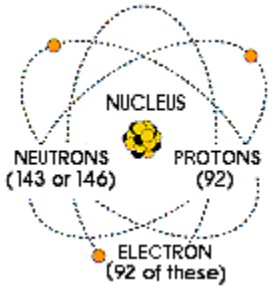
2. Example:

1 H	1 H	1 H

Hydrogen Deuterium Tritium

3. Many _____ isotopes are _____.

4. Naming isotopes:



a) Write the name of the _____

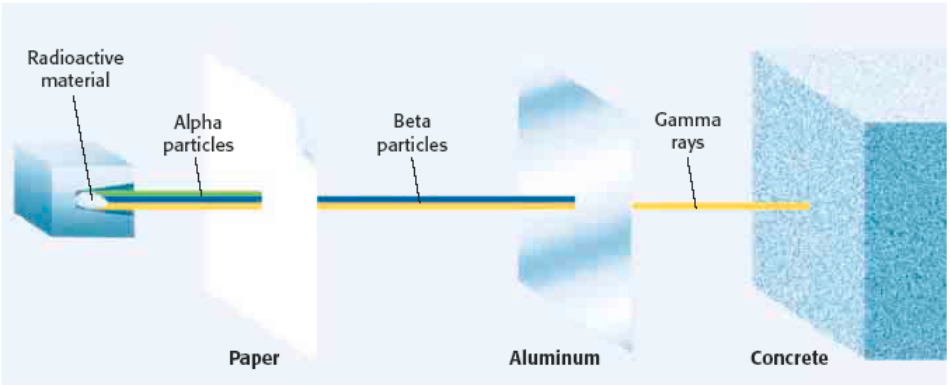
followed by a _____ and the _____#.

b) U-238 U-235

III PENETRATING POWER OF RADIATION:

A. Three types of radiation:

1. Alpha particles can be stopped with _____ or _____
2. Beta particles can be stopped with _____ foil.
3. Gamma particles can be stopped with 3 _____ of concrete.



▲ **Alpha particles** have a greater charge and mass than beta particles and gamma rays do. Alpha particles travel about 7 cm through air and are stopped by paper or clothing.

▲ **Beta particles** have a 1− or 1+ charge and almost no mass. They are more penetrating than alpha particles. Beta particles travel about 1 m through air but are stopped by 3 mm of aluminum.

▲ **Gamma rays** have no charge or mass and are the most penetrating. They are blocked by very dense, thick materials, such as a few centimeters of lead or a few meters of concrete.

B. Damage to Living Matter:

1. Radiation damages _____ and cause _____.
2. Radiation sickness causes the following symptoms:

a) _____ _____ _____

b) Also destruction of _____ _____ and _____

3. Exposure to radiation can also increase the risk of _____.

4. Radon testing in your home:

a) Radioactive radon-222 forms from decay of _____.

b) It is a _____ and can get into your house.

IV USES OF RADIOACTIVITY:

A. Medicine:

1. Tracers are injected and _____follow them through the body.

2. Can _____ illnesses including _____.

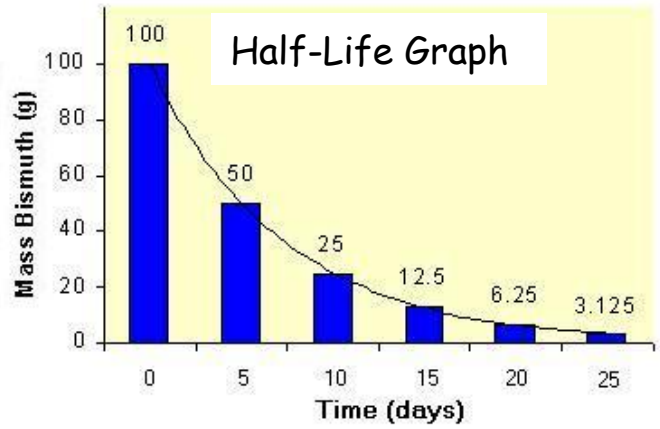
3. Can _____ healthcare products.

B. Industry:

1. Can _____ defects in structures.

C. Geiger Counter:

1. _____ when there is radiation.



D. Radioactive Dating:

1. Radioactive decay occurs at a _____ rate.

2. Decay is _____, it never speeds up or slows down.

3. Half-life:

a) The time it takes for _____ of the radioactive substance to _____.

b) Half-lives range in time from _____ to _____

c) Example: Substance X has a half-life of 20 years…..

X ⟹ _____ ⟹ _____ ⟹ _____

100 atoms

d) Determining age: Compare the radioactive substance with what

it decays into.

e) Atomic "Clocks":

Carbon- 14:_____ (good up to 50,000 years)

Potassium-40:_____ (most commonly used)

Uranium-238:_____(determined Earth's age)

V NUCLEAR FISSION:

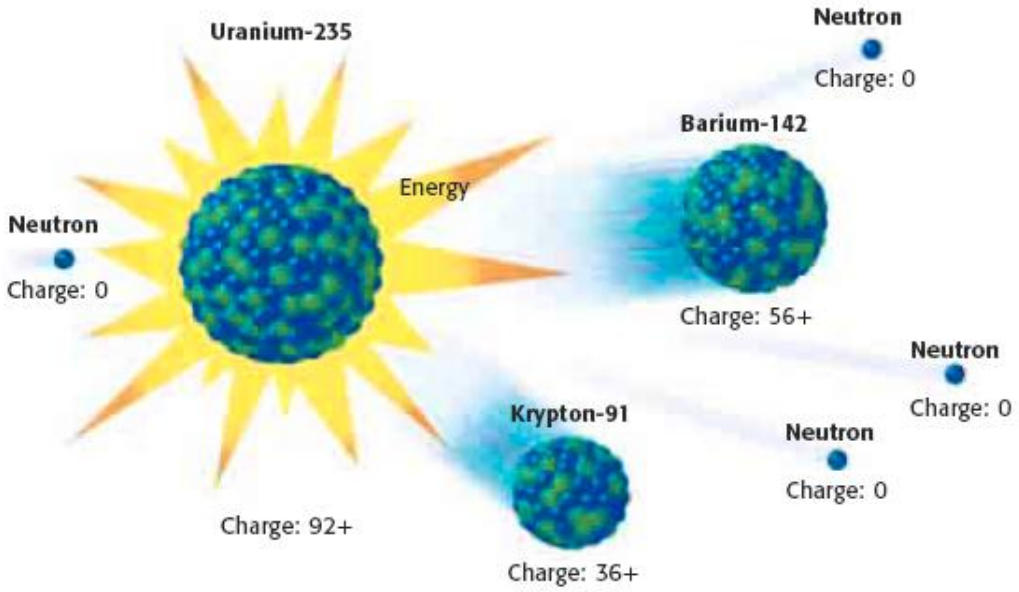
A. What is it?

1. When a _____ nucleus _____ into _____

   _____ nuclei and releases _____.

2. Some uranium atoms _____ naturally, others can be

   _____ to split by hitting the nucleus with a _____.



3. When U-235 splits you get the following:

   a) 2 new _____ (_____ _____)

   b) 3 _____

   c) Radiation (_____ _____ _____)

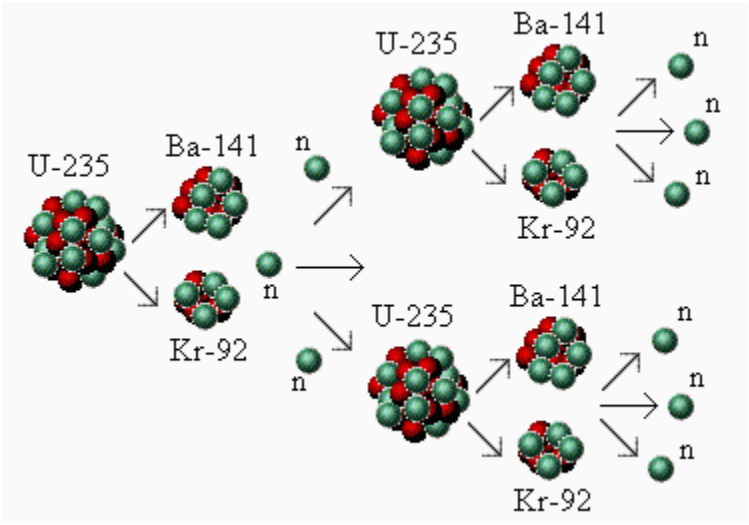
   d) Less mass…it is converted into _____

4. One fuel _____ of uranium, can release as much _____

as the _____ change of burning _____kg of coal.

B. Nuclear Chain Reactions:

1. A _____ series of nuclear _____ reactions.



2. Controlled chain reaction:

a) Uranium is _____ within a nuclear _____.

b) Neutrons can be _____ to _____ the reaction.

3. Uncontrolled chain reaction:

a) _____ amounts of _____ are given off very quickly.

b) An atomic _____.

C. Advantages and Disadvantages of Nuclear Fission:

1. Advantages of nuclear fission:

a) No _____ _____

b) Costs _____ to run.

c) Saves on _____ _____.

2. Disadvantages of nuclear fission:

a) Waste is _____, no place to _____ it.

b) Costs _____ to build.

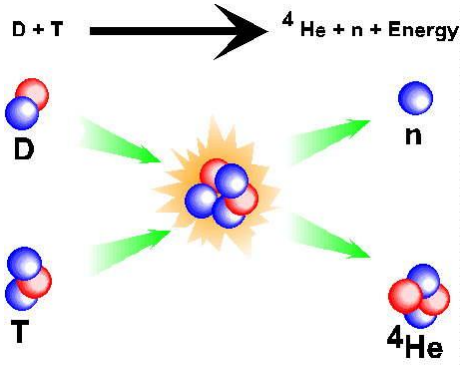
c) Possible _____, that might release_____.

VI NUCLEAR FUSION:

A. What is it?

1. When _____ or more _____ that have _____ masses, combine , or _____ to form a larger _____.

_____ + _____ ⇨ _____+_____



2. Advantages of fusion:

a) No _____ pollution. No nuclear _____.

b) Save on _____ fuels.

c) Unlimited _____ , because the fuel is _____ which is found in _____.

3. Disadvantages:

a) Needed temperatures are too _____.(_____)

b) Not possible to do yet.