

# Year 12 Chemistry Revision Tables

# Elemental and Environmental Chemistry

## Topic 1.1: The Periodic Table

<b><i>Expectation</i></b> From SACE Subject Outline <i>Note: these can be asked in converse</i>	<b><i>Summary of things I know about this</i></b> (include tricks for memorising things, etc.)	<b><i>Example question(s) to practice until I can do under test conditions without help</i></b> There are likely to be some in the textbook too; also take note of questions you'd like examples of from the teacher
Write, using subshell notation, the electron configuration of an atom or monatomic ion of any of the first thirty-eight elements in the periodic table.		Assignment 1 Q1
Identify the <i>s</i> , <i>p</i> , <i>d</i> , and <i>f</i> block elements in the periodic table.		Assignment 1 Q2
Predict the following properties of the <i>s</i> and <i>p</i> block elements of any of the first thirty-eight elements in the periodic table: <ul style="list-style-type: none"><li>• metal, metalloid, or non-metal nature of the element</li><li>• charge of the monatomic ions</li><li>• likely oxidation number(s) of the element in its compounds (including octet expansion for phosphorus, sulfur, and chlorine).</li></ul>		Assignment 1 Q3 (b)
Find regions in the periodic table with elements of high, intermediate, and low electronegativity.		Assignment 1 Q3 (a)
Predict the acidic/basic character of the oxides of an element from the position of the element in the periodic table.		Assignment 1 Q7
Write equations for the reactions of oxides of non-metals such as SiO <sub>2</sub> , CO <sub>2</sub> , SO <sub>2</sub> , SO <sub>3</sub> , and P <sub>4</sub> O <sub>10</sub> with hydroxide ions and with water, where a reaction occurs.		Assignment 1 Q5

Write equations for the reactions of oxides of metals such as MgO, Na <sub>2</sub> O, CuO, and Fe <sub>2</sub> O <sub>3</sub> with acids and with water, where a reaction occurs.		Assignment 1 Q4
Write equations for the reactions of amphoteric oxides such as Al <sub>2</sub> O <sub>3</sub> and ZnO with hydrogen ions or hydroxide ions.		Assignment 1 Q6
Predict whether or not a compound or element is likely to be molecular, given its properties, name, elemental composition, or formula.		Assignment 2 Q2
Compare the strengths of covalent bonds with the strengths of secondary interactions.		Assignment 2 Q3 (e)
Explain the higher melting points and boiling points of substances of large molar mass.		Assignment 2 Q4 (c)
Draw diagrams showing covalent bonds, non-bonding pairs, and shapes for three-element molecules and two-element ions containing no more than five atoms. Examples that involve valence shell octet expansion are limited to PO <sub>4</sub> <sup>3H</sup> tetrahedra, SO <sub>2</sub> , and SO <sub>3</sub> .		Assignment 2 Q5
Predict whether or not a molecule is polar, given its spatial arrangement.		Assignment 2 Q4 (b)
Explain the higher melting points and boiling points of polar substances compared with those of non-polar substances of similar molar mass.		Assignment 2 Q7 (b)
Describe, with the aid of diagrams, hydrogen bonding between molecules.		Assignment 2 Q7 (a)

## Topic 1.2: Cycles in Nature

<i>Expectation</i>	<i>Summary of things I know about this</i>	<i>Example question(s) to practice</i>
State, for aerobic and anaerobic conditions, the products of the decomposition of organic matter containing carbon, nitrogen, phosphorus, or sulfur.		Assignment 3 Q1
Describe and write equations for the processes of photosynthesis and aerobic respiration involving glucose.		Assignment 3 Q2
Describe and write equations for the formation of oxides of nitrogen by the reaction of nitrogen and oxygen at high temperatures.		Assignment 3 Q3
Describe how the nitrogen cycle operates by natural processes (e.g. lightning, nitrogen-fixing bacteria, and decay) and industrial processes (e.g. fertiliser manufacture and combustion engines).		Assignment 3 Q3
Explain why fertilisers need to contain nutrients in soluble form.		Assignment 3 Q4

## Topic 1.3: The Greenhouse Effect

<i>Expectation</i>	<i>Summary of things I know about this</i>	<i>Example question(s) to practice</i>
Describe the action of the common greenhouse gases, carbon dioxide and methane, that serve to maintain a steady temperature in the Earth's atmosphere.		Assignment 3 Q5
Explain the enhanced greenhouse effect and its potential consequences for the environment.		Assignment 3 Q5

## Topic 1.4: Acid Rain

<i>Expectation</i>	<i>Summary of things I know about this</i>	<i>Example question(s) to practice</i>
Calculate the concentration of $H^+$ and $OH^{\ominus}$ of solutions, given their pH, and vice versa.		Assignment 4 Q1
Write equations to show how carbon dioxide produces acidic rain.		Assignment 4 Q2
Describe and write equations for the formation of acid rain.		Assignment 4 Q3
Describe the environmental effects of acid rain, including its action on metals and carbonates (with equations) and on the mobilisation of toxic cations such as aluminium.		Assignment 4 Q4 Assignment 4 Q5
Calculate the pH of solutions of strong bases and strong monoprotic acids.		Assignment 4 Q1

## Topic 1.5: Photochemical Smog

<i>Expectation</i>	<i>Summary of things I know about this</i>	<i>Example question(s) to practice</i>
Write equations for the formation of nitrogen oxides NO and NO <sub>2</sub> .		
Describe and write equations showing the role of nitrogen oxides in the formation of ozone in the troposphere.		Assignment 4 Q6
Explain the terms 'primary pollutants' and 'secondary pollutants' with reference to the harmful effects of nitrogen oxides and ozone in the troposphere.		Assignment 4 Q6 (e)
Describe how catalytic converters reduce the quantities of nitrogen oxides generated by cars.		Assignment 4 Q7

## Topic 1.6: Water Treatment

<i>Expectation</i>	<i>Summary of things I know about this</i>	<i>Example question(s) to practice</i>
Describe the use of aluminium ions in the removal of suspended matter from water.		Assignment 4 Q8
State that hypochlorous acid, chlorine, and hypochlorites kill bacteria by their oxidising action.		
Explain the effect of pH on the equilibrium between chlorine, water, and hydrochloric acid and hypochlorous acid.		Assignment 4 Q9