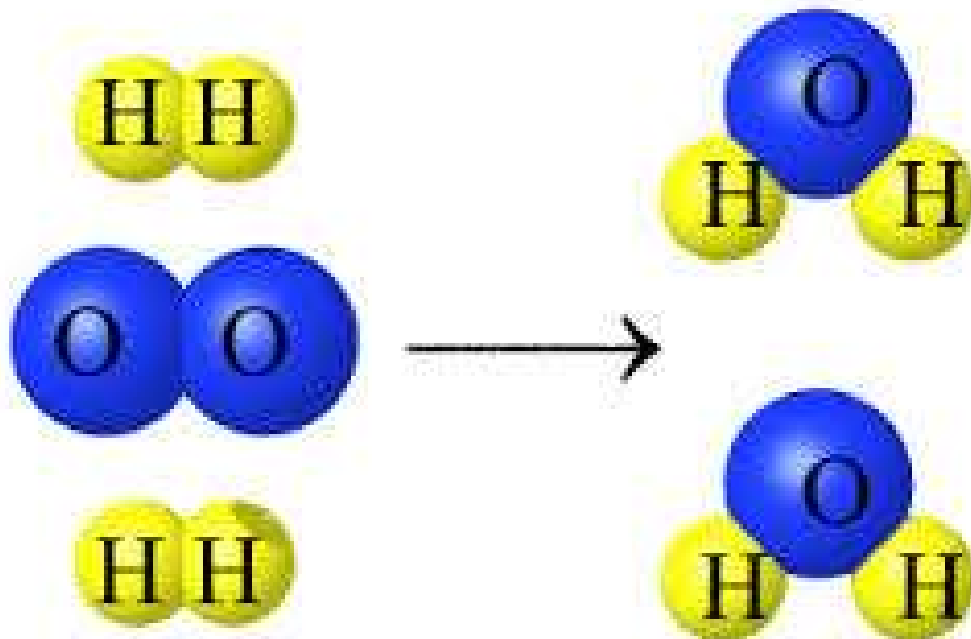


# **Atomic Bonding**

Mr. Skirbst

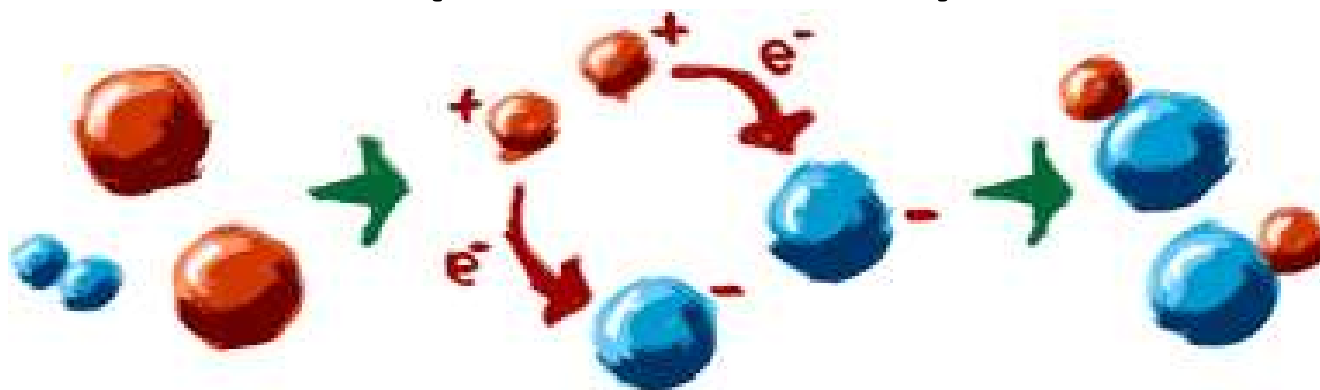
# Bonding

\* Atoms (of elements) combine to form new substances



# Bonding

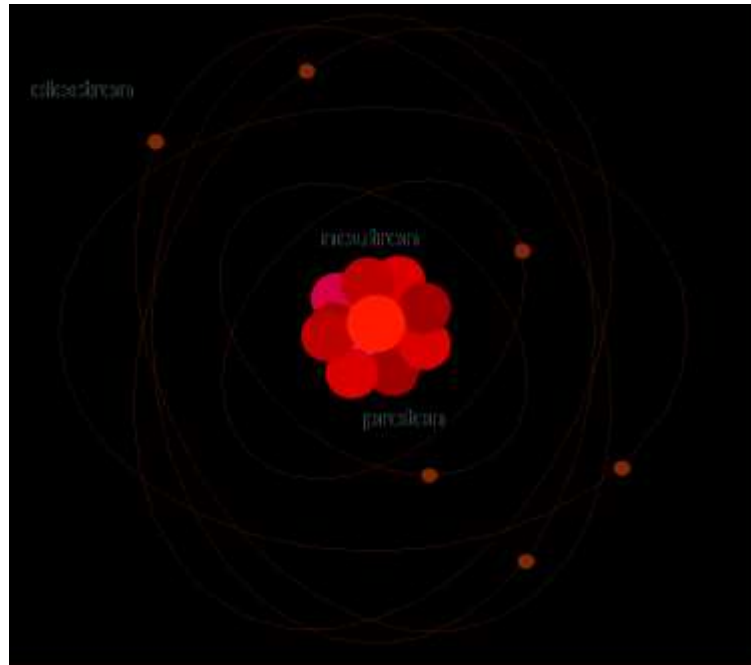
- \* Atoms (of elements) combine to form new substances
- \* Determined by atomic structure (electrons)



REACTIONS INVOLVE THE CHEMICAL CHANGE OF ATOMS AND MOLECULES.

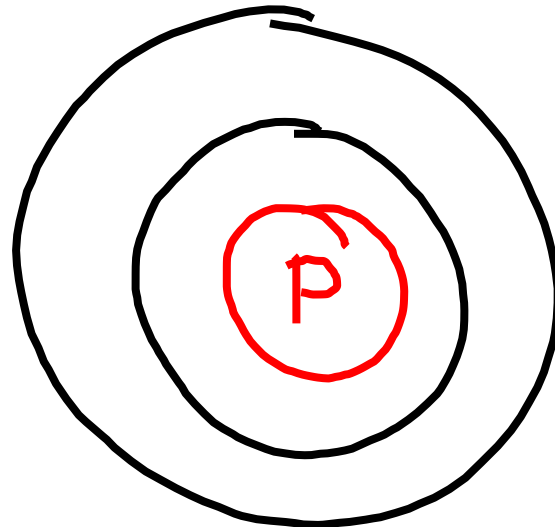
# Electron Cloud

- \* Area outside (+) nucleus where (-) electrons are found



# Electron Cloud

- \* Area outside (+) nucleus where (-) electrons are found
- \* Electrons found in various energy levels



# Electron Cloud

- \* Neutral atoms have balanced # of protons (+) & electrons (-)



# Energy Levels

\*each level has a maximum # of electrons that can fit



# Energy Levels

- \* each level has a maximum # of electrons that can fit
- \* Levels are filled from the lower (inside) to higher (outer) energy level

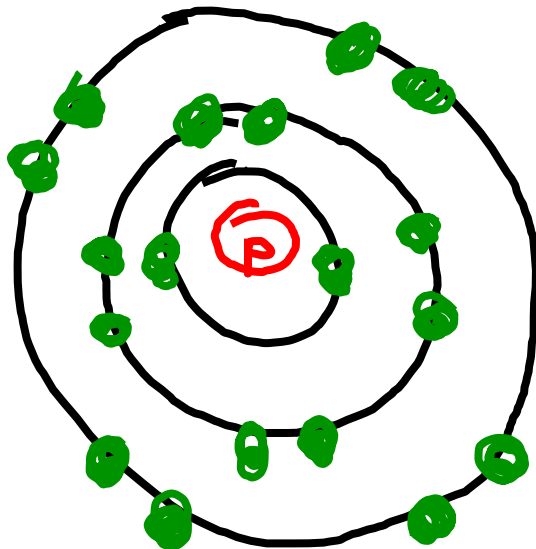


# Energy Levels

1<sup>st</sup> level = 2 electrons maximum

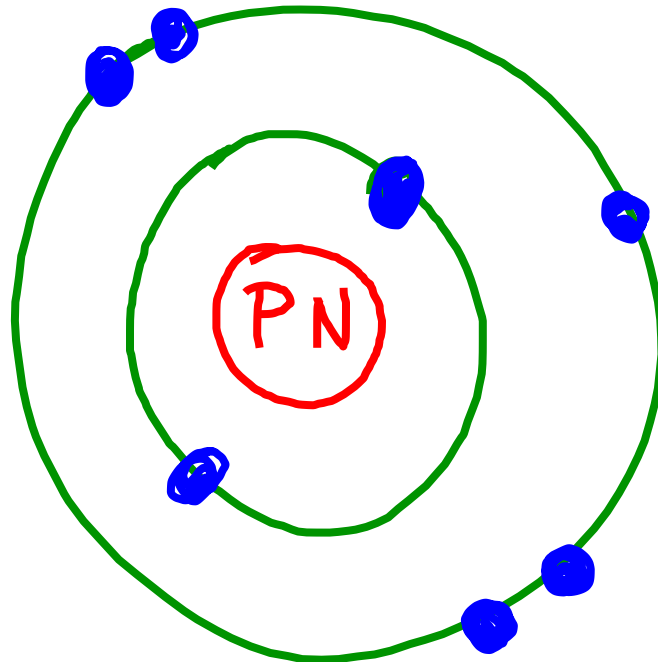
2<sup>nd</sup> level = 8 electrons maximum

3<sup>rd</sup> level = 8 electrons maximum

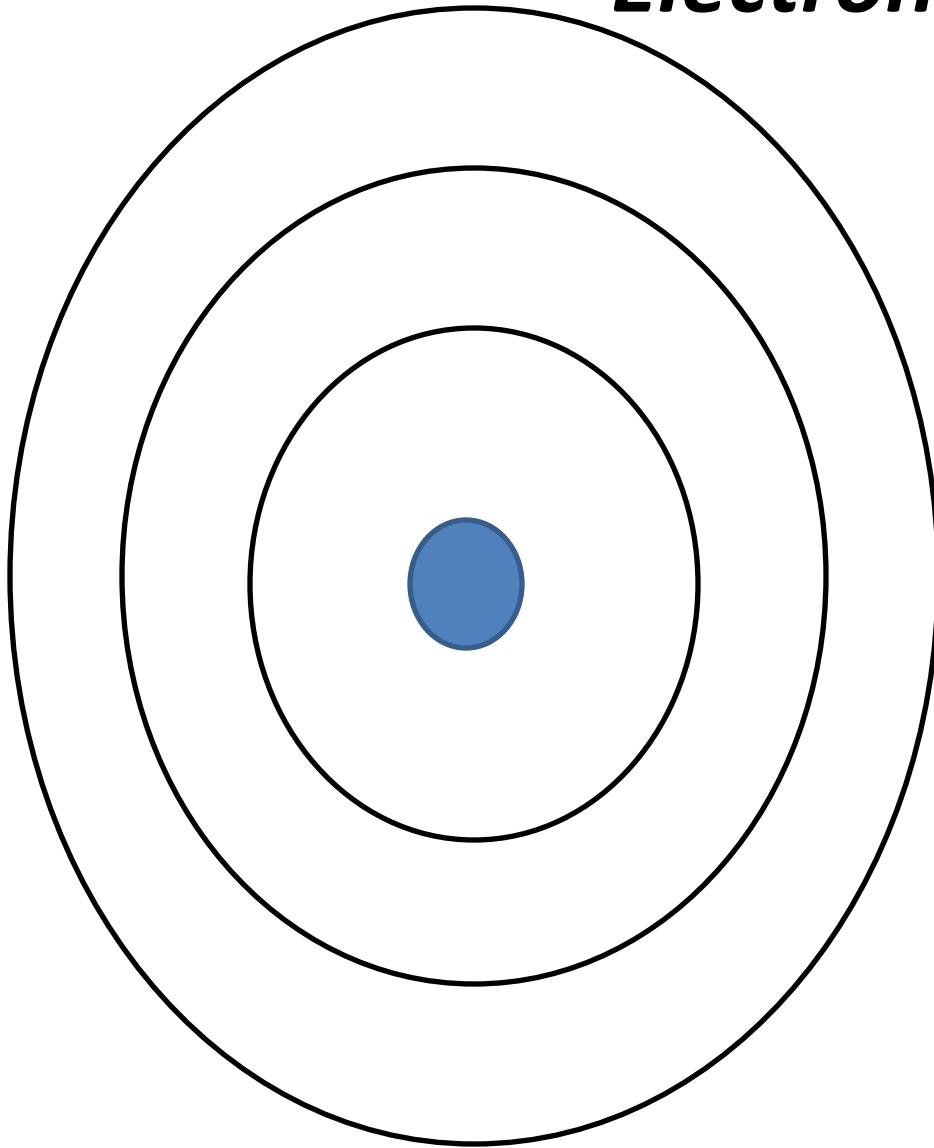


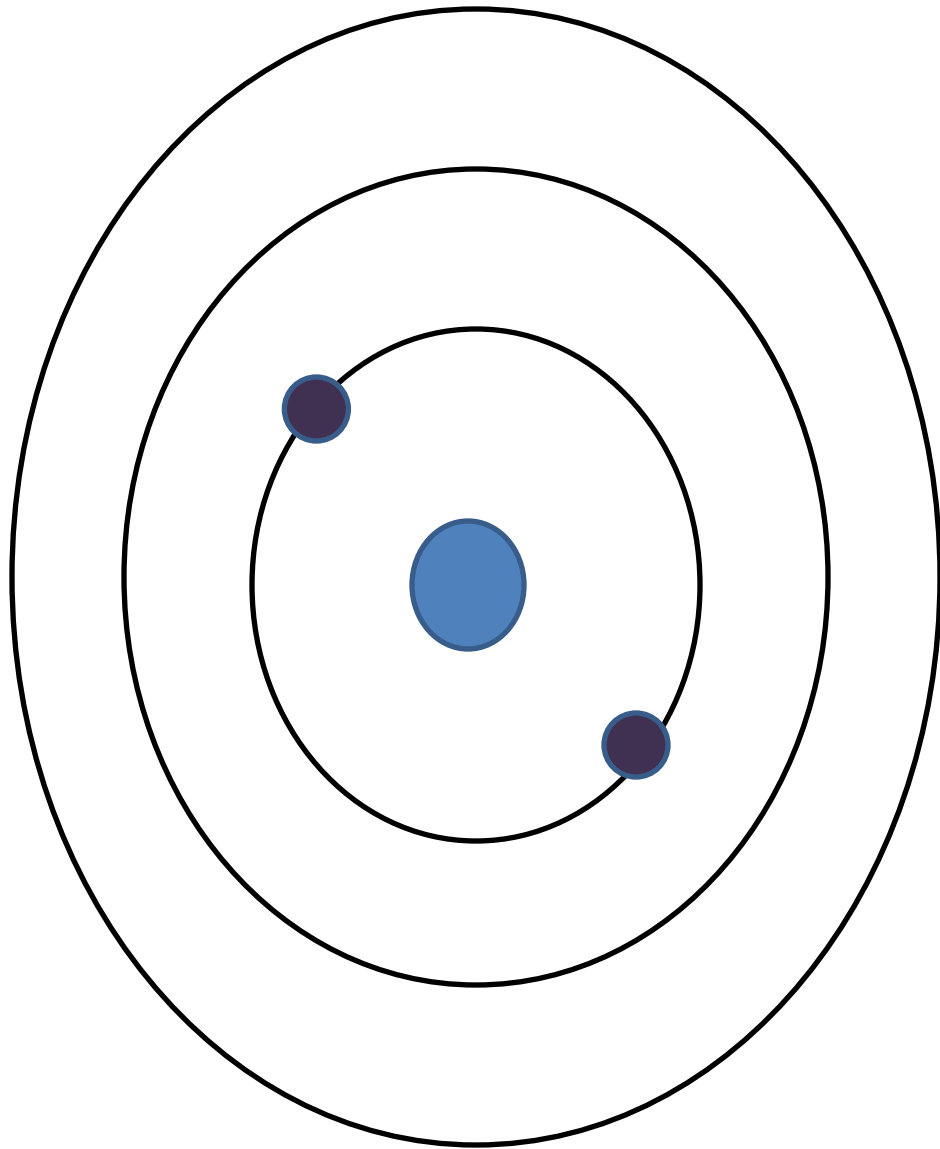
# Valence Electrons

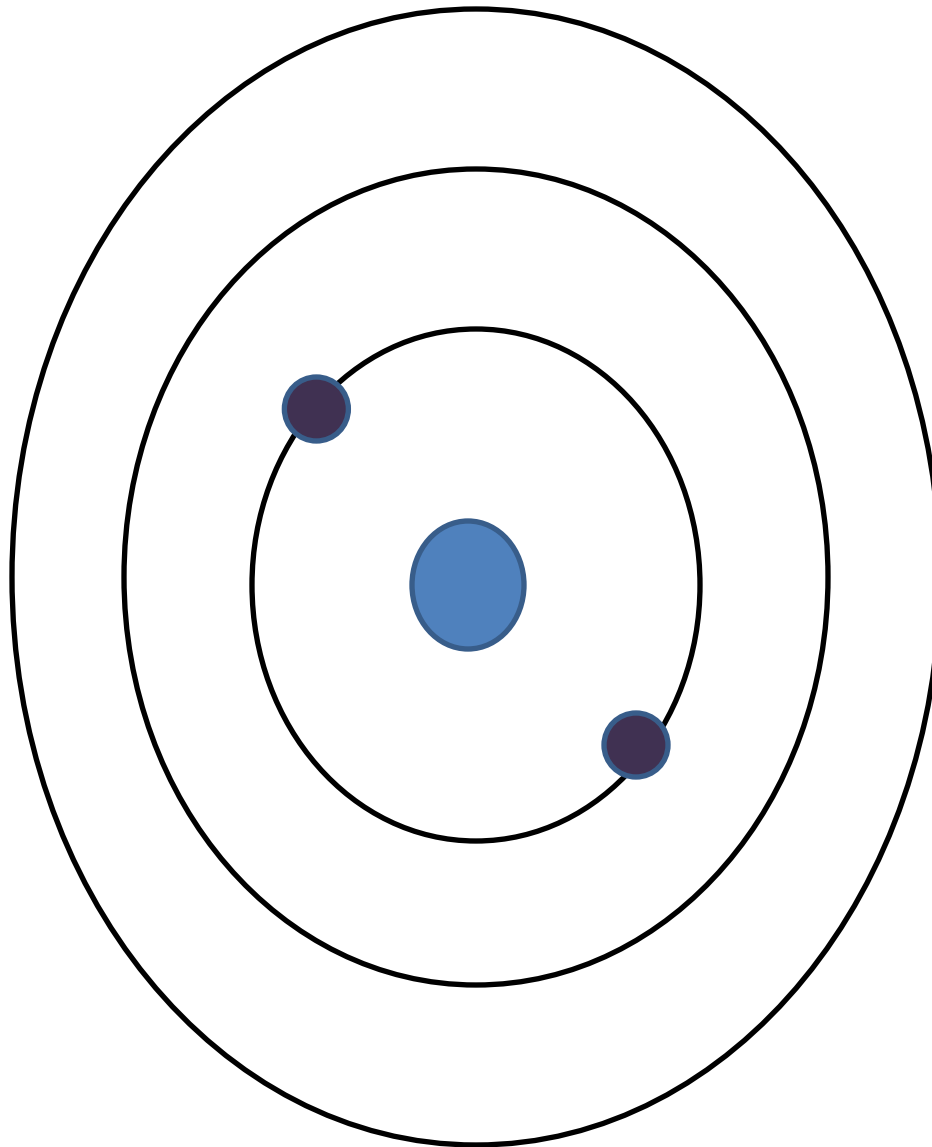
Number of electrons in the  
outermost energy level



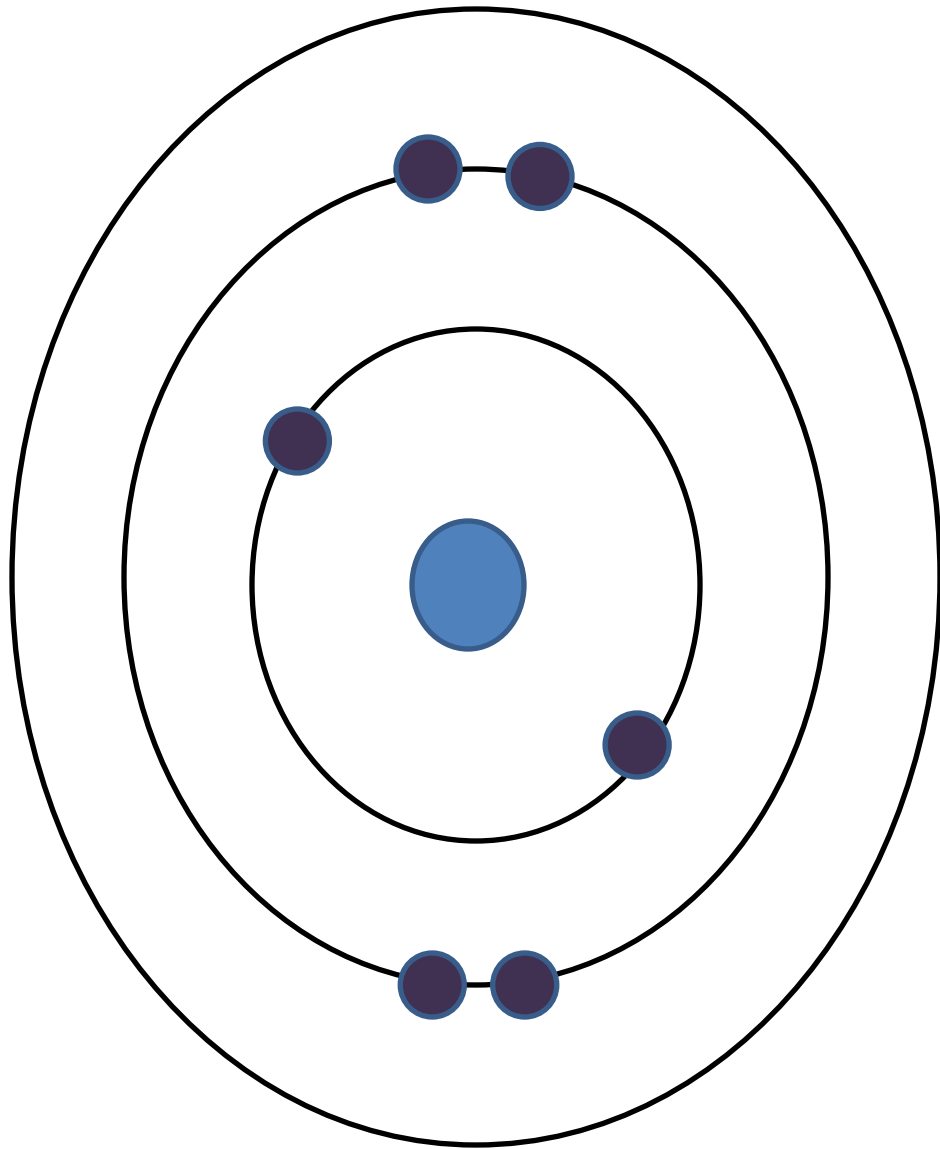
# ***Electron Energy Levels***

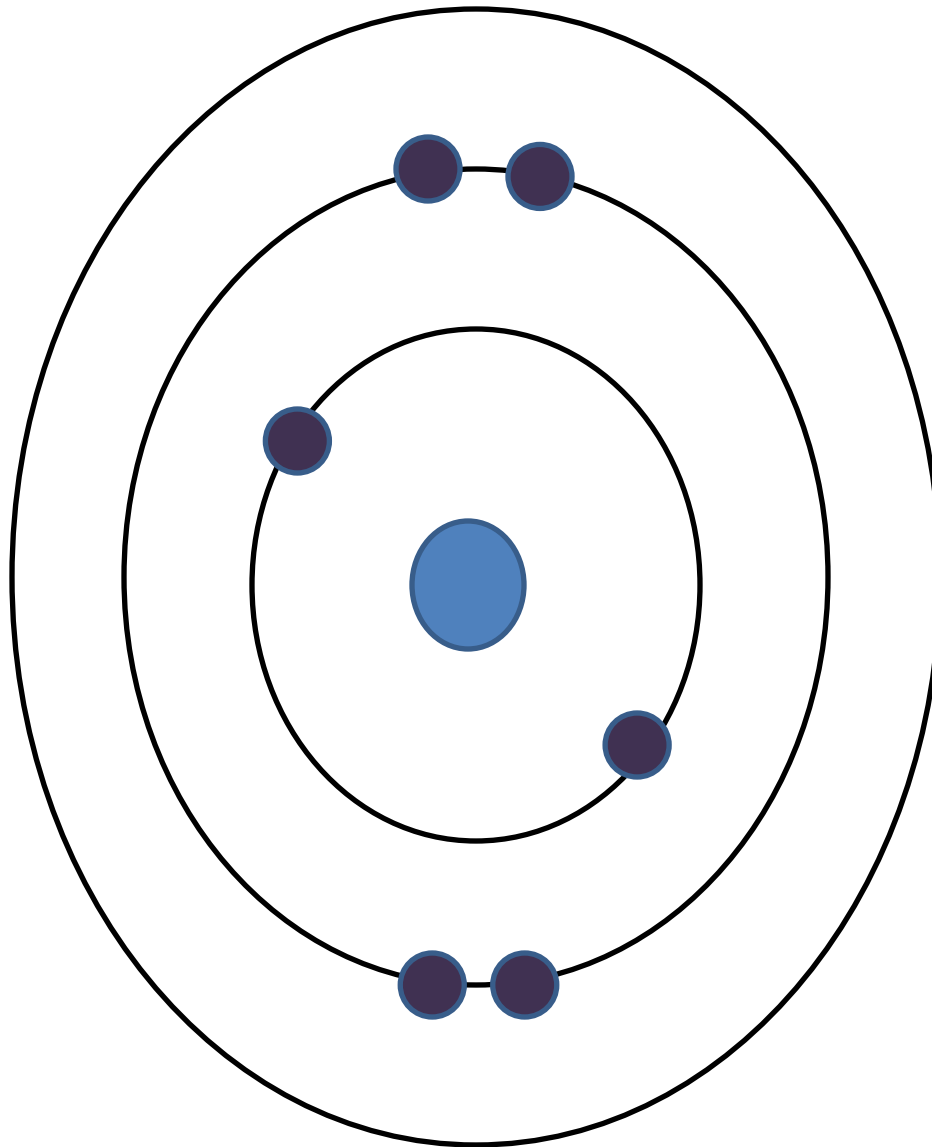




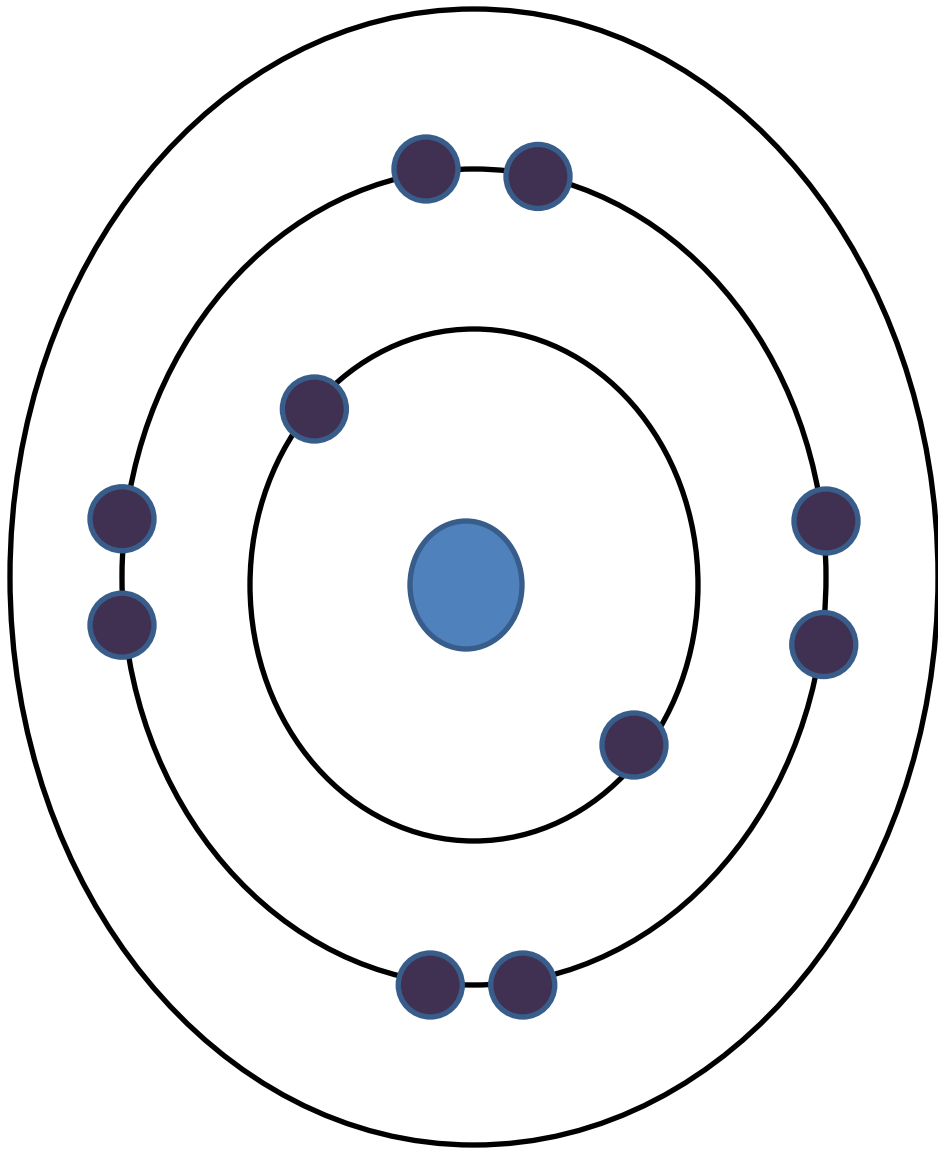


**2 Valence Electrons**

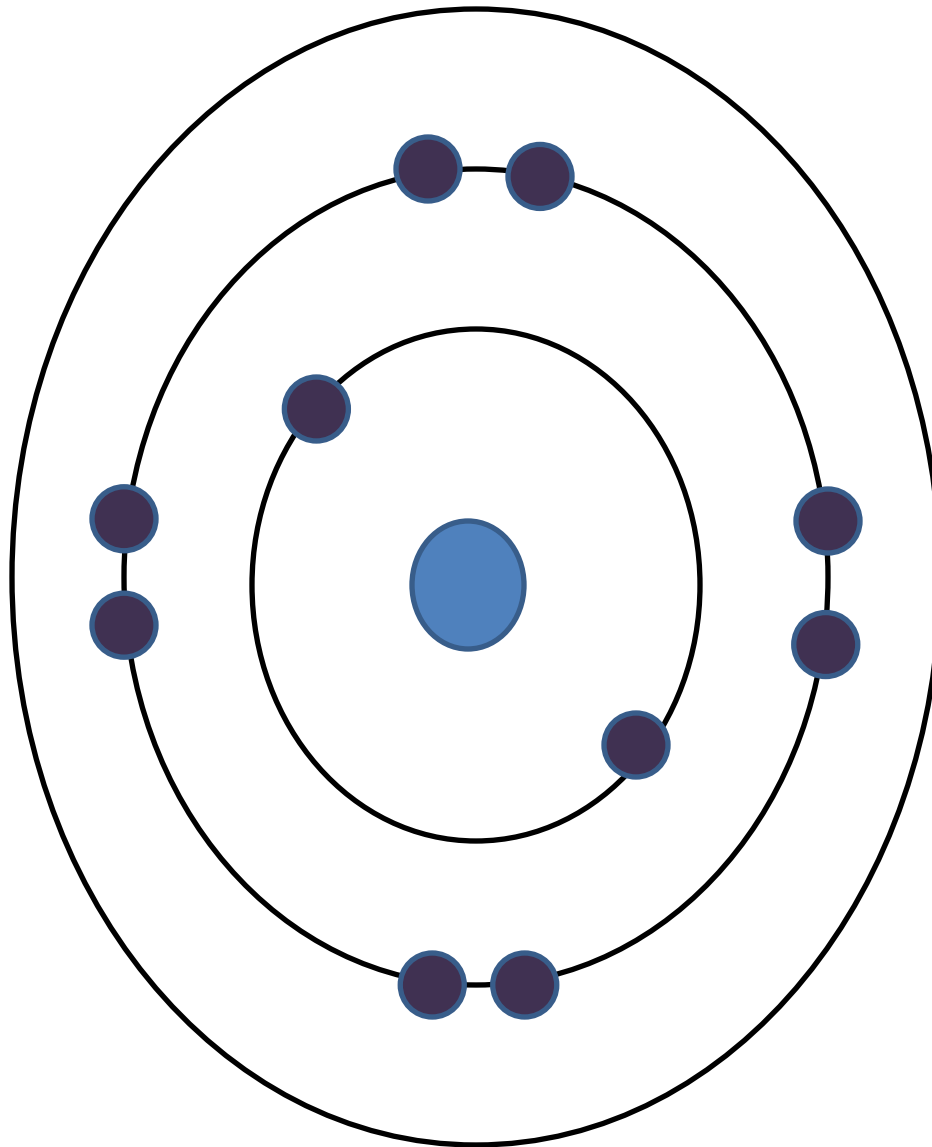




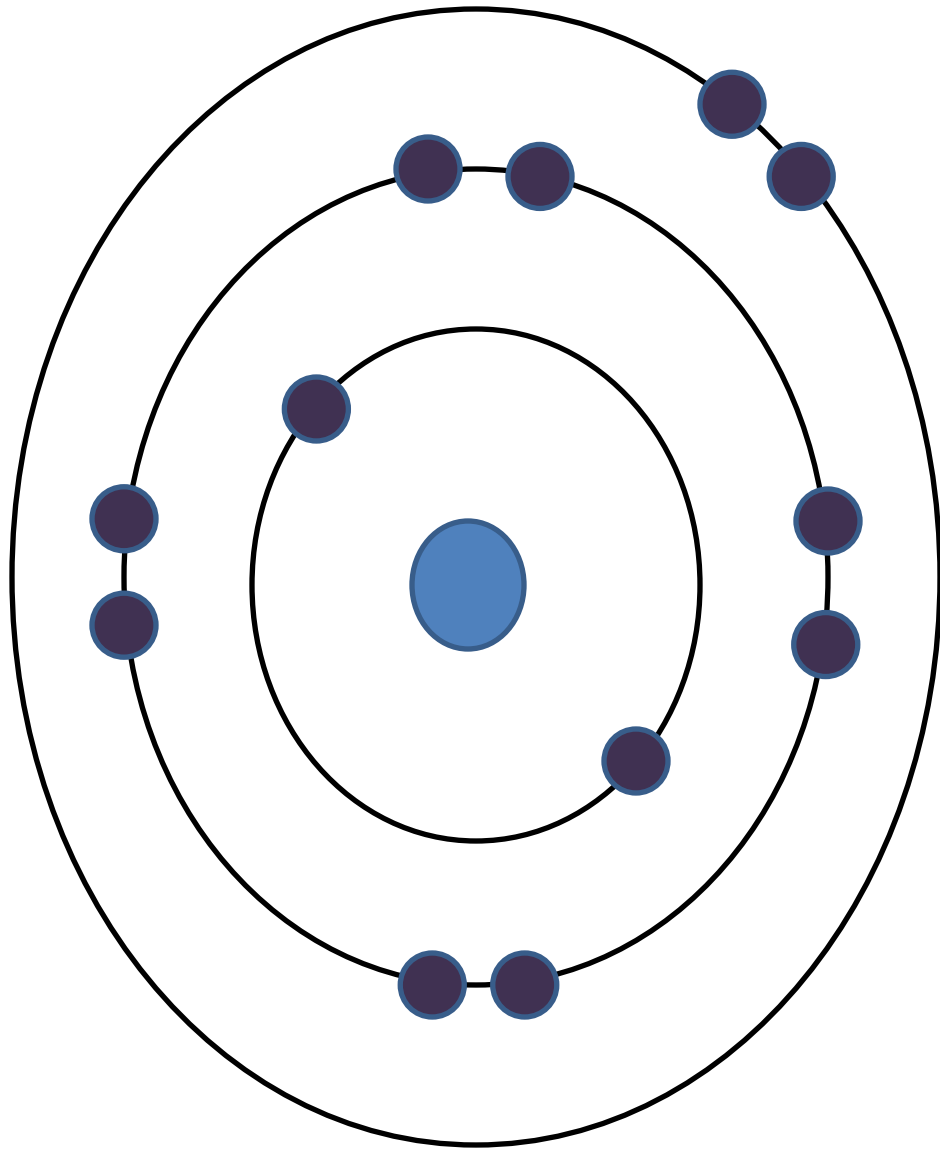
**4 Valence Electrons**

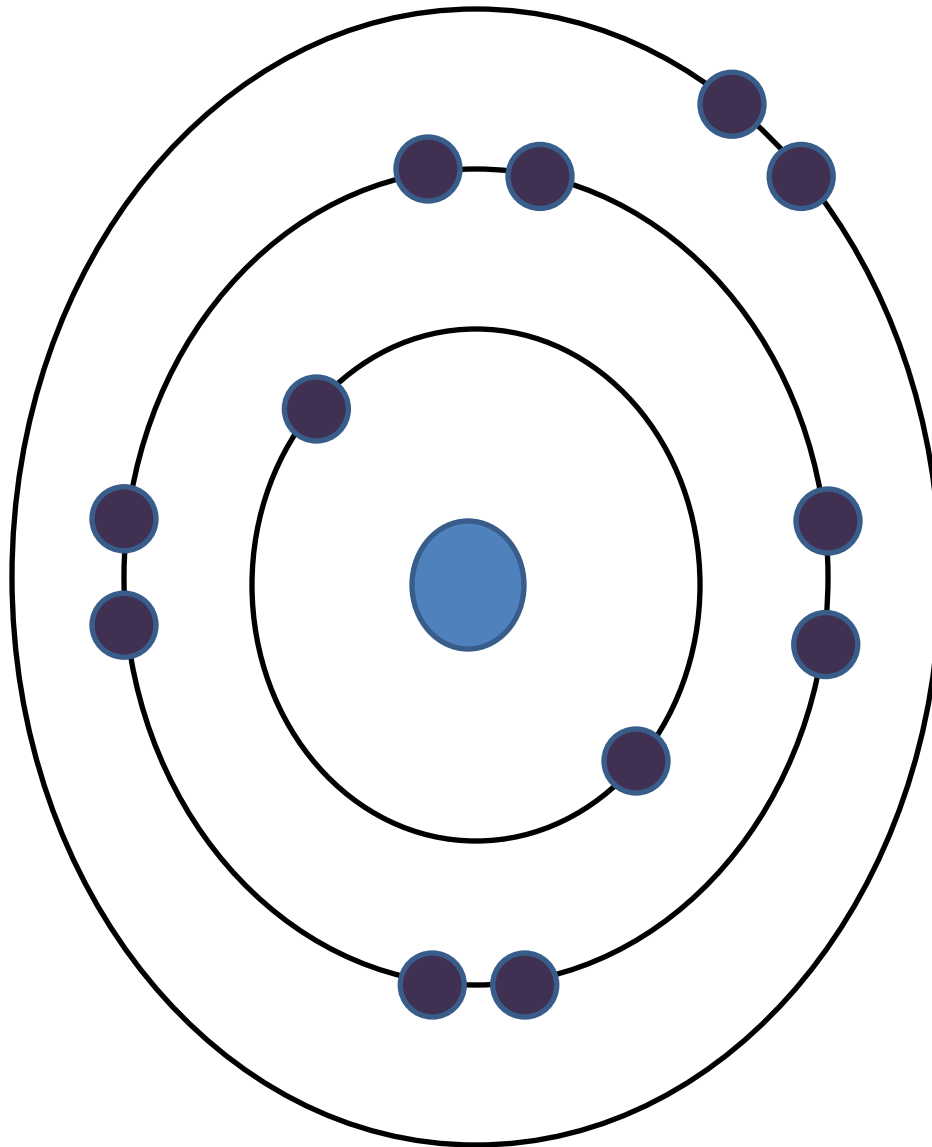






**8 Valence Electrons**





**2 Valence Electrons**

# Valence Electrons

Number of electrons in the  
outermost energy level

# Valence Electrons

Number of electrons in the outermost energy level

\* Stability achieved when outer energy level is filled (complete)

# Valence Electrons

Number of electrons in the outermost energy level

\* Stability achieved when outer energy level is filled (complete)



# Valence Electrons

Number of electrons in the outermost energy level

- \* Stability achieved when outer energy level is filled (complete)
- \* Valence # determines possibility and type of bond

# 3 Types of Bonds



# 3 Types of Bonds



# 3 Types of Atomic Bonds

# 3 Types of Atomic Bonds

- 1. Ionic Bond**
- 2. Covalent Bond**
- 3. Metallic Bond**

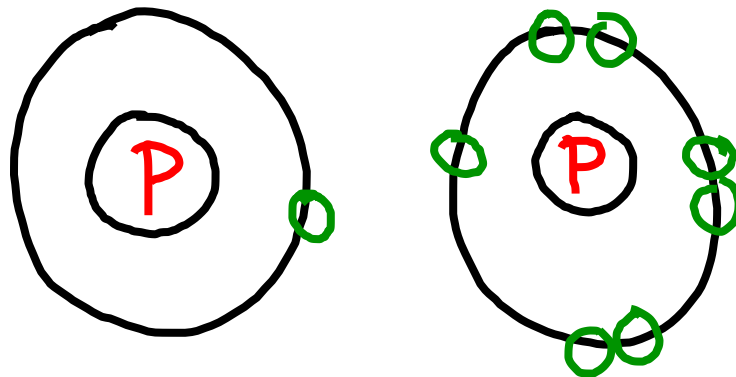
# 3 Types of Atomic Bonds

## 1. Ionic Bond

# 3 Types of Atomic Bonds

## 1. Ionic Bond

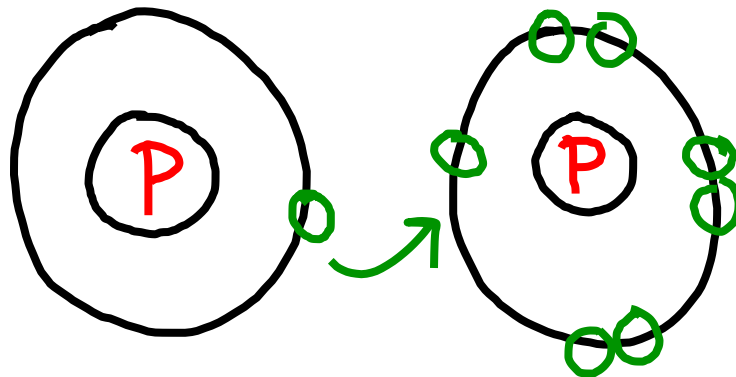
\* involves *transfer* of valence electron



# 3 Types of Atomic Bonds

## 1. Ionic Bond

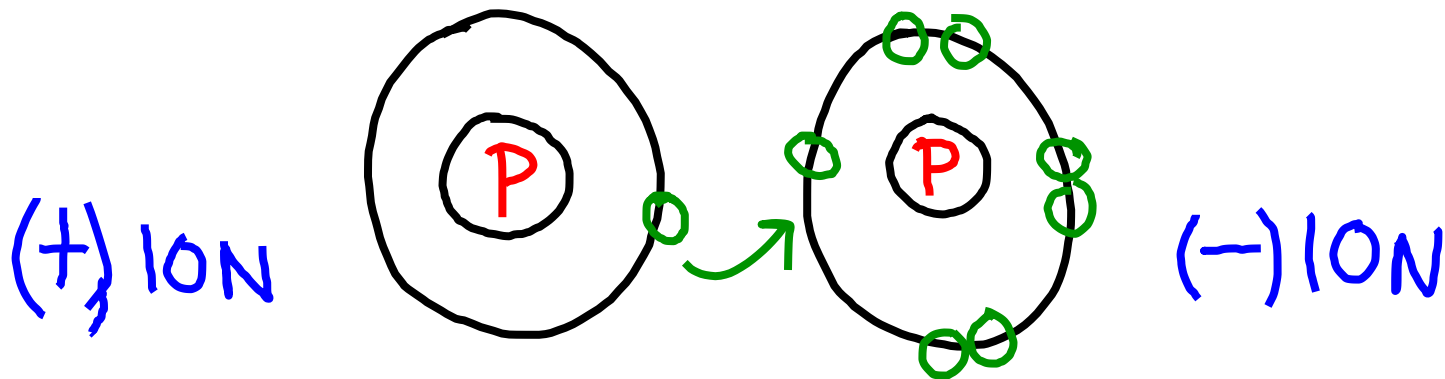
\* involves *transfer* of valence electron



# 3 Types of Atomic Bonds

## 1. Ionic Bond

\* involves *transfer* of valence electron



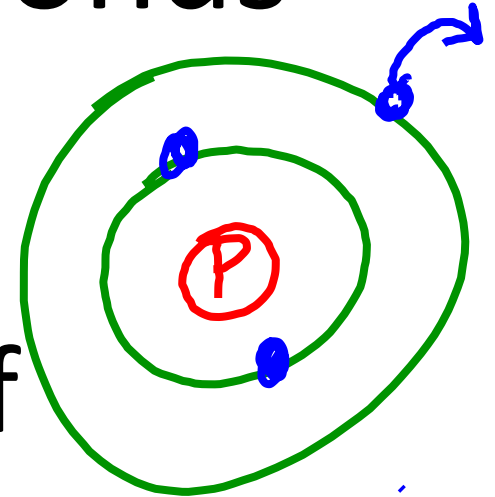
# 3 Types of Atomic Bonds

## 1. Ionic Bond

\* involves *transfer* of valence electron

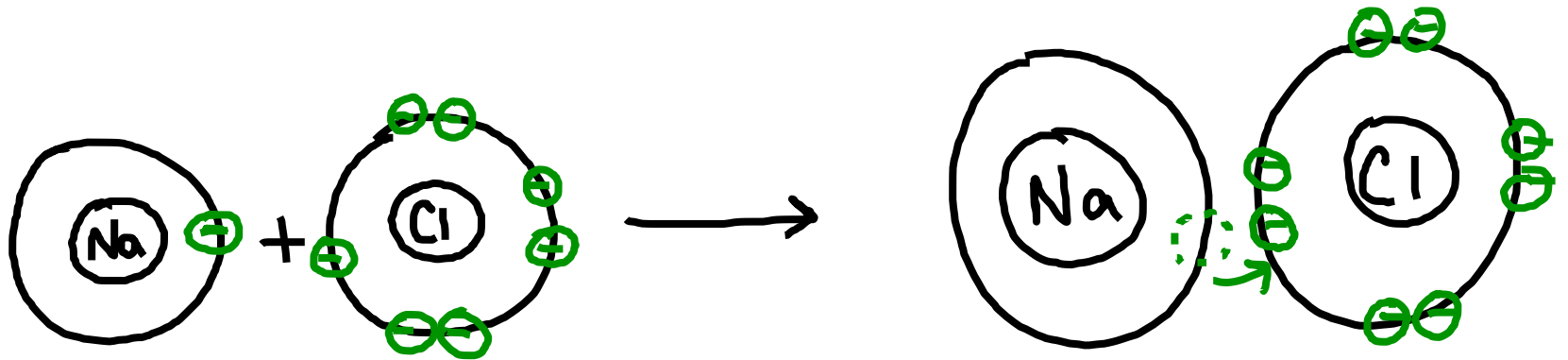
\* atoms form *ions* (of opposite charges)

\*\* opposites attract!\*\*





# Ionic Bond example



11 P (+)    17 P (+)

11 E (-)    17 E (-)

+ 10N

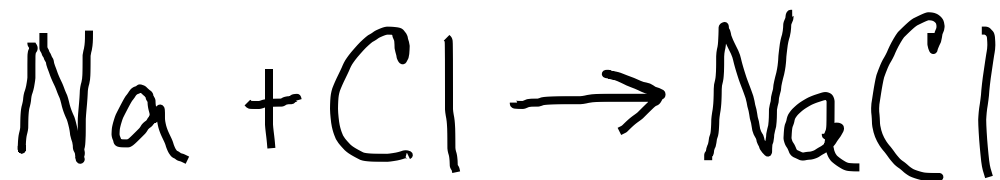
- 10N

11 P (+)

17 P (+)

10 E (-)

18 E (-)



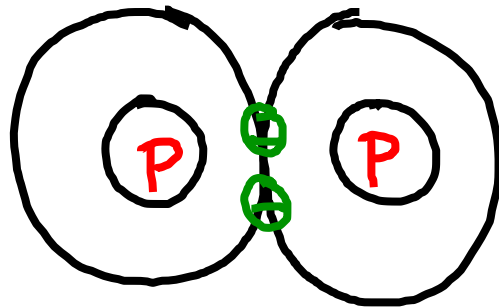
# 3 Types of Atomic Bonds

## 2. Covalent Bond

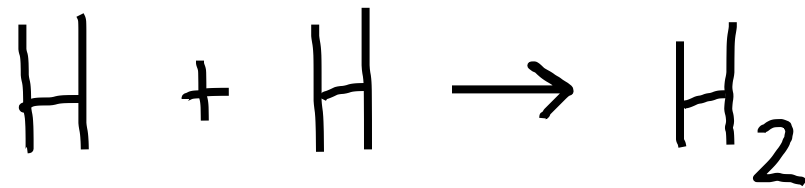
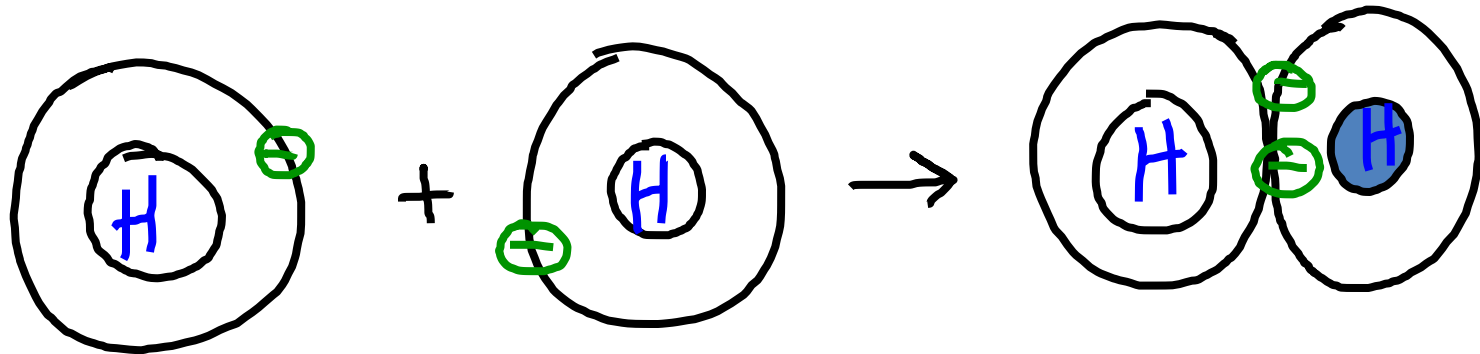
# 3 Types of Atomic Bonds

## 2. Covalent Bond

\* involves *sharing* valence electrons



# Covalent Bond example



# 3 Types of Atomic Bonds

## 3. Metallic Bond

# 3 Types of Atomic Bonds

## 3. Metallic Bond

\* involves a “*sea of electrons*”

# 3 Types of Atomic Bonds

## 3. Metallic Bond

- \* involves a “*sea of electrons*”

- \* valence electrons free to “swim” from one atom to another (ex. body surfing)

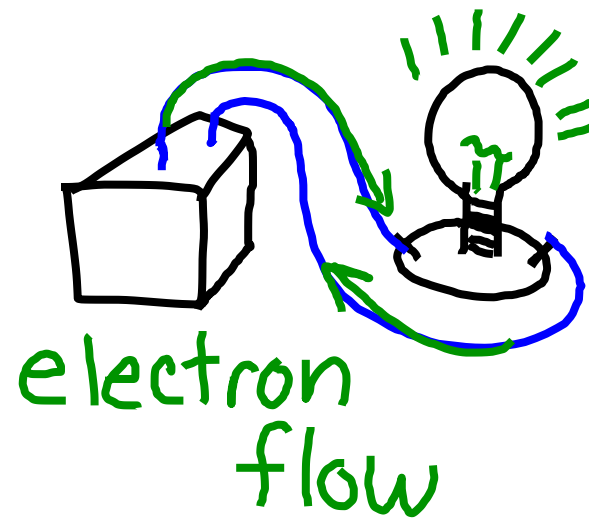
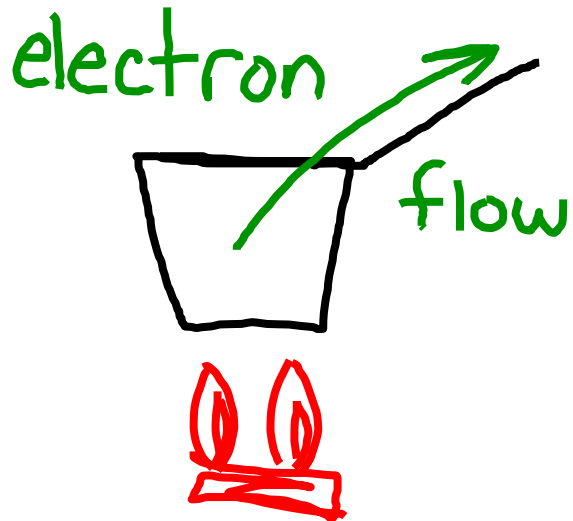
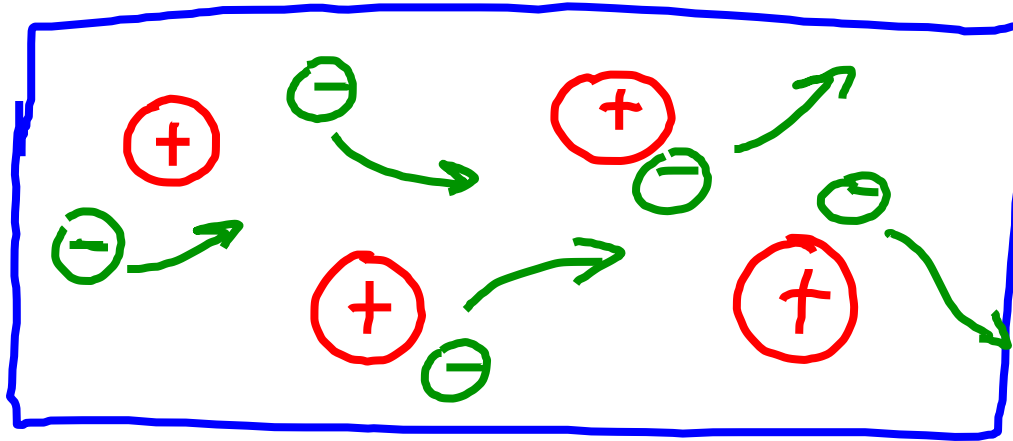
# 3 Types of Atomic Bonds

## **3. Metallic Bond**

\* metals are good conductors of heat and electricity



# Metallic Bond Example



# Atomic Bond Lab

***Metallic*** bonds conduct electricity well,  
but what about ***covalent*** or ***ionic*** bonds?

# Atomic Bond Lab

***Metallic*** bonds conduct electricity well,  
but what about ***covalent*** or ***ionic*** bonds?

***Covalent*** bonds – between ***non-metals***

# Atomic Bond Lab

***Metallic*** bonds conduct electricity well, but what about ***covalent*** or ***ionic*** bonds?

***Covalent*** Bonds – between ***non-metals***

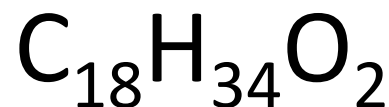
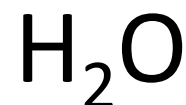
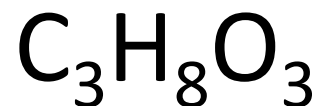
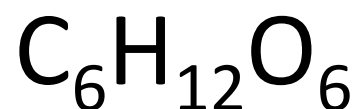
***Ionic*** Bonds – between ***metal & non-metal***

# Atomic Bond Lab

## *Lab Solutions:*

1. Glucose
2. Glycerol
3. Silver nitrate
4. Sodium chloride
5. Water (distilled)
6. Vegetable oil

## *Formulas:*



## *Bond:*

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_