

## Chapter 8 Periodicity - GCSE Assumed Knowledge

Learning Objectives	Keypoints
Describe the properties of metals and non-metals, and their position in the Periodic Table	<p>In the periodic table, metals are found on the left hand side and non-metals are found on the right hand side.</p> <p>Metals are shiny, usually have high melting points, are solid at room temperature, are malleable, are ductile and are good conductors of electricity and heat.</p> <p>When metals react chemically they lose electrons to form positive ions.</p> <p>If a metal reacts with oxygen the metal oxide that forms is alkaline.</p> <p>Non-metals are dull, usually have low melting points, are brittle, are non-ductile and are good insulators of electricity and heat.</p> <p>When non-metals react chemically they gain electrons to form negative ions or share electrons with other non-metals to form covalent compounds.</p> <p>If a non-metal reacts with oxygen the oxide that forms is acidic.</p>
Explain how the position of an element in the Periodic Table relates to its electronic structure	<p>The last number in an electronic structure shows which group number the element is in. For example, 2,8,2 and 2,8,8,2 are both in Group 2, whereas 2,8,7 and 2,8,8,7 are both in Group 7.</p> <p>The number of numbers in an electronic structure shows which period the element is in. For example, 2,8,2 and 2,8,8 are both in Period 3, whereas 2,5 and 2,7 are both in Period 2.</p>
Describe the structure and bonding in ionic compounds	A solid ionic compound has positive and negative charges in a regular arrangement called a giant ionic lattice. There are strong electrostatic forces of attraction between the positive and negative charges called ionic bonds. As solids, the ions cannot move past each other so solid ionic compounds do not conduct electricity.
Describe the structure and bonding in simple molecules	Covalent bonds are the electrostatic forces of attraction between each nucleus and the shared electrons. Covalent bonds are very strong. In simple covalent molecules, the intermolecular forces are weak.
Describe the structure and bonding in giant covalent structures	Giant covalent compounds are giant covalent lattices where every atom is interconnected by covalent bonds. It is a giant molecule with many, strong covalent bonds. Melting points are high because in order to melt, all of the many strong covalent bonds need to be broken.
Describe the structure and bonding in metals	Metals consist of a regular arrangement of metal cations in a sea of delocalised electrons. The metallic bonds are the electrostatic forces of attraction between the positive metal cations and the negative delocalised electrons. Metallic bonds are strong.
Explain how Mendeleev's arrangement was refined into the modern Periodic Table	Mendeleev ordered the elements into a periodic table based on increasing atomic mass. He also tried to arrange them so that elements in the same columns had similar chemical and physical properties. Other people had already tried to do this but Mendeleev swapped elements that he thought were in the wrong order and he left gaps for undiscovered elements and predicted their properties. When these elements were discovered they were found to have similar properties to what he had predicted. The modern periodic table is arranged in order of atomic number.
Explain patterns of chemical properties in the Periodic Table in terms of atomic structure	<p>Elements in the same group have similar chemical properties because they have the same number of electrons in their outer shell.</p> <p>Elements in Group 0 are unreactive as they have a full outer shell of electrons.</p>