



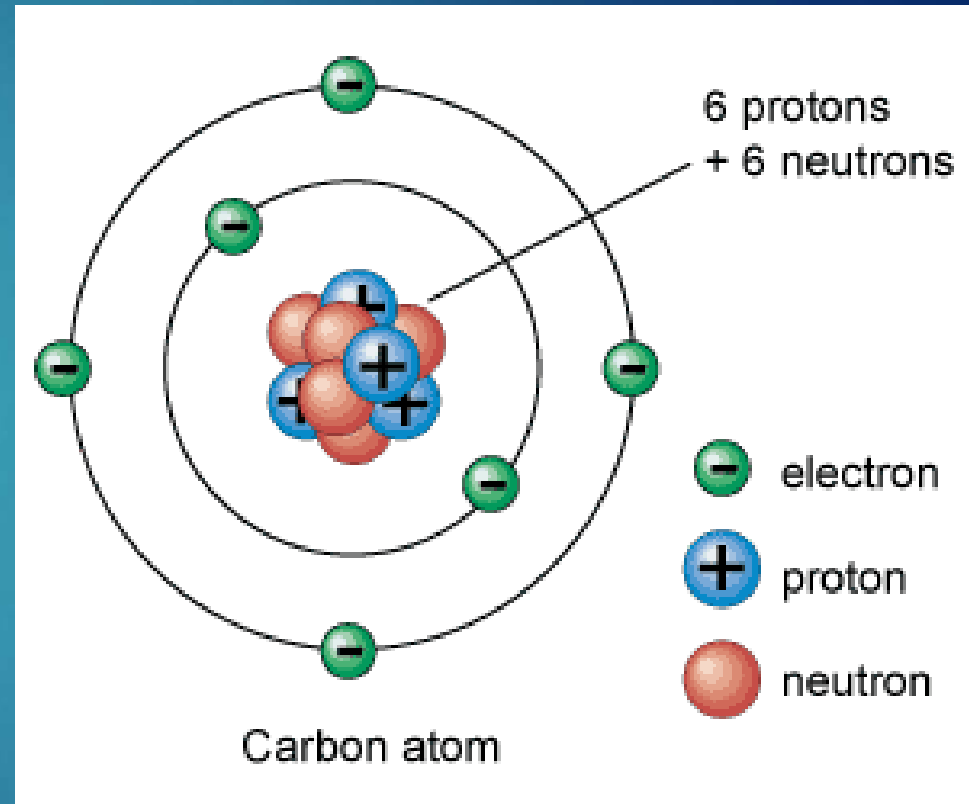
Chemical reactions

MR. BANKS

7TH GRADE SCIENCE

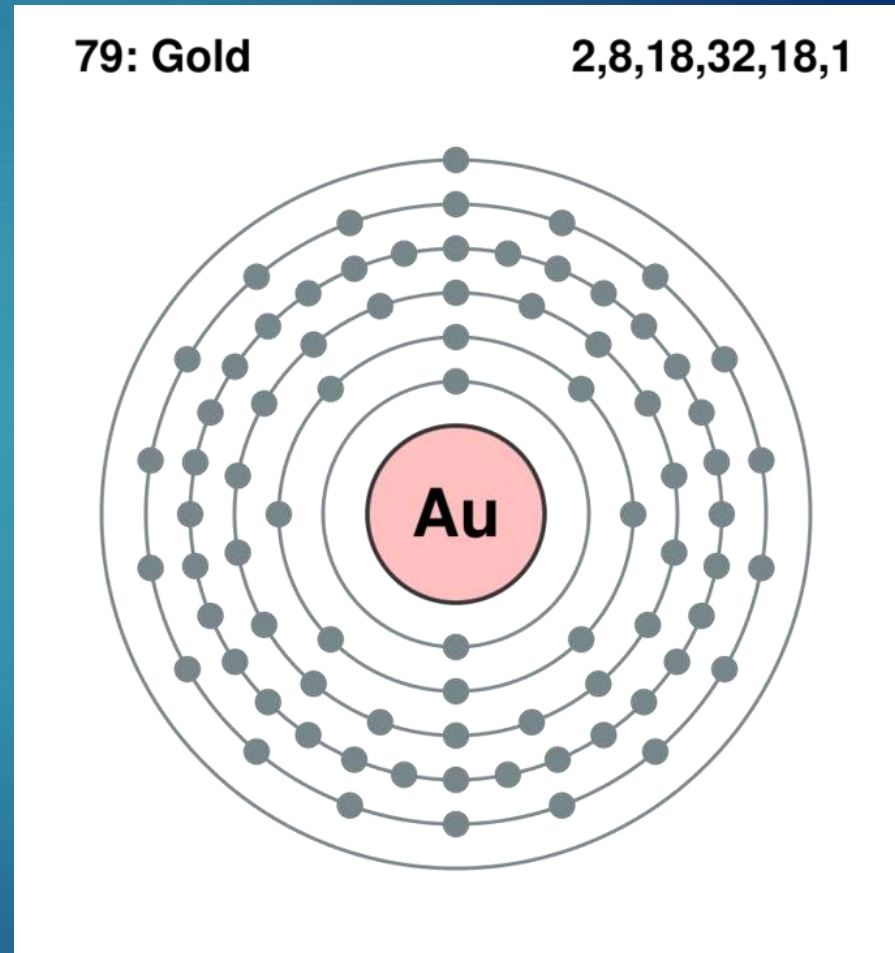
Atomic structure

- ▶ Atoms are the smallest things that can still be considered a chemical.
- ▶ Atoms are made out of small particles.
 - ▶ Protons and neutrons in the nucleus at the center.
 - ▶ Electrons orbiting around the nucleus.



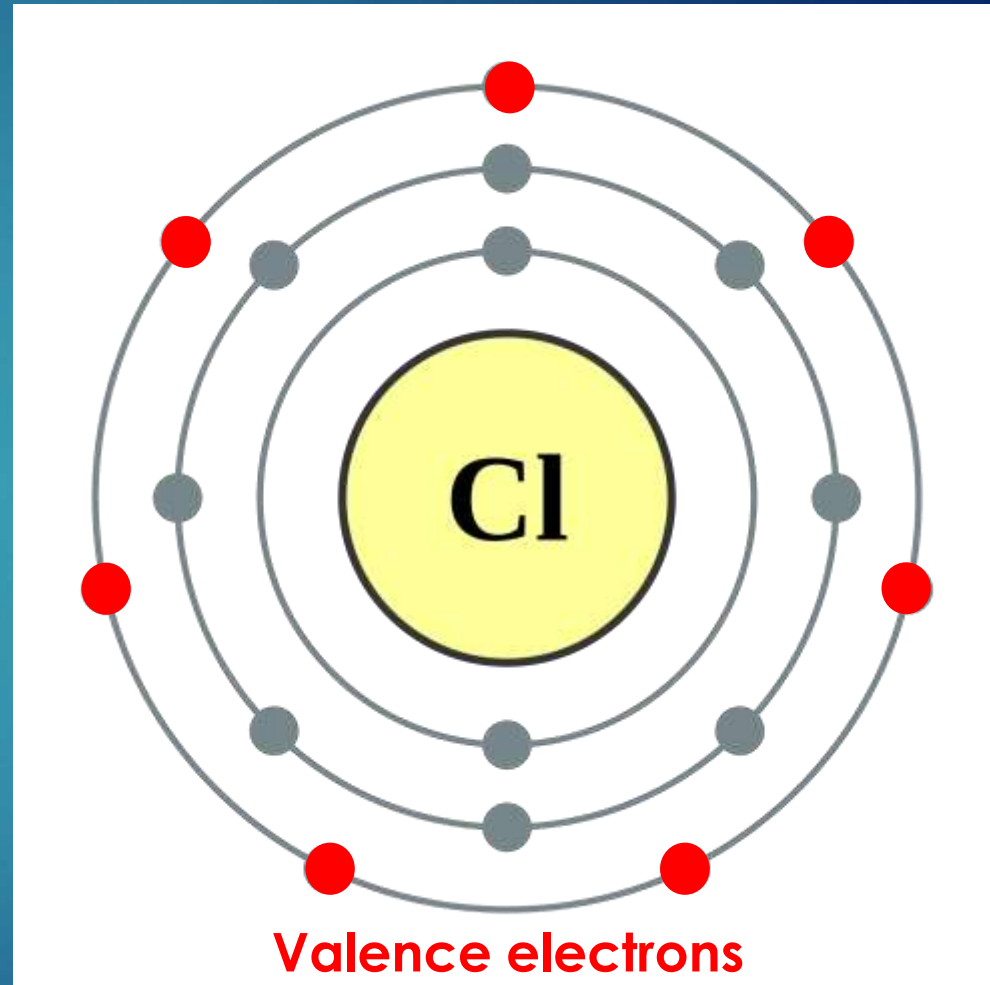
Valence electrons

- ▶ Electrons orbit the nucleus at different distances.
- ▶ These different distances are known as energy levels.
- ▶ Electrons are held onto more tightly the closer you move toward the nucleus.



Valence electrons

- ▶ Electrons in the outermost energy level are held onto the loosest.
- ▶ These outermost electrons are known as the valence electrons.
- ▶ The valence electrons control the chemical bonding of the atom.



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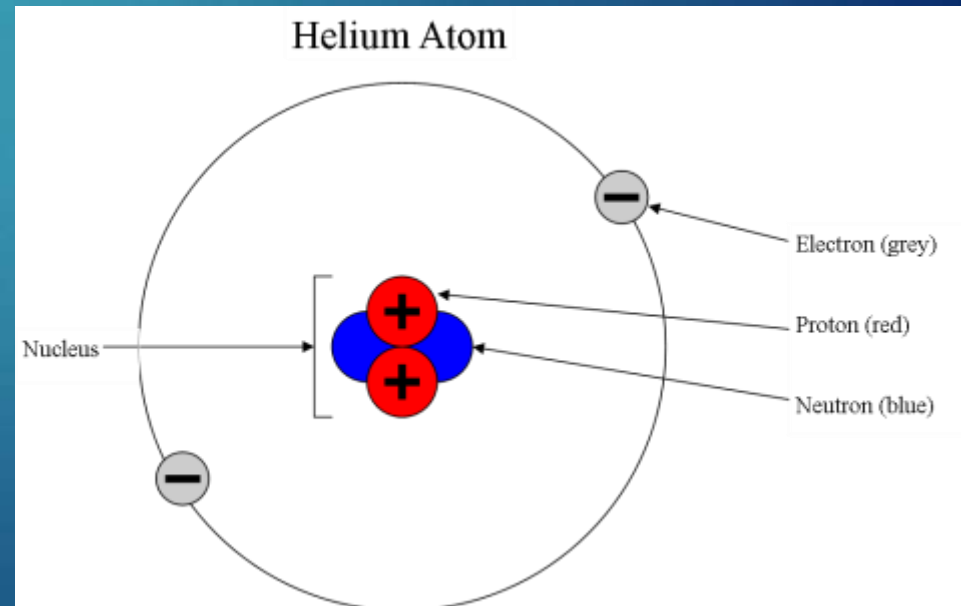
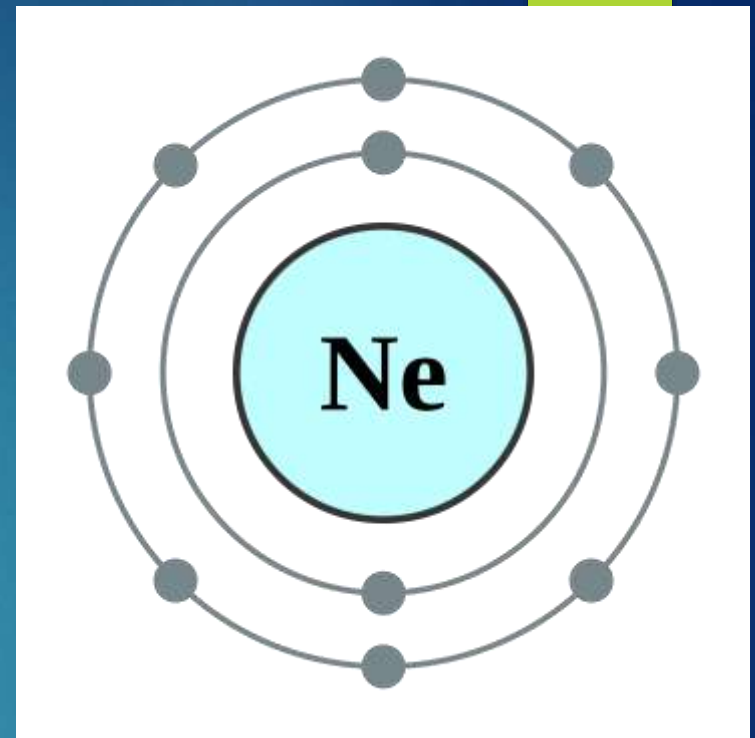
- [illegible]

Group																	
1															2		
1	2										3	4	5	6	7	8	
1	2										3	4	5	6	7	8	
1	2											3	4	5	6	7	8
1	2											3	4	5	6	7	8
1	2											3	4	5	6	7	8
1	2											3	4	5	6		

[illegible]

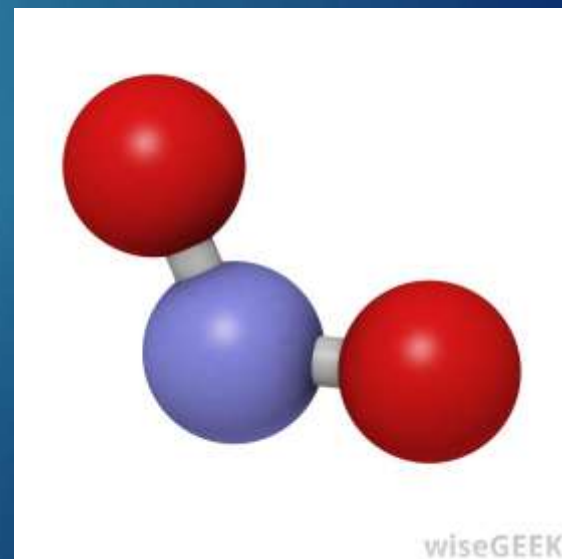
Valence electrons

- ▶ However, an atom “wants” to have 8 electrons in its valence.
- ▶ Having 8 valence electrons makes the atom “stable”.
- ▶ Hydrogen and helium are the only exceptions. They each want two valence electrons.



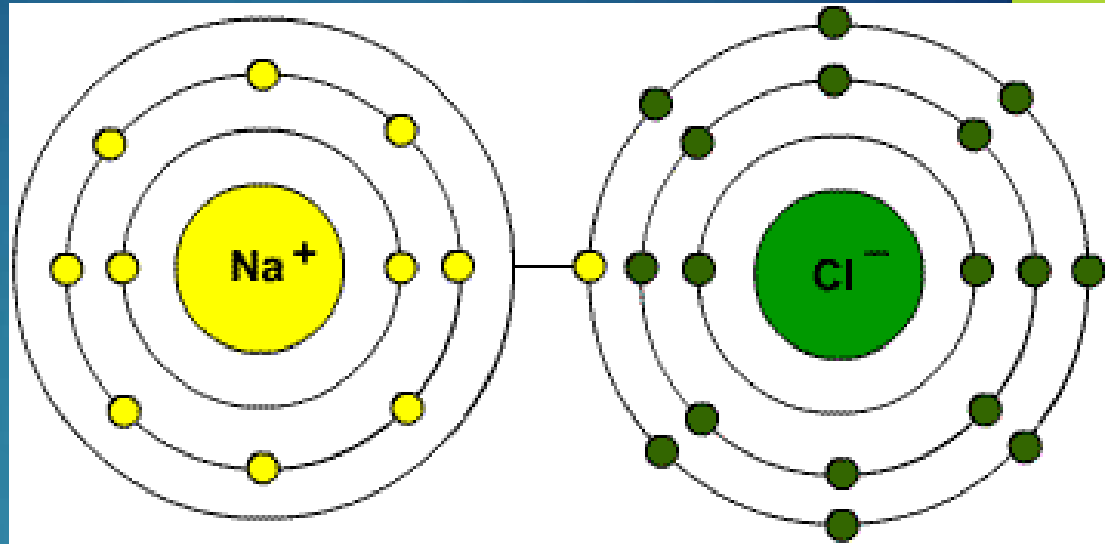
Chemical bonds

- ▶ There are only three ways for an atom to get to 8 valence electrons.
 - ▶ Take electrons from another atom.
 - ▶ Give away electrons to another atom.
 - ▶ Share electrons.
- ▶ Each of these actions leads to the formation of a chemical bond between the atoms and the creation of a compound.

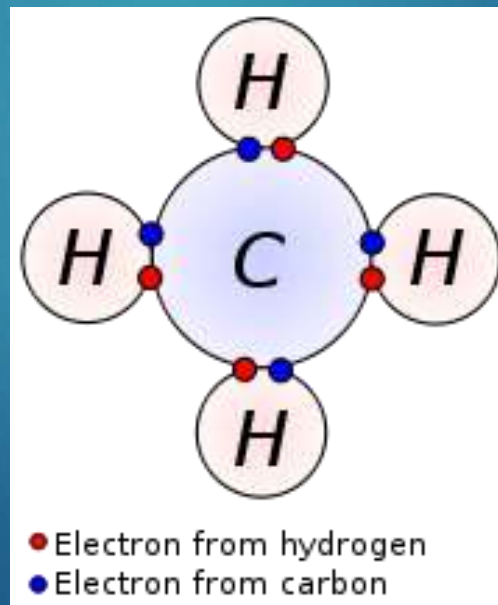


Chemical bonds

- ▶ Electrons given/taken

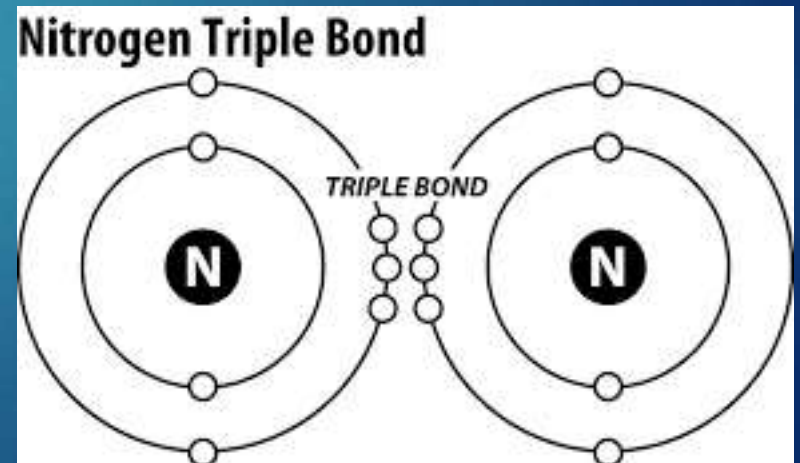
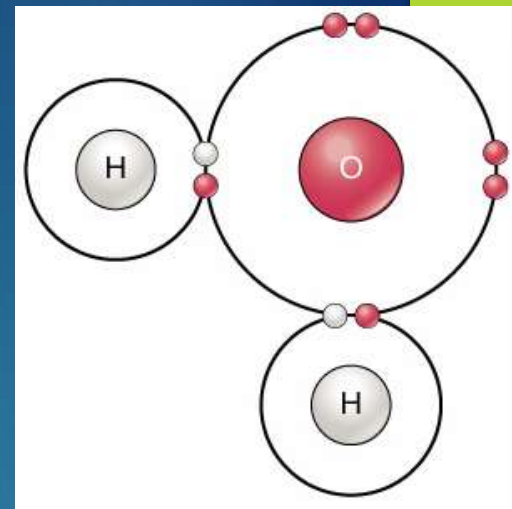


- ▶ Electrons shared



Chemical bonds

- ▶ Two atoms can share up to three pairs of electrons at a time (six electrons total).
- ▶ Each pair of electrons shared creates a new bond.
- ▶ The more bonds there are between two atoms the stronger those atoms are stuck together.



Reactivity

- ▶ Being close to having 8 electrons makes an atom more “reactive”.
- ▶ They will easily form bonds with other atoms to get/give away or share the electrons they need.
- ▶ They can even break apart other compounds to get what they need.
- ▶ Atoms in groups 1a, 2a, and 7a are the most reactive.



Physical property

- ▶ Physical properties are characteristics of a substance that can be observed without changing the chemical identity of the substance.
- ▶ Density, shape, texture, color, smell, taste, melting point, boiling point, hardness, solubility, flexibility, etc.



Physical changes

- A change where the form of matter is altered, but the chemical is not transformed into a different chemical.
- Examples: cutting, breaking, melting, and freezing.



Chemical properties

- ▶ Chemical property – A characteristic of a substance that describes its ability to chemically change or react.
- ▶ Can only be observed when a substance chemically changes.
- ▶ Examples: Reactivity, flammability, toxicity.



Chemical changes


- ▶ A process where one or more substances are altered into one or more new and different substances.
- ▶ A chemical reaction must occur.
- ▶ Burning, rusting, fizzing, creating something new.



Chemical properties

- ▶ A chemical property of magnesium is its ability to combine with oxygen to form magnesium oxide.



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- Find an object in the room.
 - Describe that object in as many ways as you can think of and record your description in your notebook.
 - Pair up with another student and have them read your description and try to guess your object.

Chemical reactions

- ▶ Signs of chemical reaction.
 - ▶ Bubbling (making gasses)
 - ▶ Changes in temperature
 - ▶ Production of an odor
 - ▶ Formation of a solid
 - ▶ Changes in color



Compounds

- ▶ The chemical and physical properties of compounds are different from the properties of the elements they are made of.

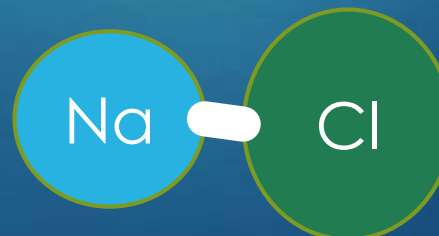
Sodium, Na



Chlorine, Cl



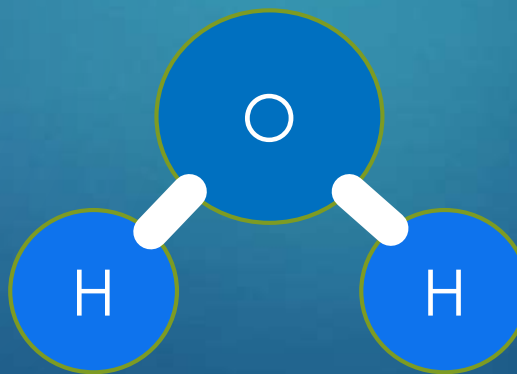
Salt, NaCl



Oxygen, O



Water, H₂O



Hydrogen, H



1. A. Physical Change B. Chemical Change



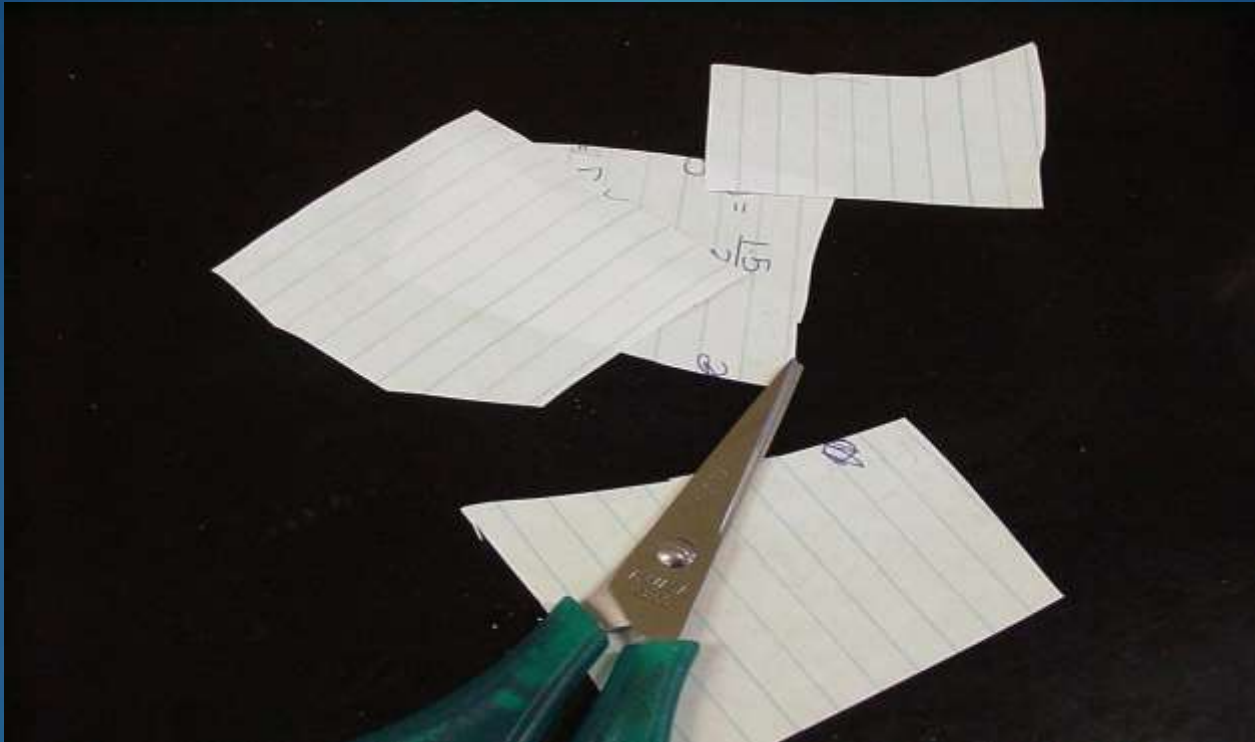
Rusting nails

2. A. Physical Change B. Chemical Change



Effervescent tablet

3. A. Physical Change B. Chemical Change



Cutting paper

4. A. Physical Change B. Chemical Change



Vinegar and Baking soda

5. A. Physical Change B. Chemical Change



Salt and water

6. A. Physical Change B. Chemical Change



Breaking glass

7. A. Physical Change B. Chemical Change



Burning wood

8. A. Physical Change B. Chemical Change



Ice melting

9. A. Physical Change B. Chemical Change



Sodium and water

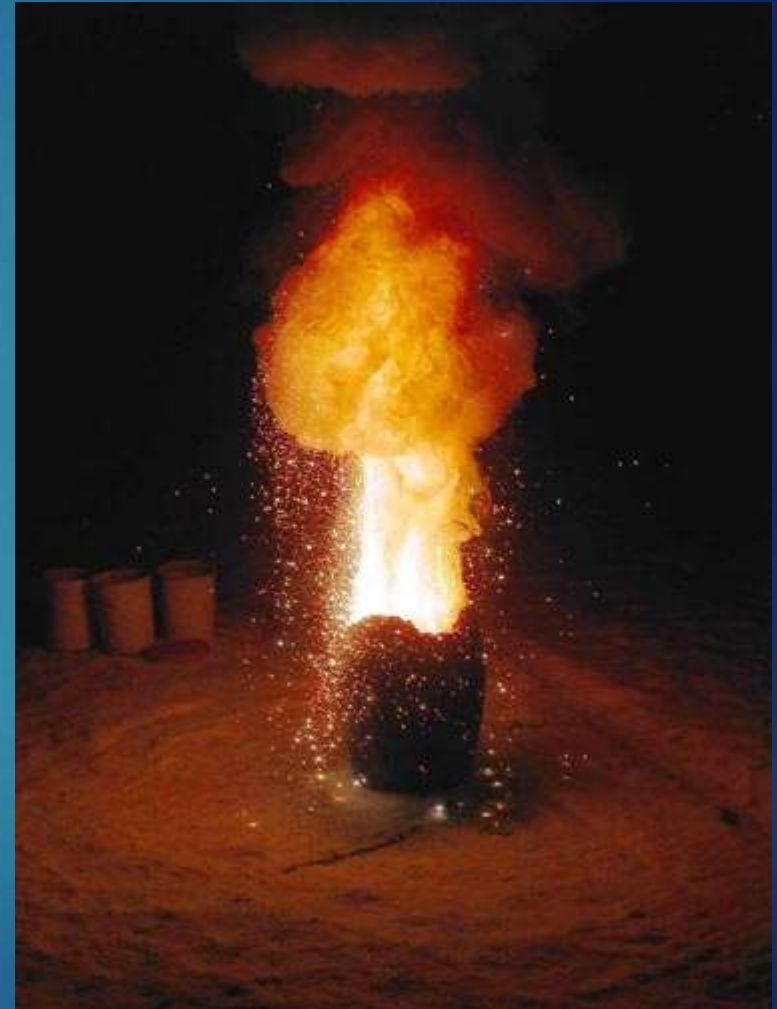
10. A. Physical Change B. Chemical Change



Boiling water

Changes in energy

- ▶ When matter undergoes a chemical change it can either absorb or release energy.
- ▶ An exothermic reaction is a reaction in which energy is released.
- ▶ This can be in the form of sound, light, or most commonly, heat.



Changes in energy

- ▶ An endothermic reaction is a reaction in which energy is absorbed from the environment.
- ▶ This can lead to a decrease in temperature or a reaction that has to have energy constantly added to it.



Activation energy

- ▶ Activation energy is the minimum amount of energy needed to start a chemical reaction.
- ▶ All chemical reactions need some energy to get started.
- ▶ Some reactions need very little and can get it from the environment.
- ▶ Other reactions require an outside source to add energy, usually in the form of heat.







