



Bilton School Sixth Form

Chemistry – Transition Work

To prepare effectively for Chemistry you should work through the below tasks and bring these with you for your first day at Bilton Sixth Form.

Please note you will sit a baseline assessment related to the materials below (TASKS1, 2, 3 & 4) when you commence sixth form.

Task 1— **Structures, Bonding and the Properties of Matter**

- Draw and label the structure of an atom and make comprehensive notes on the sub-atomic particles that make up an atom (protons, neutrons, and electrons), including but not limited to relative masses, relative charges, the charge of an atom. Define the following and give examples for each atomic number, mass number and isotopes. Explain how you would calculate the Relative atomic mass of an element using chlorine as your example. How would you calculate the relative formula mass of a compound such as CaCl_2 .
- Create comprehensive notes on Electronic structures and the period table. Include notes on how electrons are arranged in energy levels and show this with a dot and cross diagram and show the short hand notation (e.g. 2,8,8), extend your notes to show how energy levels are split into sub-shells called s, p and d and explain how electronic structures are written using this notation and identify the s, p and d blocks on the periodic table as well as defining GCSE terms such as groups and periods.
- Create comprehensive notes on the formation of ions, including but not limited to notes on ionisation energies and what affects the ionisation energy and the trend shown on the periodic table; the formation of ions with links to group 1, 2, 6, 7 and the transition metals (s, p and d elements) and complex ions (polyatomic ions) such as SO_4^{2-} , OH^- , NH_4^+ etc; and Oxidation numbers and the rules for oxidation numbers.
- Create comprehensive notes on the different types of bonding, include ionic bonding and ionic formulae, covalent bonding both simple and macromolecular (diamond and graphite), metallic bonding. Make sure you include dot and cross diagrams where appropriate and refer to the properties that each type of bonding exhibits. Show how these properties change as you go across the periodic table. Use the oxides of Period 3 as your example. When discussing ideas about simple covalent compounds include notes on intermolecular forces and what affects the strength of the intermolecular bond and how this affects the boiling point of the molecule. Define what electronegativity is and show the trend on the periodic table; define what a polar bond is and what a hydrogen bond is and give examples of each. Then discuss how the polar bonds can affect the strength of intermolecular forces.

Task 2— Types of Reaction

Make comprehensive notes on the different types of chemical equations (word equations, symbol equations, ionic equations). Make sure you give examples of each and include how to balance symbol equations and what state symbols are.

Make notes on each of the following types of reaction. For each include a definition and an example:



Addition, Combustion, Condensation, Cracking, Dehydration, Displacement, Disproportionation, Electrolysis, Elimination, Endothermic, Endothermic, Hydrogenation, Neutralisation, Oxidation, Precipitation, Radical (chain) Reaction, Redox, Reduction, Substitution, Thermal decomposition

Make comprehensive notes on how to measure the rate of a chemical reaction. Include the factors that can affect the rate of a chemical reaction, methods for collecting data and graphs of how the results could be interpreted, explain how each factor affects the rate of reaction referring to collision theory.

d) Make comprehensive notes on what a reversible reaction is and how we can affect the position of equilibrium. Include notes on Le Chatelier's Principle and how we can affect the yield.

Task 3— Calculations

a) Make comprehensive notes on what a mole is and how to calculate a mole of a substance. Include examples of calculations that link mass, moles and molar mass together and what Avogadro's constant is.

b) Make comprehensive notes on how to calculate the empirical formula of a substance and include an example. Then show how you could calculate the molecular formula from the empirical formula.

c) Make comprehensive notes on how to calculate the atom economy and explain why it is important to industry to have a reaction with a high atom economy.

d) Explain how you could calculate the energy change in a reaction using bond energies.

e) Explain how you would calculate the Percentage error in a reaction.

Task 4— Organic and Inorganic Chemistry

a) Make comprehensive notes on the different types of organic molecules. Show the functional group of alkanes, alkenes, alcohols, aldehydes, ketones and carboxylic acids and an example of each. Show the different types of formulae that can be used to represent molecules; general formula, Molecular formula, Structural formula, skeletal formula, displayed formula and use butanol as an example.

Include more detailed notes on Alkanes, Alkenes, Alcohols. Include how they are named, what their functional groups are and properties. Make sure for alkenes you have discussed how they can form polymers.

b) Make comprehensive notes on the trend in reactivity of group 2 and group 7 elements. For group 2 include the trend in melting points. And for group 7 include ideas about their states and colours at room temperature and notes on displacement reactions.

c) Make comprehensive notes on the pH scale and acids and bases. Include notes on the ions that make acids and alkalis, discuss which are proton donors and which are proton acceptors and give examples of each.

If you have any questions, email: Head of Subject - bunce.s@stowevalley.com