

CORE KNOWLEDGE AUDIT

YEAR 13 CHEMISTRY

TOPIC 1 – Atomic Structure and the periodic table

1. Basic atomic structure
2. Using the periodic table
3. Isotopes, and calculating RAM from mass spectra
4. Terms: 'ionisation energy'. 'successive ionisation energy'
5. Understand general increase in first ionisation energy across a period
6. Understand decrease in first ionisation energy down a group
7. Understand how the small drops in first ionisation energy values across a period provided evidence for electron sub-shells
8. Know the shapes of s and p orbitals
9. Complete electron configurations for the first 36 elements
10. Understand that 'periodicity' is a repeating pattern across different periods

TOPIC 2 – Bonding and Structure

1. Illustrate ionic bonding with dot and cross diagrams
2. Work out formulae of ionic compounds using ionic charges
3. Know the impact of ionic radius and charge on the strength of an ionic bond. (Larger charge = stronger bond) (smaller radius = stronger bond).
4. Know that a covalent bond is the electrostatic attraction between 2 nuclei, and a shared pair of electrons between them.
5. Dot and cross diagrams for covalent molecules (H_2SO_4 is a particularly good one)
6. Know and draw dative covalent bonds
7. Understand relationships between bond lengths and bond strengths
8. Predict the shapes of molecules by looking at lone pairs, and bonding pairs
9. Know and describe 'electronegativity.'
10. Use electronegativity to predict polarity of bonds, and polarity of molecules (they are not the same!)
11. Intermolecular forces – WEAKEST London forces, permanent dipole attraction, hydrogen bonds STRONGEST
12. Properties of water resulting from hydrogen bonds
13. Trends in terms of intermolecular forces – boiling temperatures of alkanes, effect of branching alkanes, alcohols have higher boiling points than alkanes, boiling points of hydrogen halides (HF – HI)
14. Choosing solvents
15. Metallic structure and bonding – and the properties that arise
16. Giant lattices – ionic and covalent (diamond, graphite silicon oxide)

Topics 3 and 14 – Redox I and II

1. Know and calculate 'oxidation number'
2. Define oxidation and reduction in terms of electrons
3. Know that oxidising agents gain electrons
4. Know that reducing agents lose electrons
5. Disproportionation
6. Write half equations, combine them to form full equations
7. Know what is meant by 'standard electrode potential' (under standard conditions)
8. Know the features of the standard hydrogen electrode
9. Set up an electrochemical cell and measure voltage
10. Calculate E_{cell} by combining electrode potentials
11. Write cell diagrams
12. Use electrode potentials to predict feasibility of reactions
13. Know that these predictions are limited by standard conditions, and cannot predict rate
14. Know examples of storage cells, (eg. Hydrogen fuel cell)
15. Know redox titrations (Fe^{2+} and MnO_4^- , I_2 and $\text{S}_2\text{O}_3^{2-}$) The first example was used to calculate the amount of iron in an iron tablet.

CORE practicals 10 and 11