

Changes in Matter

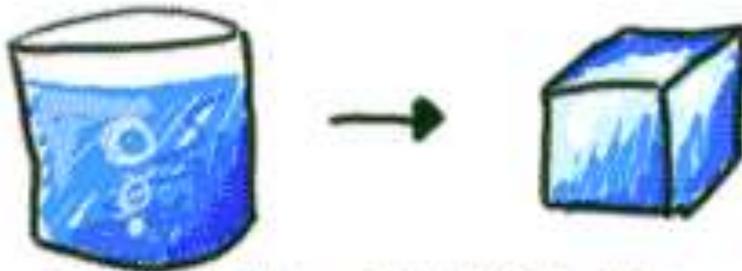
Lesson 1.3

Key Concepts

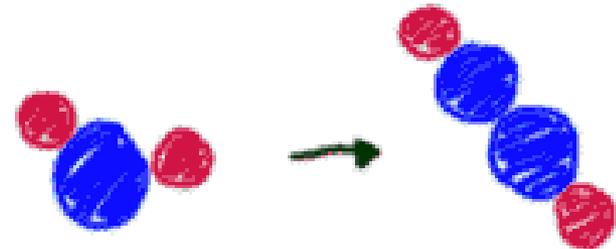
- What is a physical change?
- What is a chemical change?
- How are changes in matter related to changes in energy?

Changes in Matter

- Chemistry is the study of changes in matter.
- Matter can change in two ways.



PHYSICAL CHANGE OF
WATER INTO ICE



CHEMICAL CHANGE OF
WATER INTO
HYDROGEN PEROXIDE

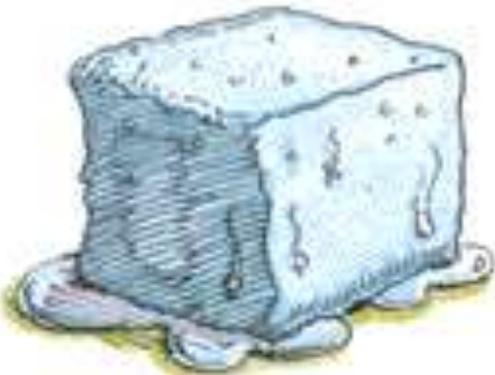
Physical Change

- In a **physical change**, matter changes its appearance but does not change into a different substance.
- A substance that undergoes a physical change is **still the same substance after the change.**



Change in State

- One example of a physical change is a change in state.
- Changing from a solid to a liquid or from a liquid to a gas is a change in state.



SOLID



LIQUID



GAS

Other Physical Changes

- Other kinds of physical changes are dissolving, bending, crushing, and filtering.

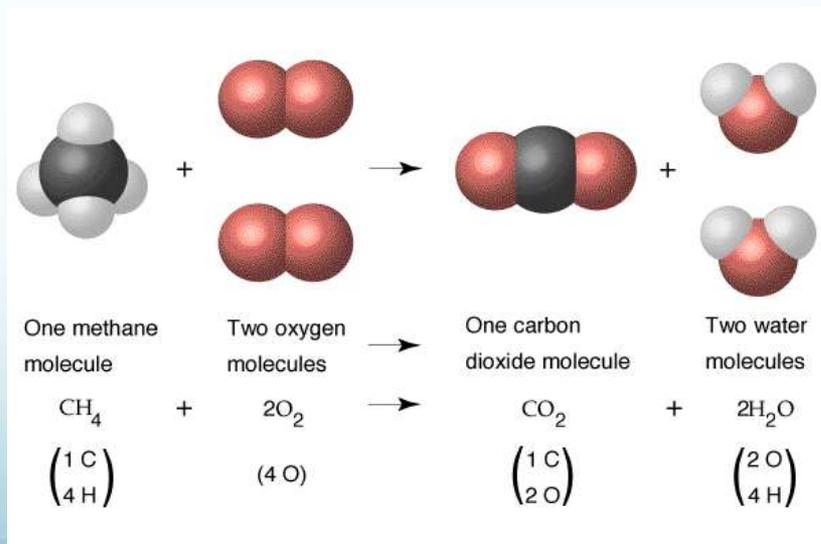


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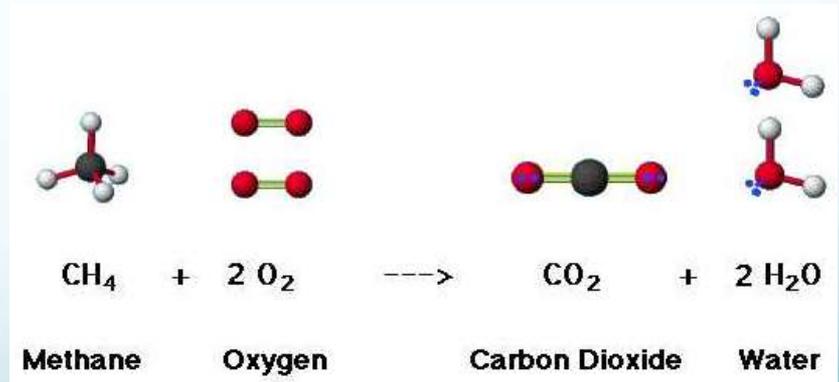
Chemical Change

- In **chemical change**, matter changes into one or more new substances.
- **Unlike a physical change, a chemical change produces new substances with different properties from those of the original substances.**



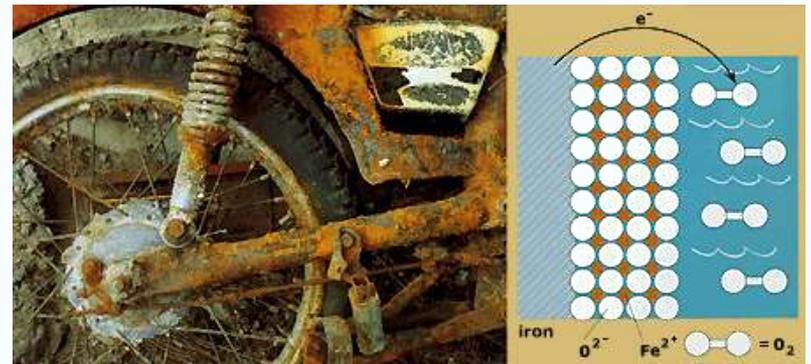
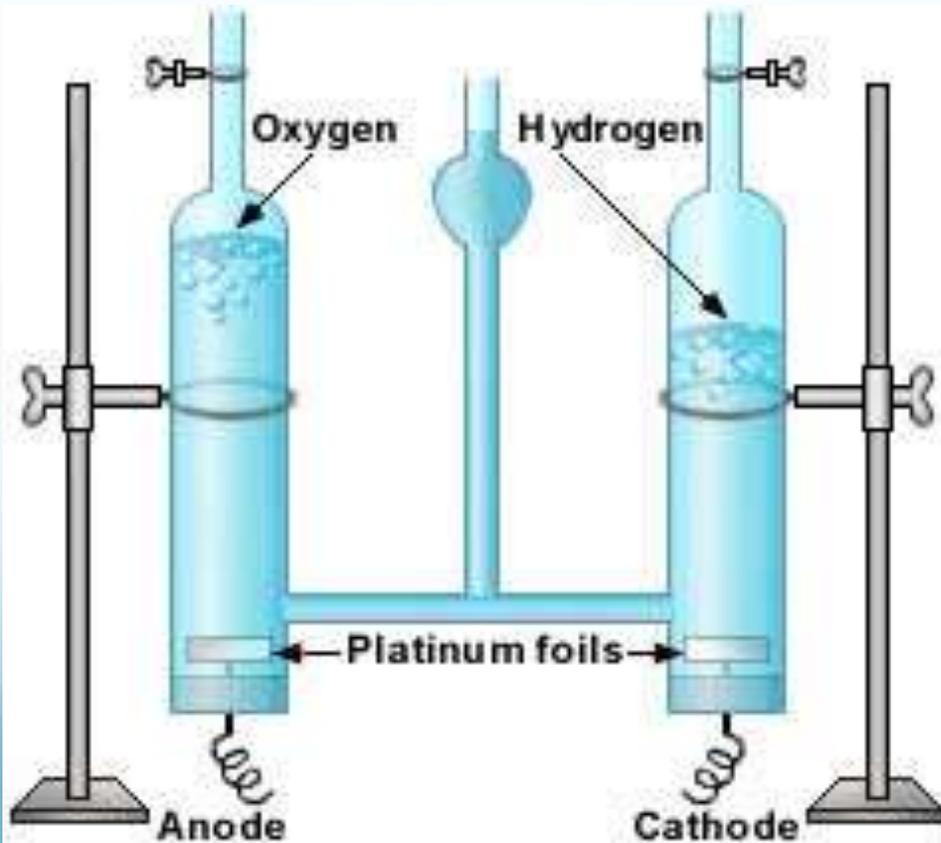
Example of Chemical Change

- Combustion, or burning, is one chemical change.
- When natural gas burns, it combines with oxygen in the air to produce carbon dioxide gas and water.



Other Chemical Changes

- Other examples of chemical change are electrolysis, oxidation, and tarnishing.

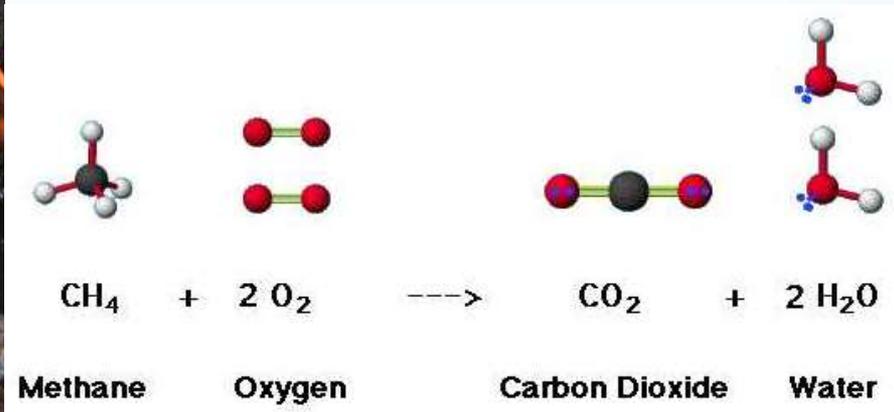


Key Concepts

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Conservation of Mass

- Although it may seem like matter disappears when it burns, that is not what is really happening.
- It has long been proven that mass is not lost or gained when matter changes.



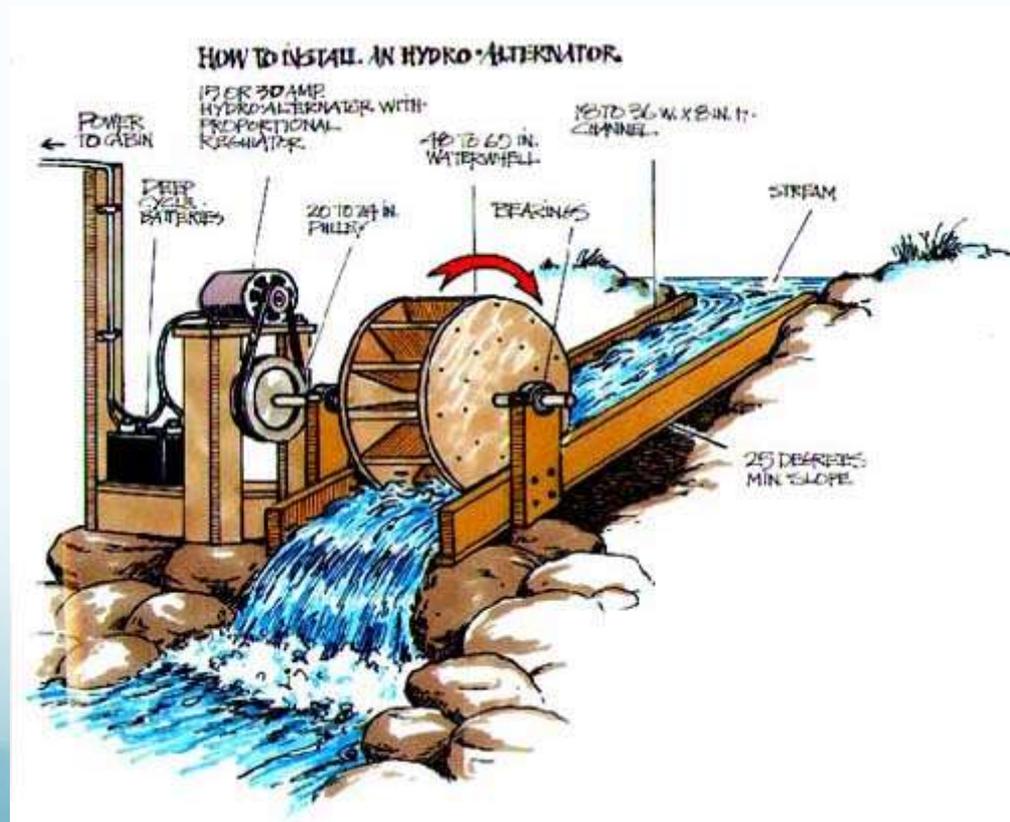
Conservation of Mass

- The **law of conservation of mass** states that matter is not created or destroyed in any chemical or physical reaction.



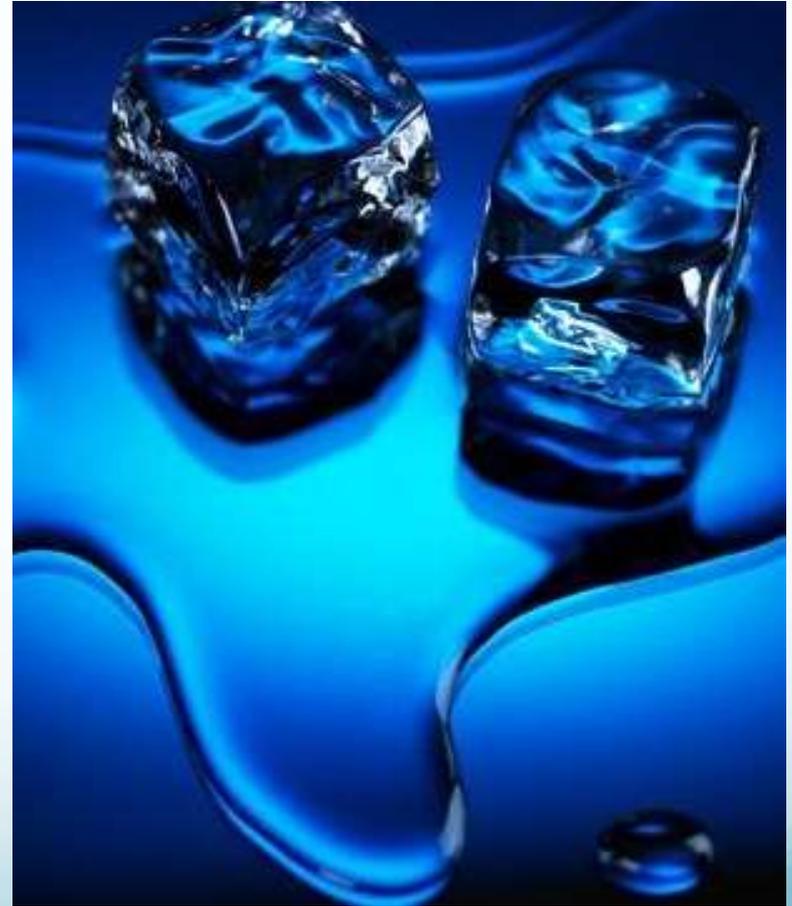
Energy

- Any time that matter changes, energy is involved.
- **Energy** is the ability to do work or cause change.



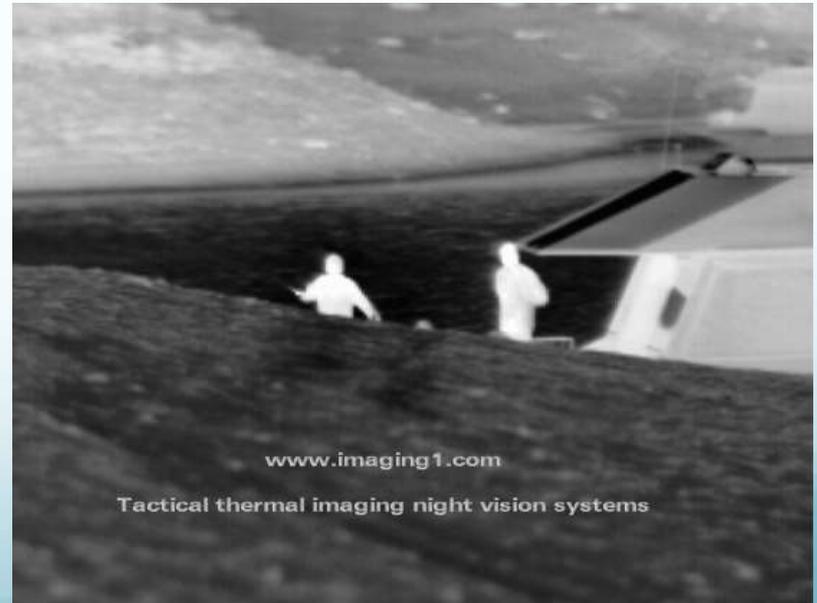
Change in Energy

- **Every chemical or physical change in matter includes a change in energy.**
- When ice melts, it absorbs energy from the surrounding matter.



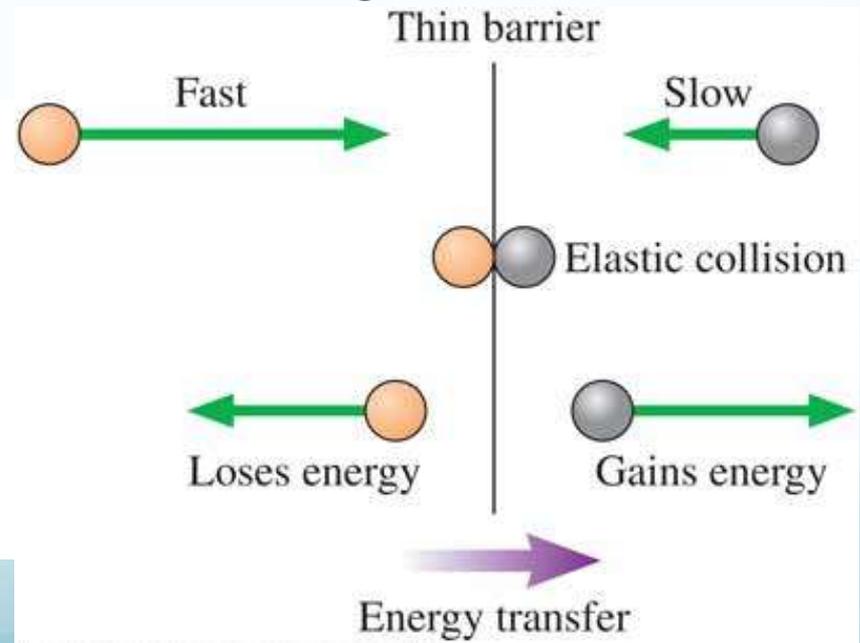
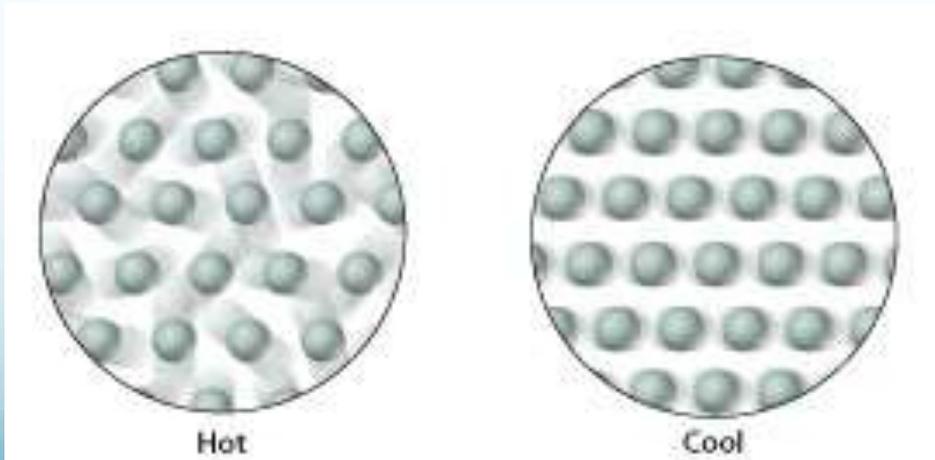
Thermal Energy

- **Temperature** is a measure of the *average* energy of random motion of the particles in an object.
- **Thermal energy** is the *total* energy of all the particles in an object.



Thermal Energy

- Thermal energy always moves from warm matter to cool matter.
- Thermal energy is the most common form of energy released or absorbed when matter changes.



Endothermic Change

- When ice absorbs thermal energy from its surroundings, it melts. This is an endothermic change.
- An **endothermic change** is a change in which energy is taken in, or absorbed.



Exothermic Change



- When wood burns, energy is given off in the form of heat and light.
- An **exothermic change** releases, or gives off, energy.