**ELECTRON DOT DIAGRAMS – COVALENT BONDING**

* **no** brackets are shown
* all **valence** electrons are shown to indicate the **sharing** of electrons between the **non-metal** atoms. The example below shows the electron dot diagram for an atom of fluorine and the electron dot diagram for two atoms of fluorine bonding together.



**Rules for drawing electron dot diagrams of covalent compounds**

1. Find valence electrons in all atoms involved. Add them together.
2. Find the ***octet*** electrons for each atom. Add them together.
3. Subtract step 1 from step 2. This will give you the bonding electrons.
4. Divide the number from step 3 by 2 (each bond is made up of 2e-).
5. Subtract step 3 from step 1. This will give you the non-bonding or lone electrons.

**Example 1** – draw the electron dot diagram for CCl4.

1. 4 +(7 × 4) = 32.
2. 8 × 5 = 40.
3. 40 – 32 = 8
4. 8 ÷ 2 = 4 (4 bonds)
5. 32 – 8 = 24 (12 non-bonding pairs of e-).

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**Example 2** – draw the electron dot diagram for SO3

1. 6 +(6 × 3) = 24.
2. 8 × 4 = 32.
3. 32 – 24 = 8
4. 8 ÷ 2 = 4 (4 bonds)
5. 24 – 8 = 16 (8 non-bonding pairs of e-).

There are actually **3** different ways of drawing SO3. All are correct.



**Your turn!**

Draw the electron dot diagrams for the following covalent compounds

|  |  |
| --- | --- |
| **a.** Br2  | **b.** CO2 |
| **c.** H2S | **d.** NCl3 |
| **e.** SiF4**g.** CH4 | **f.** PH3**h.** C2H2 |

**ELECTRON DOT DIAGRAMS – IONIC BONDING**

* only show the **valance** electrons (electrons involved in bonding)
* **Transfer** of electrons is involved in **ionic** bonding.
* Brackets are drawn around the ions with charges shown.
* The example below shows the electron dot diagram for: an atom of sodium, an atom of chlorine and then the electron dot diagram for the two atoms bonded together forming sodium chloride.



Electron dot diagrams of individual atoms

Formula of ionic compound

Electron dot diagram of ionic compound

**Rules for drawing electron dot diagrams of simple ionic compounds**

1. Only show **valence** (outer shell) electrons
2. Put ion in brackets and show charge on the ion
3. Metals lose electrons to form positive ions, so dot diagrams show***no valence electrons***and a***positive***charge
4. Non-metals gain electrons to form positive ions, so dot diagrams have ***full outer shell*** and a ***negative*** charge

**Example 3** -draw the electron dot diagram for CaCl2.



**Rules for drawing electron dot diagrams of polyatomic ionic compounds**

1. For the polyatomic ion: Determine the number of valence electrons for each atom in the molecule and draw the dot diagram as if it were covalent **BUT**
	1. **SUBTRACT** one electron (usually from the central atom) for each **positive** charge
	2. **ADD** one electron (usually to the central atom) for each **negative** charge.
2. Complete the remainder of the electron dot diagram as per a simple ionic.

**Example 4** – draw the electron dot diagram for NaOH



 +

**Your turn!**

Draw the electron dot diagrams for the following simple ionic compounds

|  |  |
| --- | --- |
| **a.** NaBr2  | **b.** MgO |
| **c.** K2S | **d.** AlCl3 |
| **e.** Fe2O3**g.** Na2CO3 | **f.** MgF2h. Al2(SO4)3 |