**Illustrating Simple Ionic Bonds Metal bonded to non-metal!**

*Ionic bonds involve the formation of ions. This occurs when atoms either donate or take electrons to complete their outer valence shells. After the transfer of electrons has occurred the ions bond due to the attraction of opposite charges to create a neutrally charged ionic compound.*

1. Complete the chart by filling in the missing information.

|  |  |  |  |
| --- | --- | --- | --- |
| **Element** | **# of protons** | **# of valence electrons**  |  **Ion symbol** |
| sodium |  |  1 |  Na+ |
| fluorine |  |  7 |   |
| lithium |  3 |  |  |
| oxygen |  |  |  **02-** |
| beryllium |  |  |   |
| phosphorus |  15 |  |  |
| chlorine |  |  |  |

1. To draw a diagram showing how ionic bonds form in ionic compounds follow these steps!
* Write the element symbols for each atom in the compound.
* Determine the ratio of each atom in the compound.
* Draw a Bohr diagram showing only the outer valence shell and the electrons for each of the atoms in the compound.
* Draw an arrow (or more if needed) to show the movement of electrons from the metal atom(s) to the non-metal atom(s) until all valence shells are complete.
* Put square brackets around each diagram and write the charge outside the brackets. See simple ionic compound notes for the examples done in class!

**Illustrate the following:**

1. lithium fluoride

1. beryllium chloride
2. sodium oxide
3. lithium phosphide

**Illustrating simple binary Covalent Compounds**

 *– Non-metal bonds with non-metals. No ions are formed instead valence shell of electrons are completed through the sharing of electrons between different atoms.*

1. Fill in the missing information in the chart.

|  |  |  |  |
| --- | --- | --- | --- |
| Element | # of protons | # of electrons  | # of valence electrons |
| hydrogen |  1 |  |  |
| chlorine |  |  |  |
| phosphorus |  |  |  |
| sulphur |  |  |  |
| nitrogen |  |  15 |  5 |
| helium |  |  |   |
| oxygen |  |  |  |
| carbon |  |  |  |

1. To show the bonding in each of the following molecules follow these steps.
* Write the symbols for each element in the molecule or covalent compound!
* Draw the valence shell of electrons for each atom.
* Rearrange the electrons to pair up electrons from different atoms.
* All non-metals except hydrogen and helium can have a maximum of four electron pairs (8 electrons) in the valence shell. Hydrogen can only have one pair or two electrons.

Refer to lesson notes on covalent compounds for examples given.

Example: Oxygen gas O2

1. Draw hydrogen gas H2 hydrogen + hydrogen
2. Draw sulphur dichloride chlorine +sulphur + chlorine
3. Draw nitrogen gas N2 (g) nitrogen + nitrogen