

Matter & Energy

Remember...everything is made of matter & matter is made of atoms and molecules.

Those particles are in constant motion.

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Kinetic Theory of Matter

Rules for determining speed of particles:

- 1.
- 2.

States of Matter

There are 3 basic phases of matter:

- 1.
- 2.
- 3.

-the difference between them is determined in part by their particle movement:

- a. Solids-
- b. Liquids-
- c. Gases-

SO...how do we classify the different types of matter?

1. Solids-

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2. Liquids-

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3. Gases-

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SO...what's the most common phase of matter?

What's plasma?

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- Plasmas are influenced by magnets
- Plasmas require an energy source to exist
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Ex. Fluorescent lights / Neon lights

** Plasmas are very similar to gases, but gases CANNOT conduct a current like a plasma can.

Energy

If there was no electricity...what sources of energy would you use?

- candles for light?
- Batteries?
- Food (our source of energy)?

What is energy?

Energy:

Now...since there are lots of different ways to move or change matter...there are several different types of energy.

For example...

Think back to the *Kinetic Theory of Matter*...

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Temperature-What is it?

We think of temperature as being how hot or cold something is.

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Temperature

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Thermal Energy –

So far...the faster the particles move, the more kinetic energy they have.

- More K.E. =

- More K.E. =

Changes of State

Why does dew form? What causes ice to melt?

-these are changes of state.

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Energy Transfers and Changes of State

First, it's important to realize that the identity of a substance doesn't change in a phase change, only the amount of energy the substance has does.

What kinds of changes are these? Physical or Chemical?

Ex.

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Specific Phase Changes:

Energy Requiring Changes:

1. Melting:

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- Melting point depends on pressure.

2. Evaporation:

- Boiling

➤ Boiling point-

3. Sublimation:

Ex. -

- Ice in a freezer will eventually sublimate to water vapor.

Energy Releasing Changes:

4. Condensation:

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➤ Ex. Water droplets of a pop can.

- Condensation point-

5. Freezing:

- freezing point-
- For a liquid to freeze,

Conservation of Mass and Energy

Mass is conserved in all changes. (both physical and chemical!)

Likewise, energy can change forms during a physical or chemical change, but the total amount of energy is constant from before to after.

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*** Fundamental Law of Physical Science!***

Law of Conservation of Mass:

Conservation of mass:

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➤ Ex. Burning a match.
(total mass before = total mass after)
match + oxygen ash + smoke + gases

Law of Conservation of Energy:

Conservation of Energy:

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Fluids

As we've stated, liquids and gases are both classified as *fluids*.

So...*what's so special about fluids?*

1. Pressure:

Ex.

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- to calculate pressure:

$$- 1 \text{ Pascal (Pa)} = 1 \text{ N/m}^2$$

2. Buoyant Force

If you place a rubber duck in a tub of water it floats.

When you push the duck down to the bottom and release, What happens?

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3. Archimedes Principle

Archimedes was an ancient Greek Mathematician (300 bc)

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Archimedes Principle

So...

4.

Ex. Bricks will sink in water because it is more dense.

So...how do steel ships float when steel is 8x more dense than water?

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Fluids in Motion:

All fluids in motion will have similar properties.

1.

2.

- Viscosity =

- Viscosity =

In general...