**Chemical Bonding**

useful additional info…

Coulomb's law

describes the electrostatic interaction between electrically charged particles

which states that…

the force between two charged particles

is directly proportional to the product of the charges

and

is inversely proportional to the square of the distance between them.



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| All chemical bonding is an electrostatic force of attraction |
| Electrostatic force means the force between two charges“like charges repelunlike charges attract”Electrostatic attraction means an attraction between oppositely charged particlesIn Chemistry, the attraction is between the electrons and nucleusbecause electrons are negatively charged and positive protons are found in the nucleus |

|  |  |  |  |
| --- | --- | --- | --- |
| **Type of bond** | **1) Metallic** | **2) Ionic** | **3) Covalent** |
| type of substance | 3D metallic | 3D ionic | molecular | network covalentgiant covalent |
| examples | *eg Na, Cu, Mg, Fe* | *eg NaCl, MgF2, Li2O* | *eg.* *H2, Cl2, O2* | *eg 2D graphite, 3D diamond,* *3D buckyball, 3D SiO2*  |
| particles | metal cations and electrons | cations and anions | molecules | atoms |
| strength | strong | strong | strong covalent bond between atomsweak force between molecules | very strong covalent bond |
| image |  |  |  |  |

Let’s look at **Ionic bonding** and **Covalent bonding** (specifically **molecular substances**) in more detail

Molecular substances contain covalent bonds between atoms, **IN**side the molecule (**INTRA**molecular force)

the covalent bond(s) will be either **pure covalent** or **polar covalent**

useful additional info…

Ionic bonds, polar covalent bonds and pure covalent bonds all sit along a continuum





Molecular substances also contain weak forces **BETWEEN** molecules (**INTER**molecular forces)

There are **THREE** different types of Intermolecular force /van der Waals force

|  |  |  |
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| A **Hydrogen bond** forms between a H atom (which is directly bonded to a N, O, F atom within the same molecule) and N. O. F (also directly bonded to a H atom) of another molecule. | **Permanent dipole/Dipole-dipole** forms between dipole positive end of one molecule and dipole negative end of another  | **Temporary dipole/London force**Covalent Bond  (strong)**Instantaneous dipole/Dispersion force** |
| **>** Hydrogen Bondwhich is a weak intermolecular forceCovalent Bond  (strong) | Permanent dipole/ dipole –dipole which is a weak-intermolecular force | **>**Temporary dipole/ instantaneous dipole/ dispersion force/ London force which is a weak intermolecular forceH HH H- - - - - - |

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