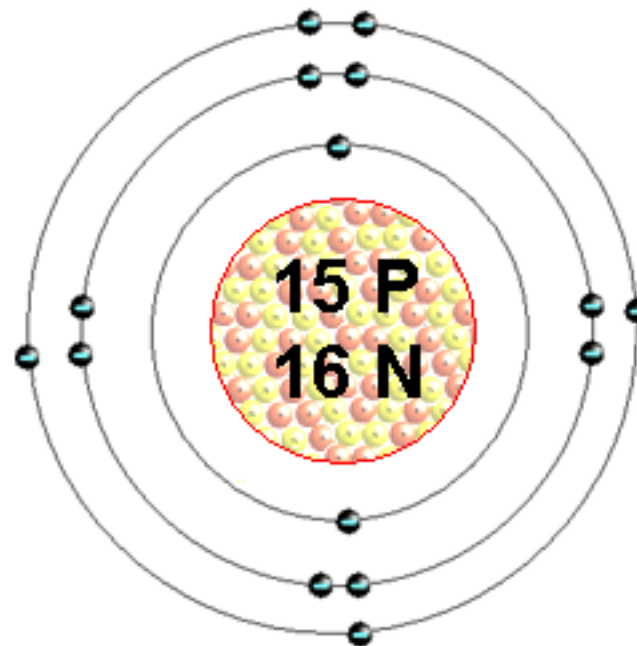
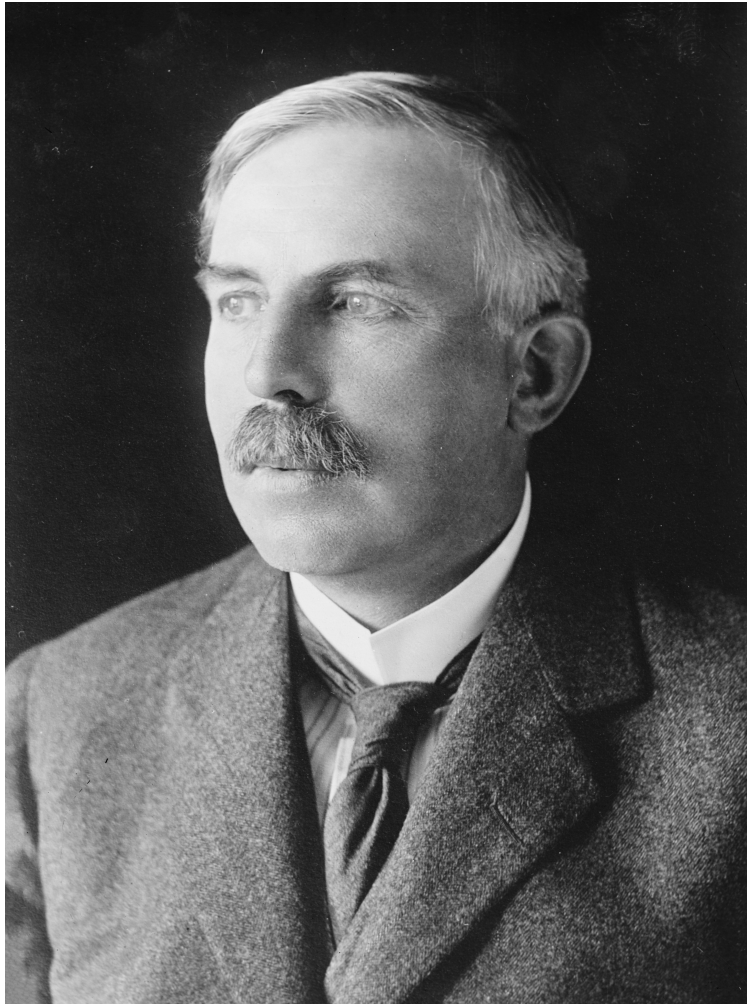
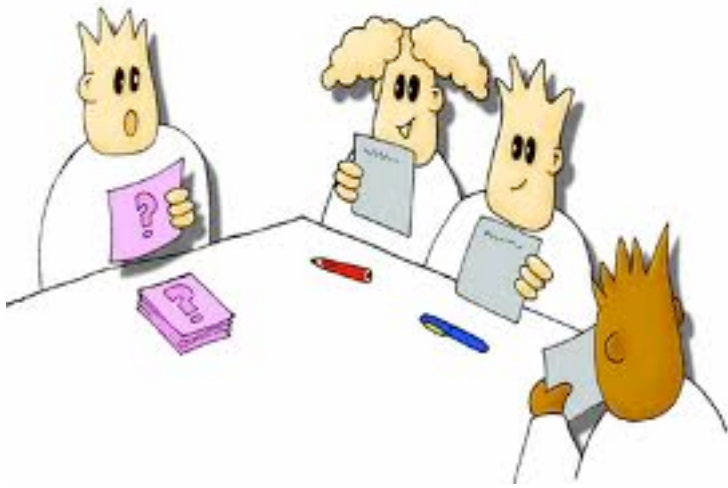


# Bohr-Rutherford Diagrams of Ions

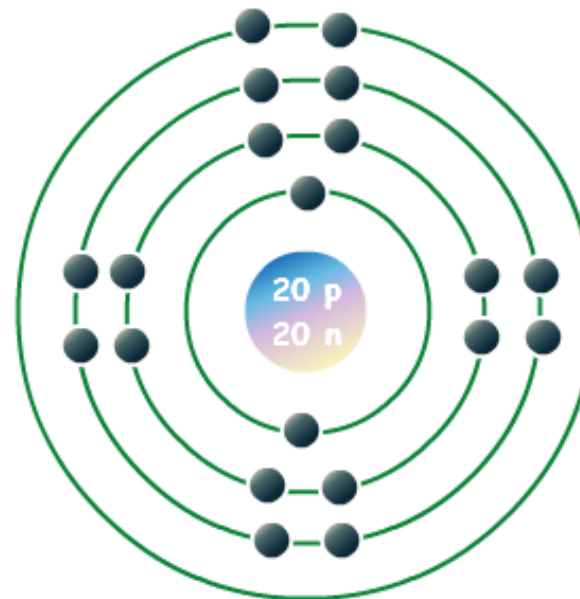




Try to make a Bohr Rutherford model for calcium.

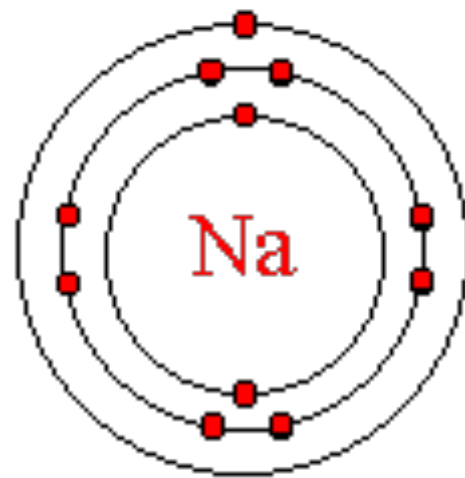
# Positive and Negative Ions

- When elements form compounds, changes occur in the arrangement of electrons in the outer orbit.
- Electrons are gained or lost so that element can have a stable electron arrangement of the closest noble gas.
- Atoms prefer a completely filled outer shell with electrons
- In order for a compound to be stable, it must have a completely filled outer electron shell



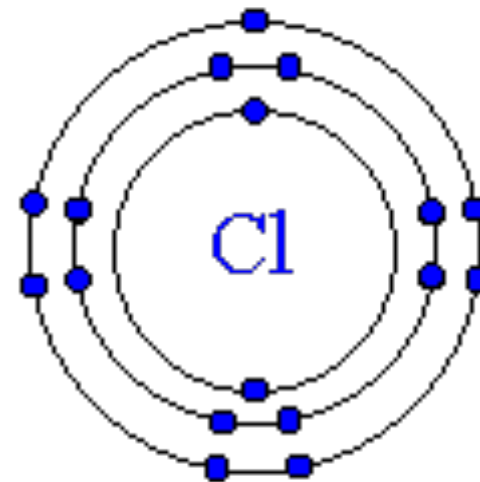
- Arrangement of outer shell electrons of metals and non-metals

Metal



Metal's outer shell are nearly empty

Non Metal

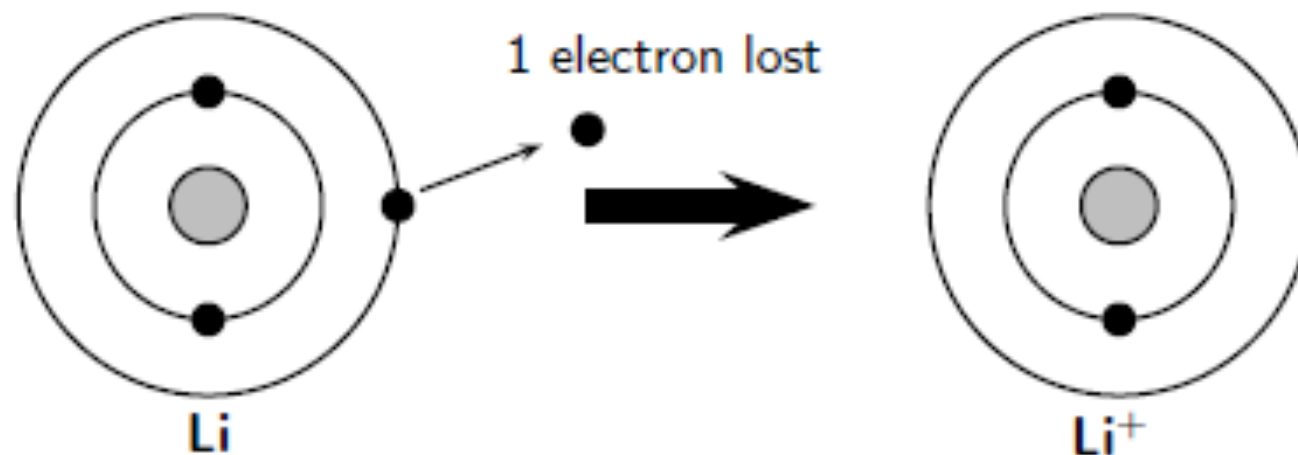


Non-Metal's outer shell are nearly full



# Metals

- Tend to have 1, 2, or 3 electrons in the outer orbits (shells)
- They lose electrons when they combine with other elements to form positive ions (**cations**) : note the **t** in the word think +
- They lose electrons, thus they have the same electron arrangement as the Noble gas a **row above** them



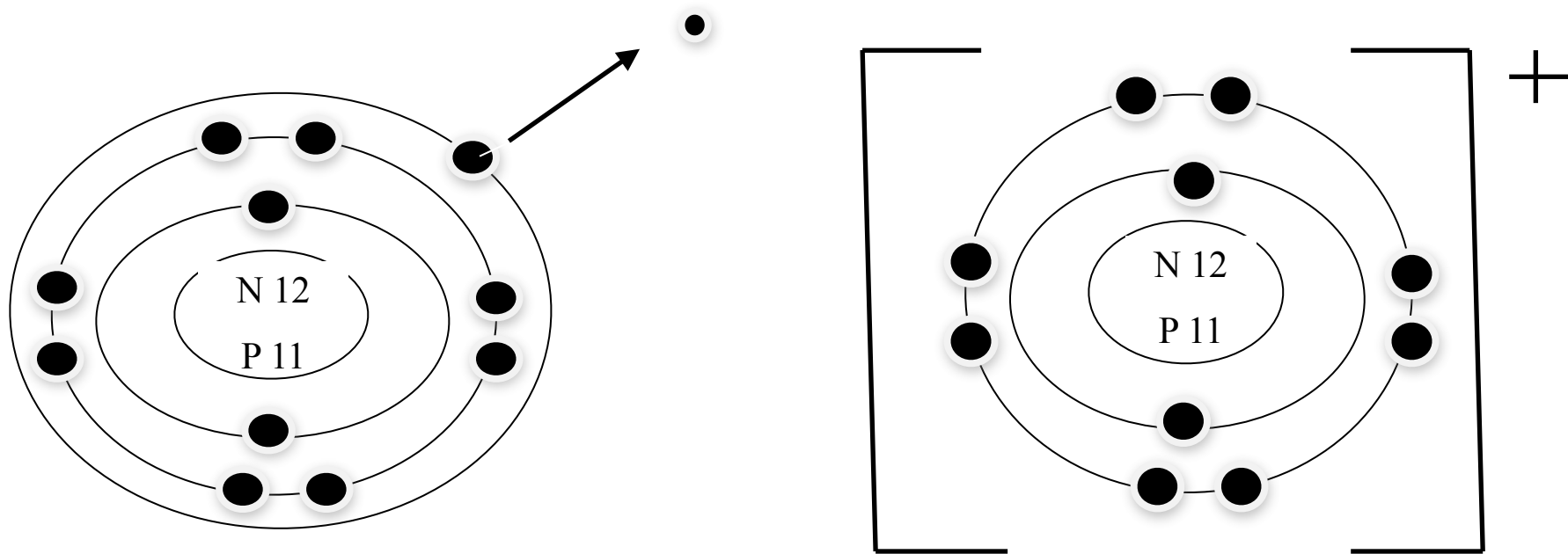
Li atom with 3 electrons

Li<sup>+</sup> ion with only 2 electrons

# Metal Ion

## Example

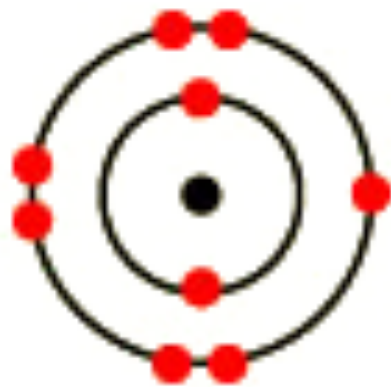
- Sodium:  $\text{Na} \rightarrow \text{Na}^+$



11 Protons (+)  
10 Electrons (-)

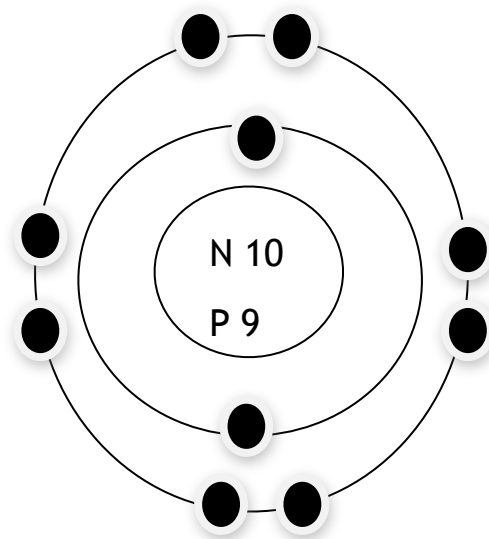
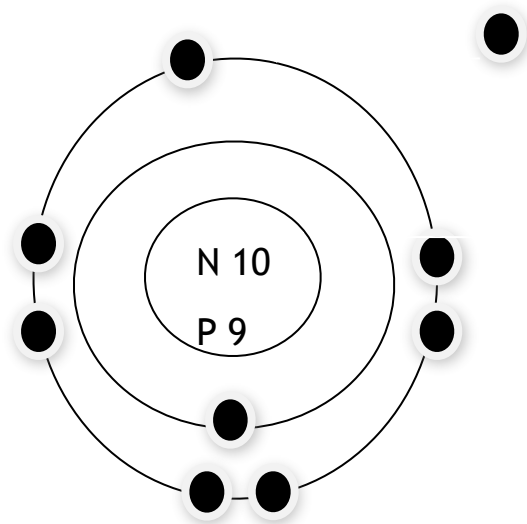
# Non-Metals

- **Non-metals** – Tend to have 4, 5, 6, or 7 electrons in their outer orbits (shells).
- They gain electrons to form negative ions (**anions**)
- They gain electrons, thus they have the same electron arrangement as the Noble gas in the **same row**.

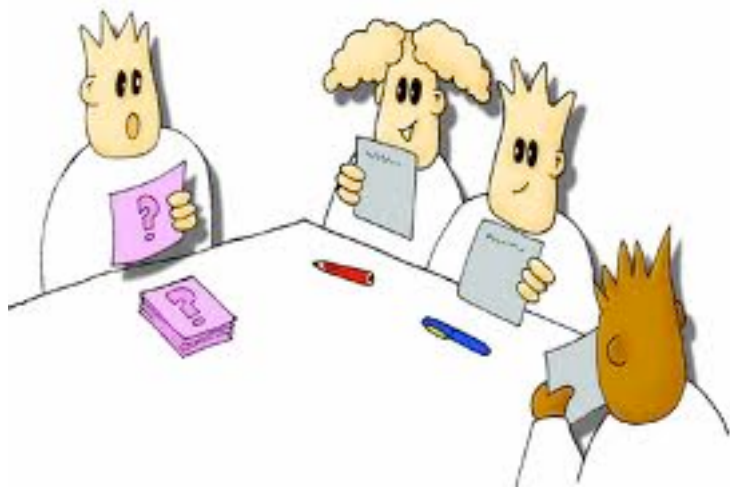


fluorine atom,

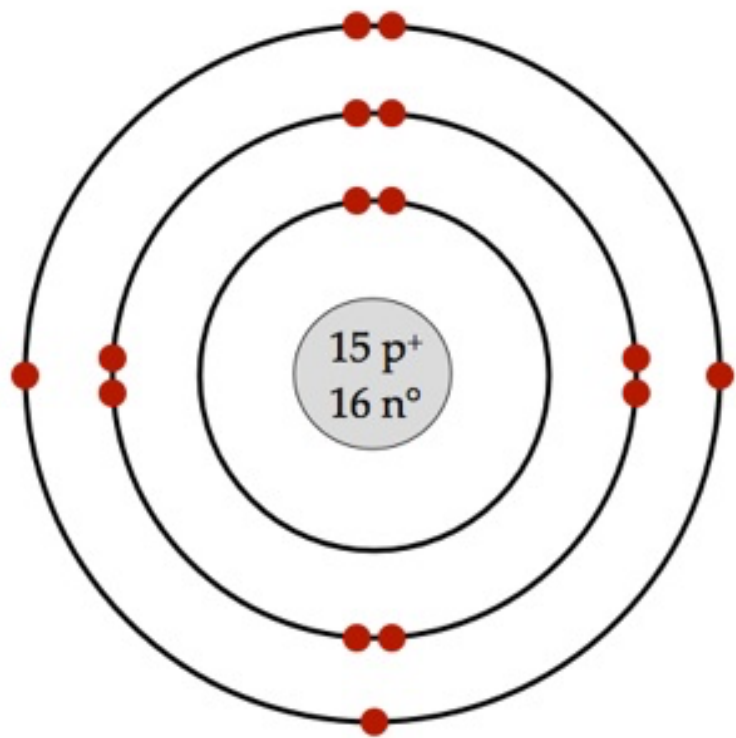
- Example
- Fluorine : F  $\rightarrow$  F<sup>-</sup>



9 Protons (+)  
10 Electrons (-)

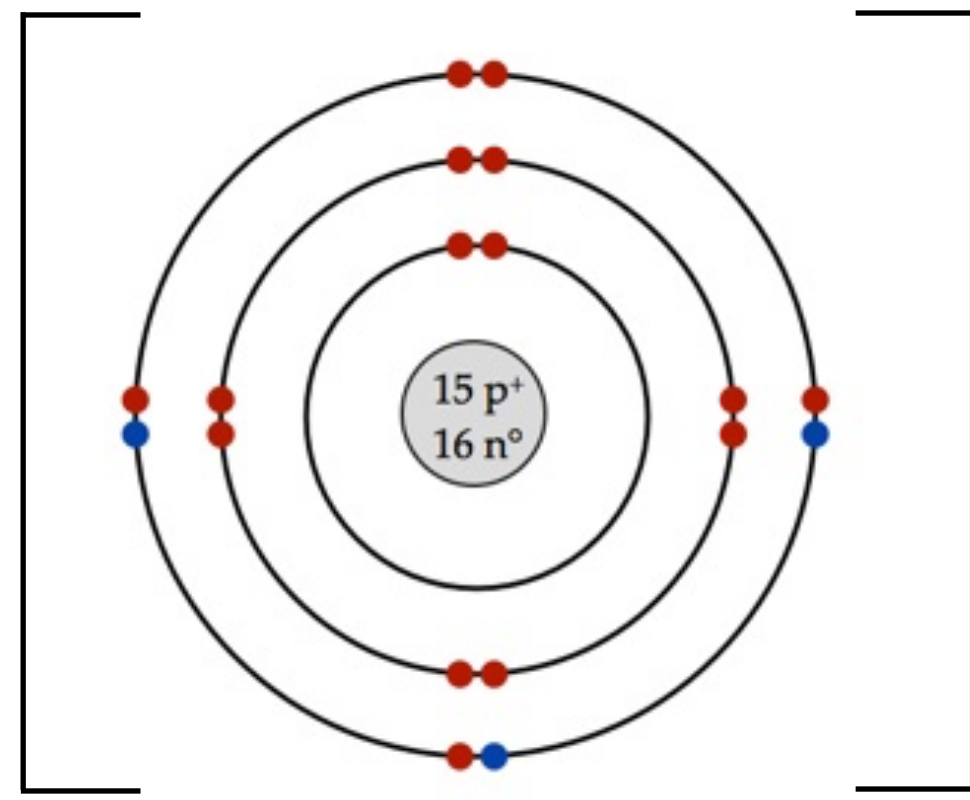


Try to make a Bohr-Rutherford ion for phosphorous.



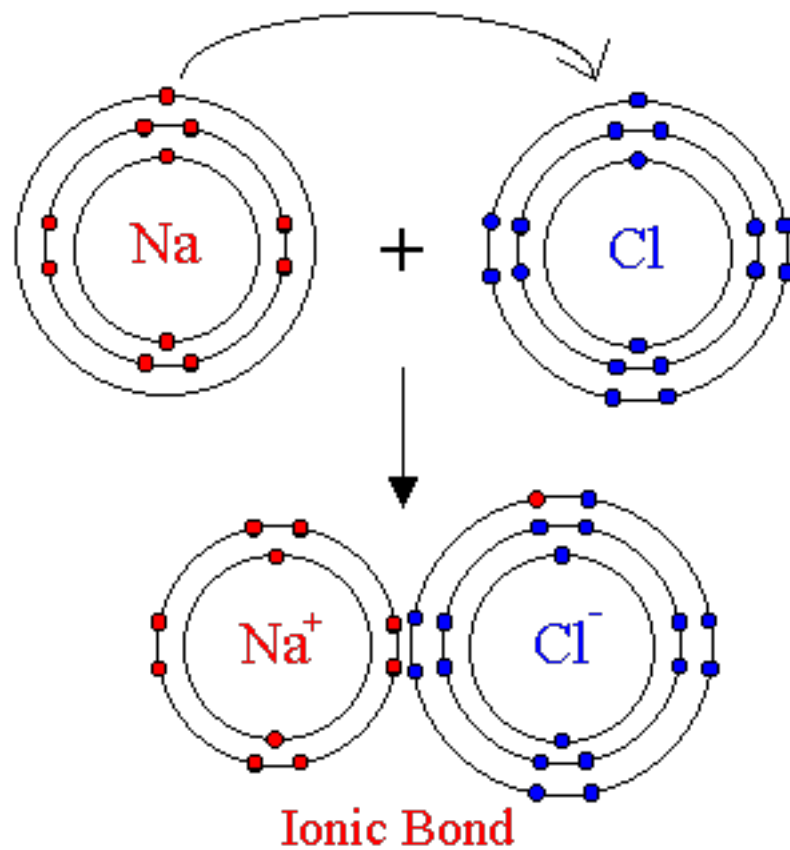
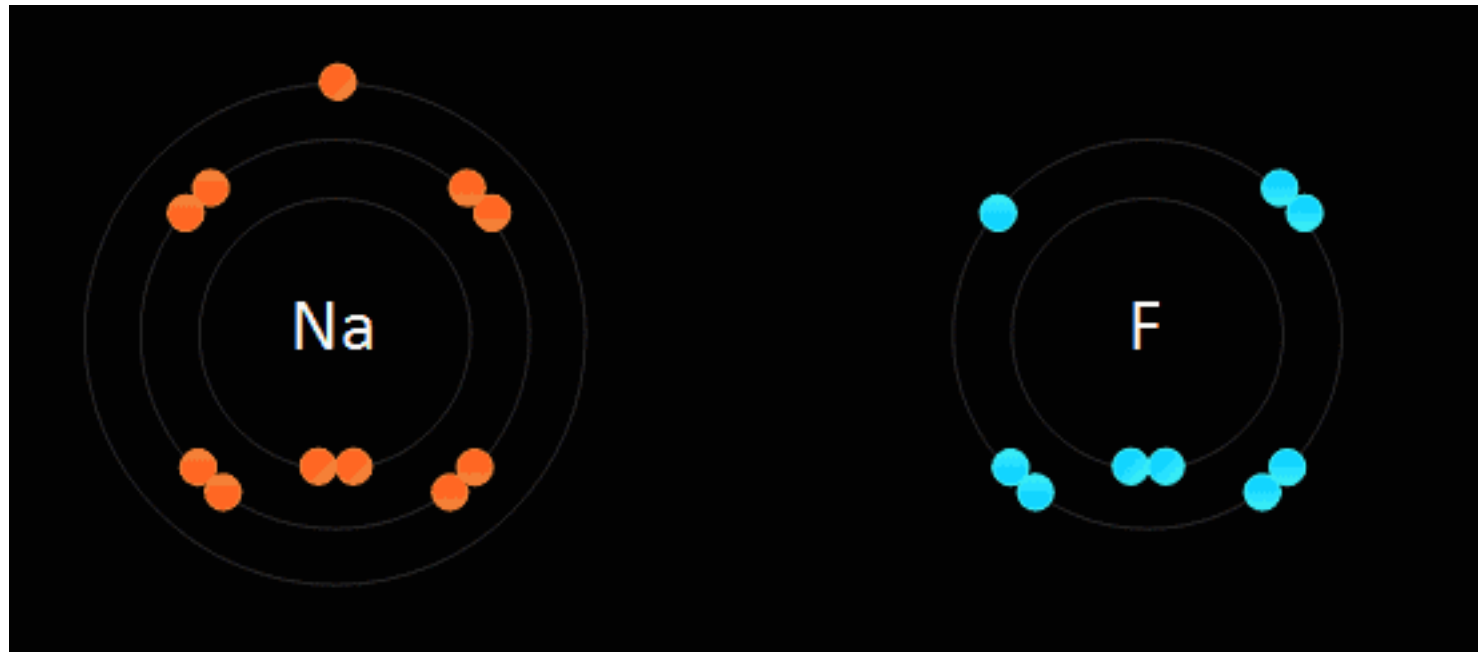
Phosphorous

$^{31}_{15}\text{P}$



3-

$\text{P}^{3-}$

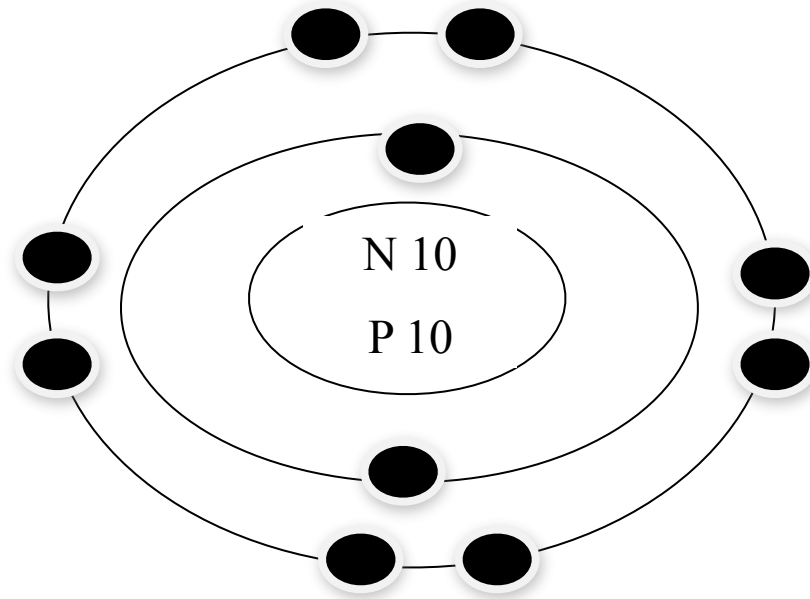


○ Metals will often form bonds with non metals.

○ This is the Basis for Ionic compounds



- **Noble gases** do not form compounds because they have a perfectly full outer orbit (shell). This electron arrangement makes them very stable and so they do not react.



10 Protons (+)  
10 Electrons (-)