

Assessment Schedule – 2006**Chemistry: Describe selected non-metals and their compounds (90173)****Evidence Statement**

| Q | Evidence | Achievement | Achievement with Merit | Achievement with Excellence | | | | | | | | | | | | | | | |
|-----------|---|---|---|--|------------|--------------------|-----|--------|-------|--------|-----------|-----|----------|-----|-------|---------|------------------|--|--|
| 1 | <table border="1"> <tr> <td>(a)</td><td>Oxygen</td><td>gas</td><td>colourless</td><td>(slightly) soluble</td></tr> <tr> <td>(b)</td><td>Sulfur</td><td>solid</td><td>yellow</td><td>insoluble</td></tr> <tr> <td>(c)</td><td>Chlorine</td><td>gas</td><td>green</td><td>soluble</td></tr> </table> | (a) | Oxygen | gas | colourless | (slightly) soluble | (b) | Sulfur | solid | yellow | insoluble | (c) | Chlorine | gas | green | soluble | 5 boxes correct. | | |
| (a) | Oxygen | gas | colourless | (slightly) soluble | | | | | | | | | | | | | | | |
| (b) | Sulfur | solid | yellow | insoluble | | | | | | | | | | | | | | | |
| (c) | Chlorine | gas | green | soluble | | | | | | | | | | | | | | | |
| 2(a) | One of: <ul style="list-style-type: none"> • The action of UV light on oxygen in air forms ozone O₃. • Ozone O₃ is formed by the interaction of nitrogen oxides with oxygen in the air. • Equation $3\text{O}_2 \rightarrow 2\text{O}_3$ in the presence of UV light. The answer must mention UV light if writing equation. • Lightning strikes. | ONE correct answer. | | | | | | | | | | | | | | | | | |
| 2(b) | Ozone is an oxidising agent. | Identifies ozone as an oxidising agent. | | | | | | | | | | | | | | | | | |
| 2(c)(i) | The ozone layer filters out harmful UV radiation from the sun. | Identifies the role of ozone in the upper atmosphere. | | | | | | | | | | | | | | | | | |
| 2 (c)(ii) | Ozone depletion allows harmful UV radiation to reach the earth's surface. This can cause: <ul style="list-style-type: none"> • increased human skin cancer rates / increased aging of skin or cataracts in eyes • inhibition of plant growth as the increased rays can burn the plants • decreased photosynthesis as the increased rays can damage the cells that produce chlorophyll or carry out photosynthesis • decreased phytoplankton productivity (marine food web), due to their sensitivity to the rays. • more radiation, more warming of the Earth • the UV radiation is high energy radiation and the energy can be used to break apart the ozone molecule. If the energy is not used to break apart the ozone, then it is used elsewhere. For instance, to damage skin tissue. | Links ozone depletion to increase in UV radiation. OR Identifies two effects | Links the ozone depletion to an increase in UV radiation and link the increase in UV radiation to two effects | Same as for Merit level plus is able to reason why depleted ozone causes there to be more UV radiation in the atmosphere OR Gives one or more effects on life forms linked to the depletion | | | | | | | | | | | | | | | |
| 3(a) | Is a brown smudge or haze or blue or brown haze. | Correct description. | | | | | | | | | | | | | | | | | |

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| 3 (b) (i) | <p>Conditions:</p> <ul style="list-style-type: none"> temperature inversion layer (or description of) NO_x, VOC, CO (and other pollutants) usually from vehicle exhausts. land enclosed by hills/ low wind levels UV radiation water, oxygen ozone. | Describes TWO correct conditions for formation of photochemical smog. | | |
| 3 (b) (ii) | <p>People:</p> <ul style="list-style-type: none"> irritate respiratory tract increases eye, nose and throat infections causes headaches cause asthma respiratory diseases unconsciousness death. <p>Environment:</p> <ul style="list-style-type: none"> inhibits plant growth/ damages leaves degrades plastics visual pollution can cause the formation of ozone at lower levels of the atmosphere acid rain. <p>Properties of smog:</p> <ul style="list-style-type: none"> poisonous gases, VOC, NO₂ and others, slowly poison living things primary pollutants can go on to cause secondary pollutants O₃, NO₂ and PAN. These can cause acid rain. smog blocking sunlight. | Identifies TWO effects. | Links a property of smog to effect on people or environment. | Links two properties of smog to effect on people and environment. |
| 3 (c) | <p>Add concentrated nitric acid to copper.</p> <p>The copper will disappear.</p> <p>The colourless nitric acid will turn green /blue.</p> <p>A brown pungent gas, NO₂, will form.</p> | <p>States method of preparation is Cu and HNO₃</p> <p>OR</p> <p>For other methods gives a correct statement of preparation.</p> | <p>States two observations</p> <p>OR</p> <p>For other methods gives all expected observations.</p> | Links three observations to preparation |
| 3 (c) | $\text{Cu}_{(s)} + 4\text{HNO}_{3(aq)} \rightarrow \text{Cu}(\text{NO}_3)_{2(aq)} + 2\text{NO}_{2(g)} + 2\text{H}_2\text{O}_{(l)}$ | <p>Identify correct reactants or products</p> <p>OR</p> <p>For other methods, correct unbalanced equation, relating to part 3(c).</p> | <p>Correct equation</p> <p>OR</p> <p>For other methods, correct balanced equation relating to part 3(c).</p> | Correct balanced equation |
| 4 (a) | Sulfur + oxygen → sulfur dioxide | Correct word or symbol equation. | | |
| 4 (b) (i) | Vanadium pentoxide (V ₂ O ₅) | Correct answer. | | |

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| 4 (b) (ii) | The process is too slow to be economic without a catalyst. | Speeds up the reactions. | | |
| 4 (c) | Any TWO relevant uses, eg: <ul style="list-style-type: none"> • Making fertilisers like superphosphate and ammonium sulfate. • Lead-acid accumulator cells (car batteries). • Dehydrating agent. • Remove oxides of steel or iron before galvanising or electroplating. • Dehydrating agent. | TWO correct uses stated. | | |
| 5 (a) | Sodium chloride solution. | Correct answer. | | |
| 5 (b) | The brine enters the membrane cell on one side and water into the other side. In the brine solution sodium and chloride ions are present. The sodium ions are small enough to be able to cross the membrane and move to the other half of the cell. The chloride ions react at the anode where they are oxidised and lose electrons to form chlorine atoms. These atoms then react with each other to form the chlorine gas by the titanium anode. | Identifies that chloride ions are formed from the brine solution or LHS or anode OR States that chloride/chlorine is negative. | Chloride ions are negative and attracted to the positive electrode or anode. | Chloride ions lose electrons at the positive electrode or anode and bond with another chlorine atom to form a chlorine molecule, which is given off as a gas. |
| 5 (c) | Chlorine gas and sodium hydroxide are produced when brine is electrolysed. Chlorine gas can be bubbled through the sodium hydroxide to produce sodium hypochlorite. $\text{Cl}_{2(g)} + 2\text{NaOH}_{(aq)} \rightarrow 2\text{NaOCl}_{(aq)} + \text{H}_2\text{O}_{(l)}$ OR $\text{Cl}_{2(g)} + 2\text{NaOH}_{(aq)} \rightarrow 2\text{NaOCl}_{(aq)} + \text{NaCl}_{(aq)} + \text{H}_2\text{O}_{(l)}$ | React the chlorine gas and sodium hydroxide. | Description of the reaction in words or symbols. | |

Judgement Statement

Chemistry: Describe selected non-metals and their compounds (90173)

| Achievement | Achievement with Merit | Achievement with Excellence |
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| EIGHT questions answered correctly. Minimum 8 × A | ELEVEN questions answered correctly, including at least THREE at Merit level. Minimum 3 × M + 8 × A | TWELVE questions answered correctly, including at least TWO at Merit level and at least TWO at Excellence level. Minimum 2 × E + 2 × M + 8 × A |