

Unit 5

NAME

Class Work

1/4/14

5.7 Properties of Ionic/Covalent

SPARK

1. What is the difference between ionic and covalent bonding?

Objective

SWBAT identify the type of bond based on the properties

Agenda:

- SPARK/Objective
- Lesson
- Practice
- Exit Ticket
- Homework

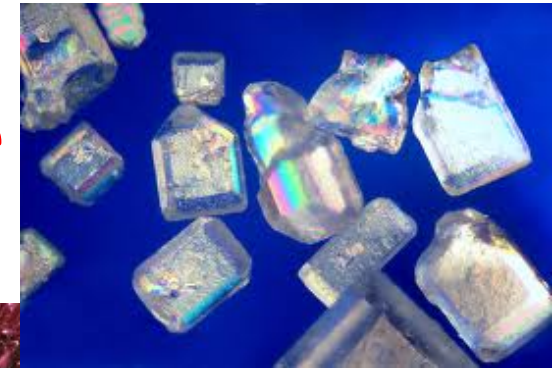
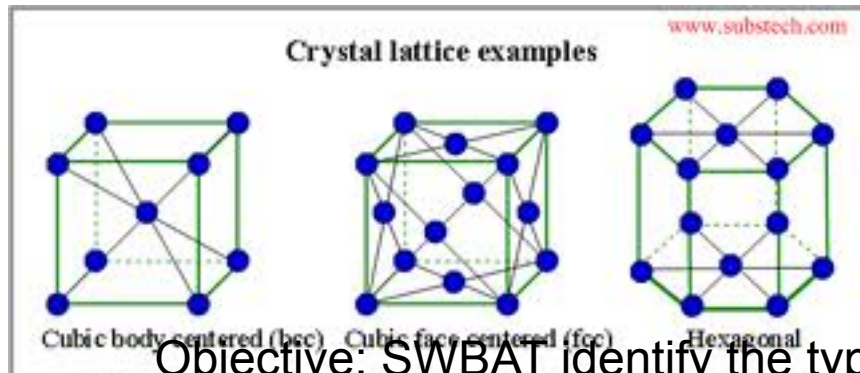


Objective: SWBAT identify the type of bond based on the properties

Physical Properties



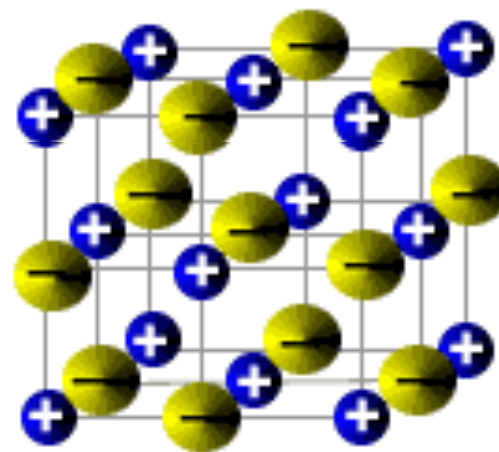
- What state of matter were the 3 substances?
- What was the appearance of each under the microscope?
- Crystalline solid – uniform structure



Objective: SVBAT identify the type of bond based on the properties

IONIC COMPOUNDS

- ALL solids, hard and brittle
- All crystalline, uniform structure
- What keeps the ionic structure held together?



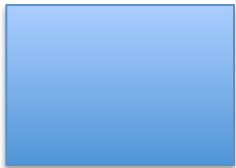
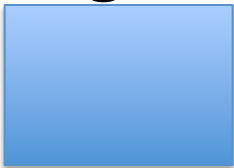
Objective: SWBAT identify the type of bond based on the properties

Physical Properties – Ionic Compounds

- Which compounds in your lab melted?
- Why do ionic compounds have high melting and boiling points?

Objective: SWBAT identify the type of bond based on the properties

Ionic Compounds

- The more electrons that are transferred the higher the melting point will be.
- Which would have a stronger bond:
- MgO  or NaCl 

Objective: SWBAT identify the type of bond based on the properties



Objective: SWBAT identify the type of bond based on the properties

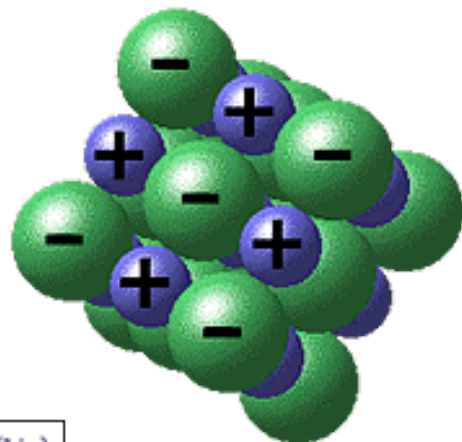
- Which compounds dissolved in water?

Objective: SWBAT identify the type of bond based on the properties

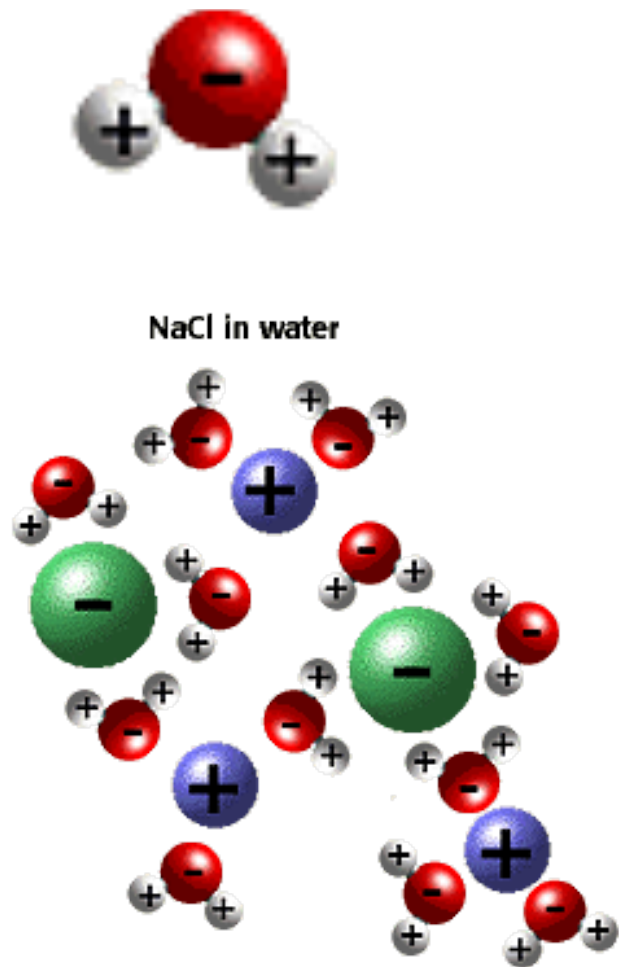
Ionic Compounds

- Soluble in water
- Dissociates in water

NaCl crystal structure

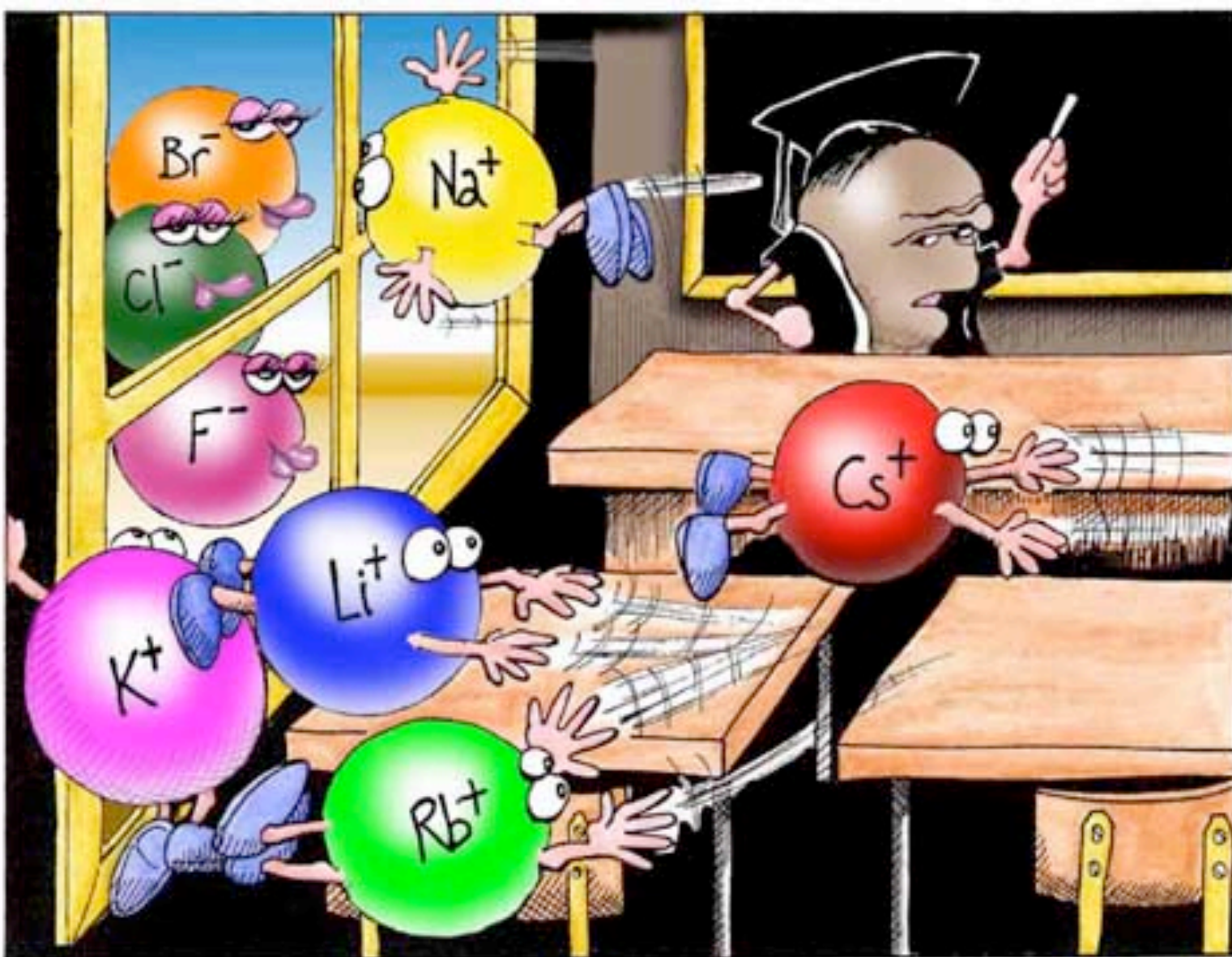


NaCl in water



sodium (Na)
chlorine (Cl)

Objective: SWBAT identify the type of bond based on the properties



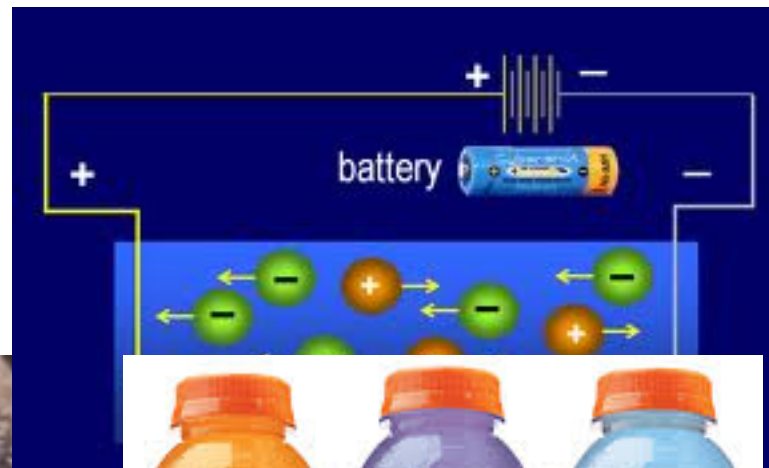
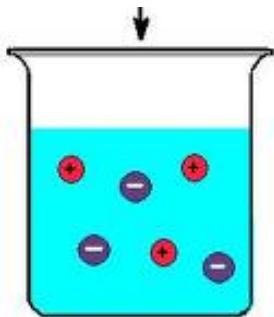
"Perhaps one of you gentlemen would mind telling me just what it is outside the window that you find so attractive...?"

Objective: SWBAT identify the type of bond based on the properties

- Which compounds conducted electricity?

Objective: SWBAT identify the type of bond based on the properties

- Ions dissociating in water allow them to move freely and therefore to conduct electricity
- An ionic solution is called an **electrolyte**



Objective: SWBAT identify the type of bond based on the properties

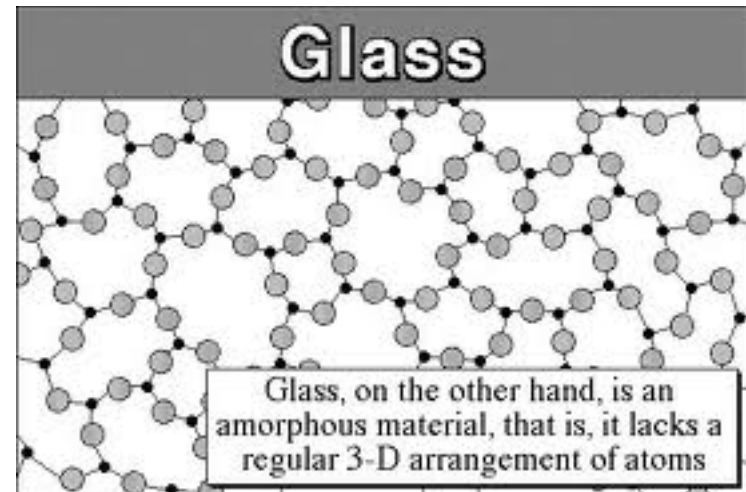
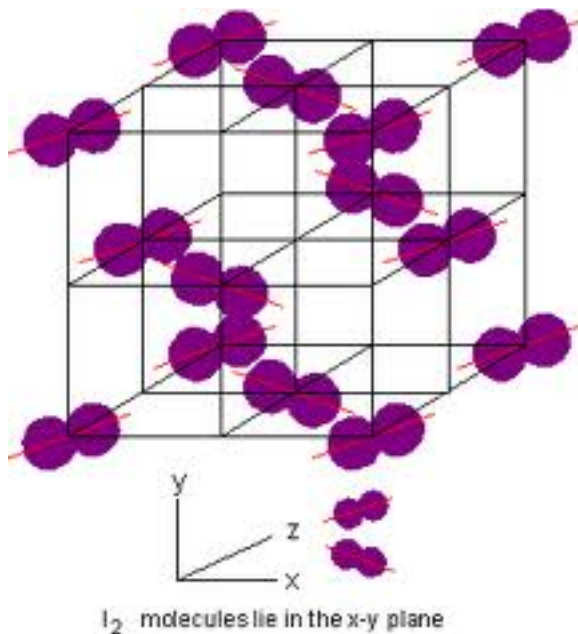
Ionic Compounds

- Ionic solids do NOT conduct electricity
- When dissolved in water to form a solution ionic compounds conduct electricity.

Objective: SWBAT identify the type of bond based on the properties

Covalent Compounds

- Solids can be **crystalline** or **amorphous** (random arrangement)



Objective: SWBAT identify the type of bond based on the properties

Covalent Compounds

- Many are gases or liquids at room temperature
 - Water, oil or O_2 , N_2 , CO_2
- Tend to have lower melting points and boiling points
- Do not conduct electricity
- Not as soluble in water

Objective: SWBAT identify the type of bond based on the properties

Characteristics of Ionic vs. Covalent Compounds		
Characteristics	Ionic Compound	Covalent Compound
Representative Unit		
Bond Formation		
Type of Elements		
Physical State		
Melting Point		
Solubility in Water		
Electrical Conductivity		

Objective: SWBAT identify the type of bond based on the properties

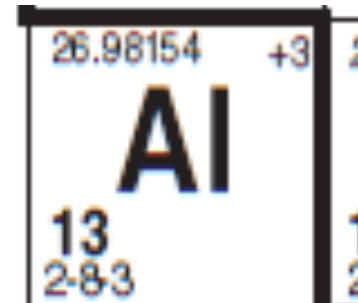
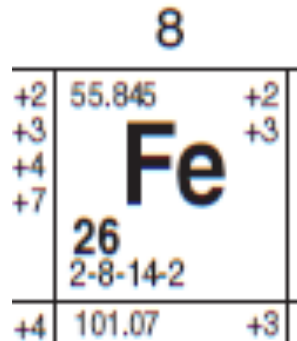
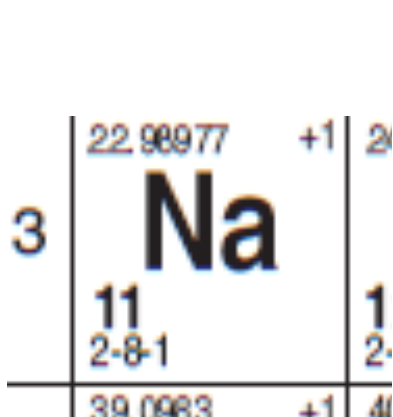
Chemical Bonds

The periodic table is color-coded as follows:

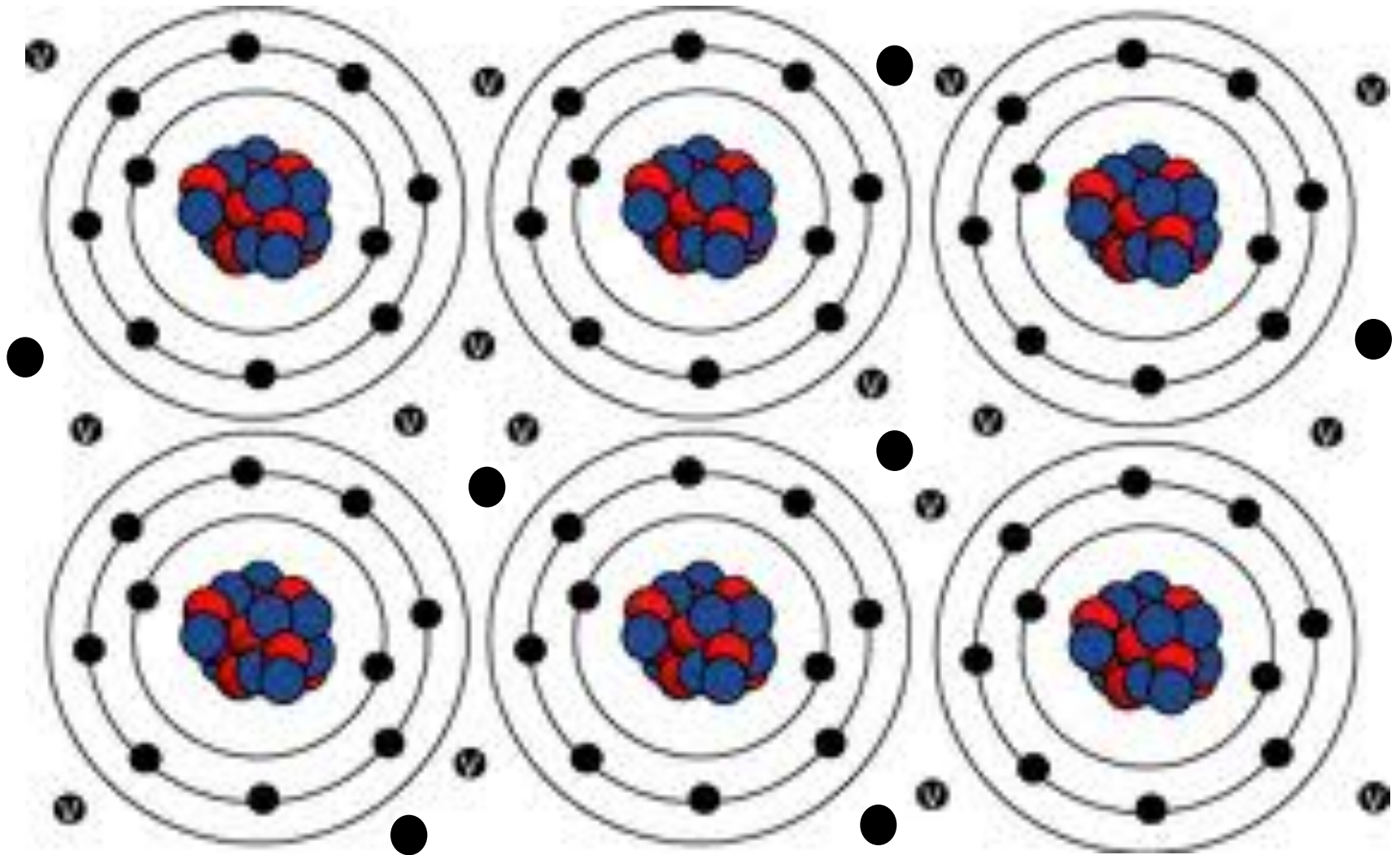
- METALS (Blue):** Includes elements like Li, Na, K, Rb, Cs, Fr, Ba, Sr, Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Sb, Te, I, Xe, Kr, Ar, Ne, He, and most transition metals.
- METALLOIDS (Orange):** Includes elements like B, Si, Ge, As, Sb, Te, Po, At, and Bi.
- NONMETALS (Green):** Includes elements like H, C, N, O, F, Ne, Al, Ga, In, Sn, Sb, Te, I, Xe, Kr, Ar, Ne, He, and the noble gases.

Metallic Bonds

- In a metallic bond, atoms lose electrons to a “sea of electrons”
- Metals have 1, 2, or 3 valence electrons

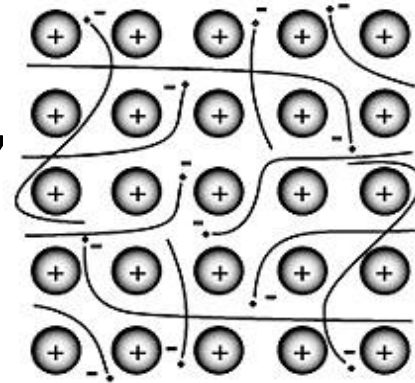


In a metal crystal, electrons move freely and do not belong to a single atom



Metallic Bonds Structure

- Cations in a “sea of electrons”



- How does this impact the structure?
- Attraction between cations (+) and the “sea of electrons (-)” hold the crystal together
- Metals are crystalline solids with atoms packed very close together.

Metallic Bond Properties

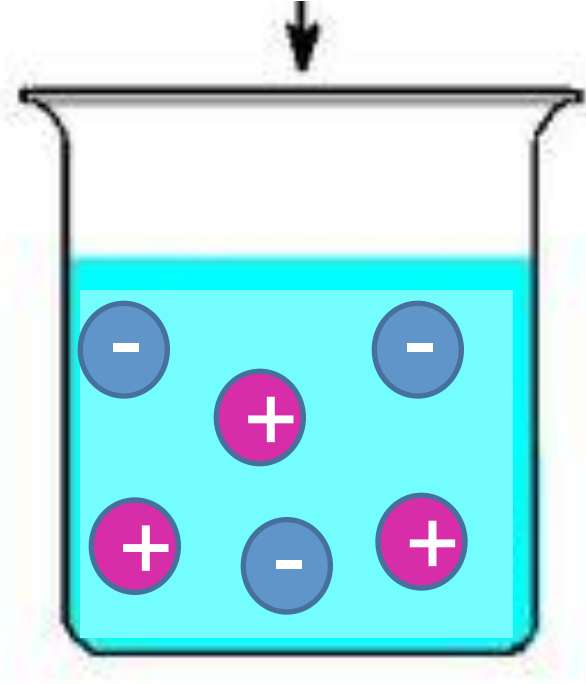
1. Malleable

2. Ductile



Metallic Bond Properties

- Conductivity
- To have good electrical conductivity, you need moving charges.
- Recall electrolytes.....



- Metals are good conductors of electricity

Characteristics of Ionic vs. Covalent Compounds

Characteristics	Ionic Bond	Covalent Bond	Metallic Bond
Representative Unit	Formula Unit (reduced ratio)	Molecule (true ratio)	
Bond Formation	Transfer of one or more electrons between atoms	Sharing of electrons pairs between atoms	
Type of Elements	Metallic and nonmetallic	Nonmetallic	
Physical State	Solid	Solid, liquid, or gas	
Solid Structure	Crystalline	Crystalline or amorphous	
Melting Point	High (usually above 300 deg C)	Low (usually below 300 deg C)	
Solubility in Water	Usually high	High to low	
Electrical Conductivity	Good Conductor	Poor to nonconducting	

Practice

1. A white crystalline salt conducts electricity when it is melted and when it is dissolved in water. Which type of bond does this salt contain?

- 1) Ionic bonds
- 2) Metallic bonds
- 3) Covalent bonds
- 4) It cannot be determined

Objective: SWBAT identify the type of bond based on the properties

Practice

2. A sample of green gas is most likely to be a compound that contains:

- 1) Ionic bonds
- 2) Metallic bonds
- 3) Covalent bonds
- 4) It cannot be determined

Objective: SWBAT identify the type of bond based on the properties

Practice

3. A purple crystal is found. This substance is likely to contain bonds that are:

- 1) Ionic bonds
- 2) Metallic bonds
- 3) Covalent bonds
- 4) It cannot be determined

Objective: SWBAT identify the type of bond based on the properties

Practice

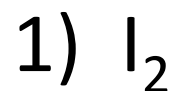
4. You look at a sample of a solid under a microscope and see what appear to be a completely random structure

- 1) Ionic bonds
- 2) Metallic bonds
- 3) Covalent bonds
- 4) It cannot be determined

Objective: SWBAT identify the type of bond based on the properties

Practice

5. Which compound will likely have the lowest melting point?



Objective: SWBAT identify the type of bond based on the properties

Exit Ticket

- Explain how you could determine whether or not a sample of an unknown substance contained ionic or covalent bonds.

Objective: SWBAT identify the type of bond based on the properties

HOMEWORK

Read page 176-182, answer question review questions on 180 AND 182.

Objective: SWBAT identify the type of bond based on the properties