

BURNING AND BONDING

BURNING AND EMISSION

Know the procedures to take in the event of a gas leak

Understand complete combustion of hydrocarbon fuels produces carbon dioxide and water (MUO)

Know that vehicle engines produce carbon dioxide and monoxide, oxides of nitrogen and unburnt hydrocarbons

Appreciate that catalytic converters can reduce unwanted emissions

Recognise combustion reactions as exothermic processes

Understand that the internal combustion engine transfers chemical energy to movement energy

Recognise that methane, ethane and propane are covalently bonded and are members of the alkane series of hydrocarbons

- Be able to balance equations for complete combustion of hydrocarbons (MUO)
- Understand the role of each exhaust gas in contributing to photochemical smog, acid rain and the greenhouse effect (ET)
- Be able to draw energy level diagrams for chemical reactions
- Be able to interpret energy level diagrams in terms of bond breaking and bonding making
- Understand activation energy as the energy needed to start a reaction

ATOMIC STRUCTURE

Be able to describe the structure of the atom as a nucleus with external electrons (EH, SB)

Know how the number of outer electrons for any atom is related to the Group in the Periodic Table

Understand that elements combine to achieve stable outer shells

- Be able to construct and interpret diagrams of electron configurations

IONIC BONDING

Know that compounds of metals with non-metals are formed by electron transfer and contain ions (MM)

Understand that metals form positive ions and non-metals form negative ions (MM)

Understand the relationship between structure and properties (melting points, solubility in water, electrical conductivity) of ionic compounds (MM)

- Understand how ionic lattices can be represented diagrammatically (MM)
- Know that electrolysis can only occur when ions are free to move in melts or in solution (MM)

COVALENT AND METALLIC BONDING

Understand the relationship between structure and properties (melting point, solubility in water, electrical conductivity) of simple molecules and covalent giant lattices

- Understand that covalent bonds involve the sharing of electron pairs between atoms
- Be able to use dot-and-cross diagrams to represent simple covalent structures
- Know that carbon exists as graphite and diamond which are both giant covalent structures
- Understand the relationship between properties and structure of different forms of carbon, diamond and graphite
- Understand the formation of metallic bonds and the relationship between metallic properties and giant lattices in metals

THE PERIODIC TABLE

Recognise Group VII of the Periodic Table as a family of elements with similar chemical properties (TC)

Know the position of the transition metals in the Periodic Table (TC)

Be familiar with uses of transition metals in coinage and jewellery (TC)

Know that compounds of transition metals are often coloured (e.g. iron and copper compounds)

Know that transition metals often act as catalysts (TC, FT)

- Understand the relationship between properties of halogens as non-metallic elements and their electronic configuration

REACTIVITY

Know that metals react with acids (and sometimes with water) to produce hydrogen (CM)

Be able to relate the position of a metal in the activity series to its chemical activity (CM, MM)

Know that metals have few outer electrons

Know that combining power of atoms depends on the number of outer electrons

- Know that metals react with oxygen to form basic oxides which are ionic solids
- Be able to write ionic equations
- Know that the lack of reactivity of the inert gases is due to their complete outer electron shells