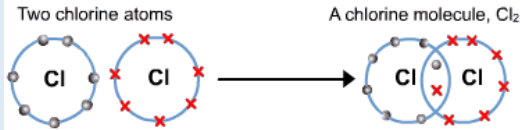
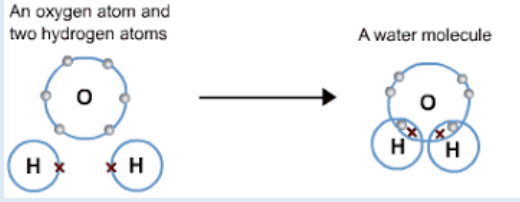
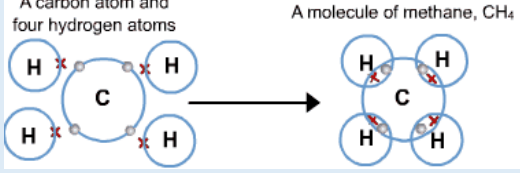
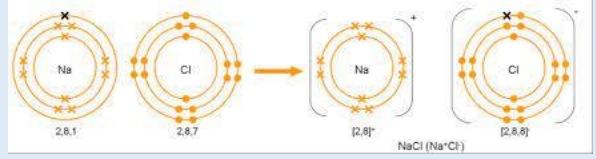
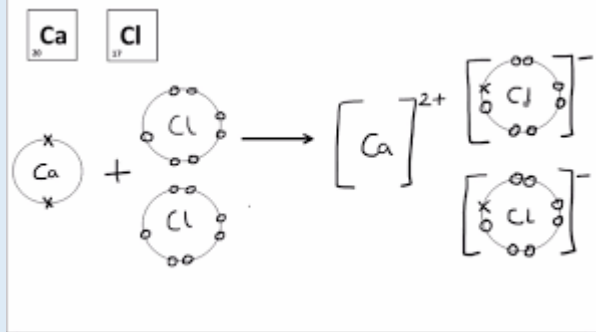


| 1: The Periodic Table   | 2: Covalent Bonding   | 3: Covalent Bonding- Examples  |
|---|---|--|
| <p><b>Periodic Table</b> a table displaying all chemical elements arranged in order of atomic number</p> <p><b>Group</b> a vertical column on the periodic table</p> <p><b>Period</b> a horizontal group on the periodic table</p> <p><b>Atomic Number</b> the number of protons inside the nucleus of an atom</p> <p><b>Mass Number</b> the sum of protons and neutrons in the nucleus of an atom</p> <p><b>Mendeleev</b> arranged the periodic table in increasing atomic weight and left gaps for future elements</p> <p><b>Trend</b> a pattern found in data</p>  | <p><b>Covalent Bond</b> a bond between two non-metals which involves the sharing of electrons</p> <p><b>Intermolecular Forces</b> a force of attraction between two atoms, molecules, or ions</p> <p><b>Non-Metal</b> appear on the right hand side of the periodic table and form negative ions</p> <p><b>Dot and Cross Diagram</b> a model of displaying the bonding within a molecule</p> <p><b>Electron</b> a negative subatomic particle which orbits the nucleus of an atom</p> <p><b>Molecule</b> a group of atoms bonded together</p> |  <p>Two chlorine atoms → A chlorine molecule, Cl<sub>2</sub></p>  <p>An oxygen atom and two hydrogen atoms → A water molecule</p>  <p>A carbon atom and four hydrogen atoms → A molecule of methane, CH<sub>4</sub></p> |
| 4: Metallic Bonding   | 5: Ionic Bonding  | 6: Ionic Bonding- Examples   |
| <p><b>Metallic Bond</b> the strong electrostatic force of attraction between the metal ions and the delocalised electrons</p> <p><b>Metal</b> appear on the left hand side of the periodic table and form positive ions</p> <p><b>Electrostatic</b> a non-contact force between two opposite charges</p> <p><b>Delocalised Electrons</b> electrons which are free to move through the substance and carry a charge</p> <p><b>Alloy</b> a metal made by combining two or more metallic elements to give a desired quality (e.g. strength/ resistance to corrosion)</p> | <p><b>Ion</b> an atom or molecule with a positive or negative electrical charge</p> <p><b>Ionic Bonding</b> a bond between a metal and non-metal which involves the transfer of electrons</p> <p><b>Metal Ion</b> a positive ion formed when a metal loses electrons (cation)</p> <p><b>Non-Metal Ion</b> a negative ion formed when a non-metal gains electrons (anion)</p> <p><b>Ionic Compound</b> a giant structure of ions arranged in a regular, repeating arrangement known as an ionic lattice.</p>                                   |  <p>Na (2,8,1) + Cl (2,8,7) → Na<sup>+</sup> (2,8) + Cl<sup>-</sup> (2,8,8)</p> <p>NaCl (Na<sup>+</sup>Cl<sup>-</sup>)</p>  <p>Ca (20) + 2 Cl (17) → [Ca]<sup>2+</sup> + [Cl]<sup>-</sup> + [Cl]<sup>-</sup></p>  |

| 7: Polymers                     |   | 2: Simple Covalent Molecules                   |  |                          |                             |   | 3: Giant Covalent Structures 1                 |   |   |
|---------------------------------|---|--|--|--------------------------|-----------------------------|---|--|---|---|
| <b>Polymer</b>                  | a large molecule made up of smaller repeating molecules (monomer)                   | <b>Simple Covalent Molecule</b>                | molecules that consist of a small number of atoms held together by covalent bonds (e.g. water and carbon dioxide)                                |                          |                             |   | <b>Giant Covalent Structure</b>                | a vast 3D structure of atoms that are joined by covalent bonds  |   |
| <b>Monomer</b>                  | a small and single, repeating-unit which makes up a polymer                         | <b>Properties of Simple Covalent Molecules</b> | <ul style="list-style-type: none"> <li>low melting and boiling points</li> <li>cannot conduct electricity</li> <li>insoluble in water</li> </ul> |                          |                             |   | <b>Properties of Giant Covalent Structures</b> | <ul style="list-style-type: none"> <li>high melting and boiling points</li> <li>some can conduct electricity (graphite and fullerenes as they have delocalised electrons which can carry the charge)</li> </ul> |   |
| <b>Cross-Linking</b>            | bonds that link one polymer chain to another to add strength                        | <b>Melting Point</b>                           | the temperature at which a solid becomes a liquid or a liquid becomes a solid  |                          |                             |   | <b>Diamond</b>                                 | <b>Graphite</b>   |   |
| <b>Thermosoftening Polymers</b> | polymers which will soften when heated and can be reshaped                          | <b>Boiling Point</b>                           | the temperature at which a liquid becomes a gas or a gas becomes a liquid  |                          |                             |   | hard, strong                                   | brittle, slippery   |   |
| <b>Thermosetting Polymers</b>   | polymers which set permanently when heated and do not soften                        |  |  |                          |                             | used in jewellery                       | used in pencils                                |   |   |
|                                 |   |  |  |                          |                             | high melting point                      | high melting point                             |   |   |
|                                 |   |  |  |                          |                             | cannot conduct electricity              | can conduct electricity                        |   |   |
|                                 |   |  |  |                          |                             | each carbon atom forms 4 covalent bonds | each carbon atom forms 3 covalent bonds        |   |   |
|                                 |   |  |  |                          |                             | arranged in a tetrahedral structure     | arranged in layers                             |   |   |
| 4: Giant Covalent Structures 2  |   | 5: Bonding Overview                            |  |                          |                             |   | 6: Limitations of Models                       |   |   |
| <b>Allotrope</b>                | a different form of the same element  | <b>Type of Bond</b>                            | <b>Ionic</b>   | <b>Covalent (Simple)</b> | <b>Covalent (Giant)</b>     | <b>Metallic</b>                         | <b>Model</b>                                   | <b>Strength</b>   | <b>Limitation</b>   |
| <b>Fullerene</b>                | a family of carbon allotropes in which the molecules are shaped like tubes or balls | <b>Atoms Involved</b>                          | metal and non-metal  | 2 non-metals             | 2 non-metals                | 2 metals                                | <b>Structural Formula</b>                      | shows the number of bonds and location  | does not show the type of bond  |
| <b>Graphene</b>                 | a single layer of graphite  | <b>Structure</b>                               | giant Lattice  | Form molecules           | strong lattice structure    | strong lattice structure                | <b>Molecular Formula</b>                       | shows the elements present in a bond  | does not show the type of bond  |
| <b>Buckminster-Fullerene</b>    | a spherical allotrope of carbon made up of 60 atoms                                 | <b>Melting Point</b>                           | high   | Low                      | high                        | high                                    | <b>Dot and Cross Diagram</b>                   | shows the type of bond  | does not show the intermolecular forces   |
| <b>Nanotubes</b>                | sheets of graphene rolled into tubes  | <b>Conduct Electricity?</b>                    | when molten  | no                       | graphite and fullerenes can | yes                                     | <b>2D Diagram</b>                              | shows the structure   | does not show the movement of electrons or how atoms are arranged in terms of space |
|                                 |   |  |  |                          |                             |   | <b>3D Diagram</b>                              | shows how atoms are arranged in terms of space  | does not show the movement of electrons   |

