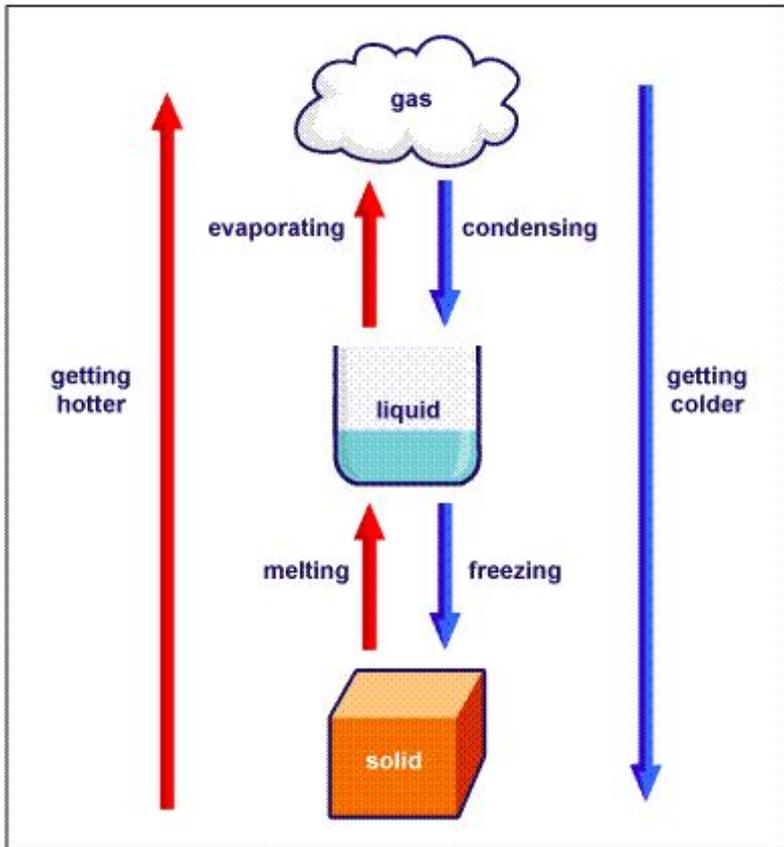


Chapter 2: Introduction to Matter

2.3 Changes in Matter

Physical change is any change that alters the form or appearance of matter but **does not** make any substance in the matter into a different form. **It is still the same substance.**



Dissolving is a physical change. So is bending, crushing, breaking, chopping, braiding, and anything else that changes only the shape or form of the matter.

You can also separate mixtures by filtration and distillation, which are also physical changes.

Chemical changes produce new substances with properties different from those of the original substances.

**A → B + C or D + E → F Examples of 2
kind of**

chemical

When natural gas (methane) combusts, what are the substances that combine?

methane (CH₄) and
oxygen

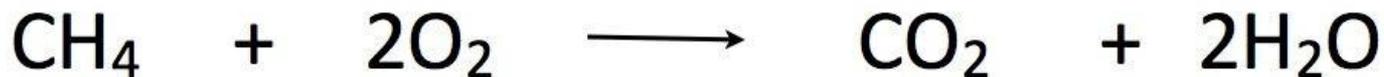
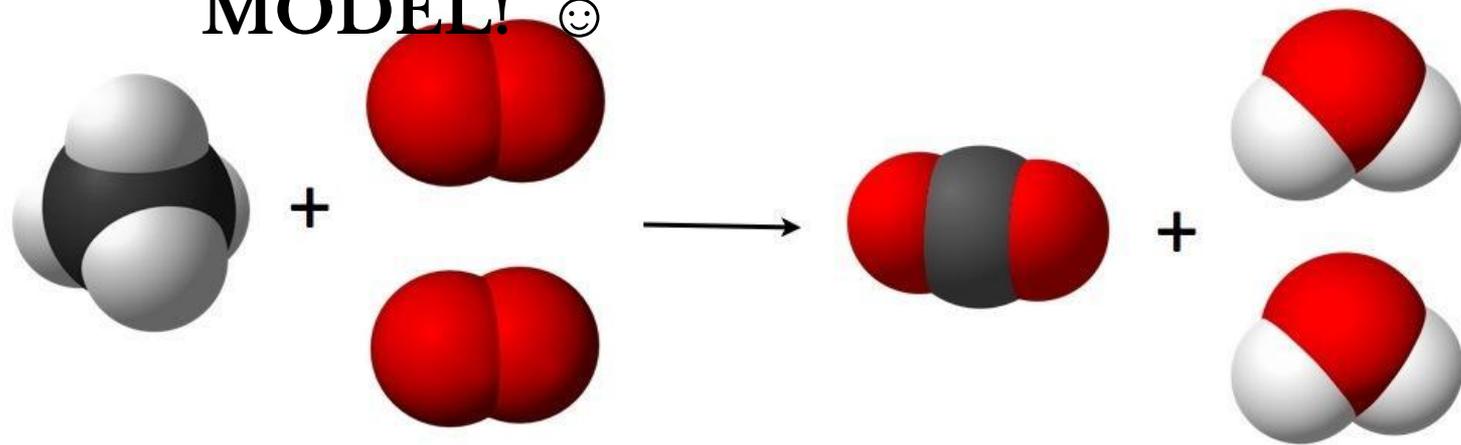
What new substances are produced?

Carbon dioxide gas
(CO₂) and water
vapor (H₂O).

Law of conservation of mass (aka law of conservation of matter) Matter is not created or destroyed in any chemical or physical change. Atoms are not lost or gained, just rearranged!

Encourage your teacher to demonstrate what happens when methane (CH₄) interacts with 2 oxygen molecules (O₂).

OR JUST LOOK AT THIS MODEL! 😊



Energy is the ability to do work. EVERY chemical or physical change in matter includes a change in energy.

Temperature is a measure of the average energy of random motion of particles of matter.

Thermal energy is total energy of all the particles in an object. It always flows from warmer matter to colder matter.

If you remove a cup of water from the ocean, does the water in the cup have the same temperature as the ocean?

Do both have the same thermal energy?

The ocean is much larger, so it has more particles and its total thermal energy is greater.



Exothermic change



Energy given off.

Exothermic reactions are exactly the opposite. While they take some energy to get going, called the activation energy of reaction, these reactions give off heat during the reaction. Good examples of exothermic reactions are explosions like fireworks or combustion in engines.

Endothermic change



Energy taken in.

Endothermic reactions are those which absorb heat during the reaction. They take in more energy than they give off, which leaves the surroundings cooler than the starting point. Evaporation of water by sunlight is a great example. The sun and the liquid water combine and the