

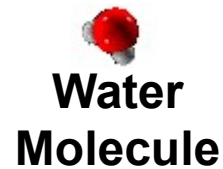
Chapter 1

Physical and Chemical Changes



Physical Changes: ...a change in the physical form

Phase
Changes:



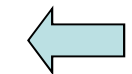
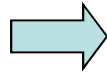
Solid Phase
Water



Regular, arrangement
of water molecules

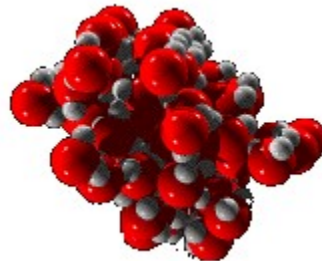
Vibrating around their
equilibrium positions

melting



freezing

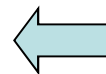
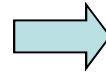
Liquid Phase
Water



Structure disappears

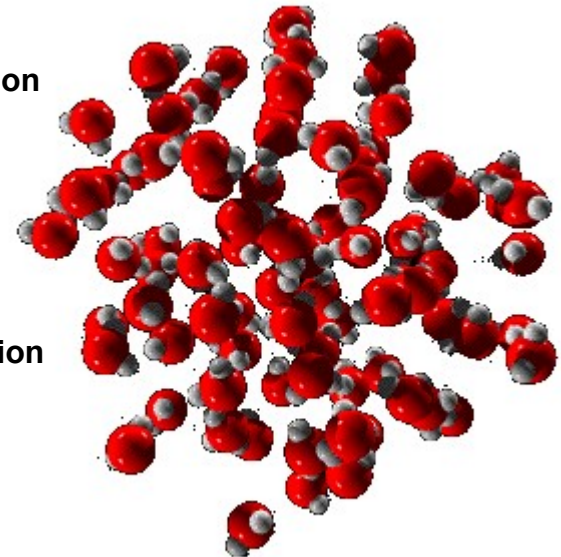
Molecules are close
together and tumble
over one another
randomly

vaporization



condensation

Gas Phase
Water



Molecules are far apart
and moving with very
high speed



Chemical Changes: Change in chemical composition

<http://www2.uni-siegen.de/~pci/versuche/english/v44-1-1.html>



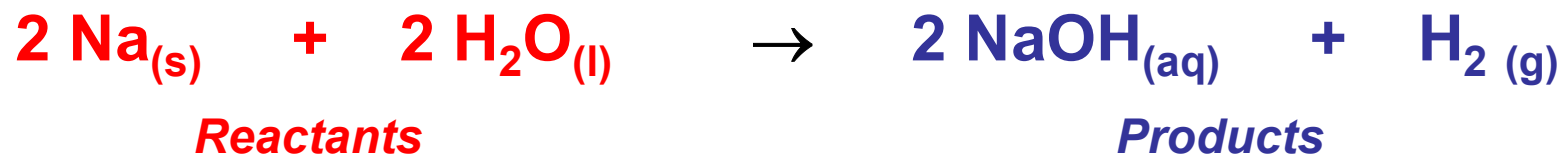
Sodium metal is removed from kerosene and placed in liquid water.



The sodium metal reacts with the water producing heat, hydrogen gas and sodium hydroxide.



The heat melts the sodium metal and ignites the hydrogen gas producing a flame.



Energy: Capacity to do work.

Potential Energy

...Stored up energy

- Food
- Fuel
- Compressed spring
- Blown up balloon
- Nuclear energy
- Batteries (*stored chemical energy*)



Kinetic Energy

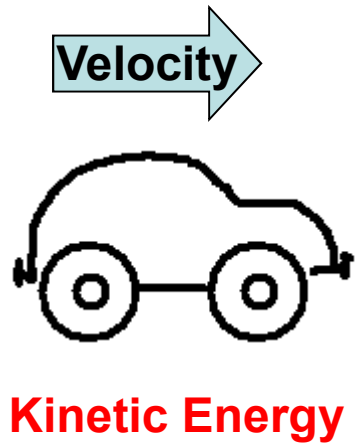
...energy of motion

- Car moving
- light
- heat
- sound
- wind

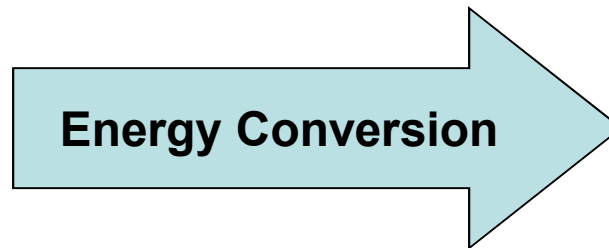


Conservation of Energy

Energy is not lost or destroyed but instead changes form.



K.E.



Wall

- **Sound**
- **heat**
- **deformation**
 - **car**
 - **wall**
 - **driver**



Separations: Terminology

Mixtures: Materials with variable composition

Pure substances: Materials with fixed/constant composition

Heterogeneous Mixtures:
Visibly divided



Salt
water &
sand

Physical change: Filtration

Sand

SiO₂

*Pure
substance*

**Salt
Water**

NaCl in H₂O

Homogeneous mixture
(Not visibly divided) 💡

Separations: Continued



Salt Water

NaCl in H₂O

Homogeneous mixture
(Not visibly divided)

Physical Change: Distillation

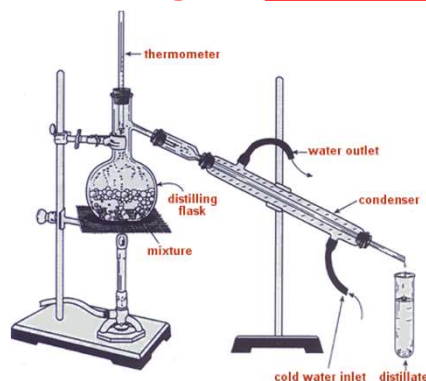
Distilled Water



Pure substance
*(Fixed
Composition)*

11.2 % Hydrogen

88.8 % Oxygen



Solid Salt



Pure substance
*(Fixed
Composition)*

39.3 % Sodium

60.7 % Oxygen



Separations: Finale



Distilled Water



Pure substance
(Fixed
Composition)

11.2 % Hydrogen

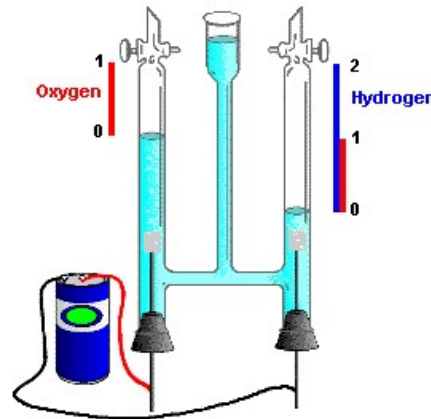
88.8 % Oxygen

Chemical Change: Electrolysis



Oxygen Gas: $\text{O}_{2(g)}$

Element



Hydrogen Gas: $\text{H}_{2(g)}$

Element

