Assessment Schedule – 2007

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

Evidence Statement

Q	Evidence	Achievement	Achievement with Merit	Achievement with Excellence
ONE (a)	A = lightning combines nitrogen and oxygen in the air to form nitrates. D = animals gain nitrogen compounds by feeding. F = denitrifying bacteria in soil or plants convert soil nitrates to nitrogen in the air.	TWO descriptions are correct.		
(b)	Nitrogen dioxide is a **poisonous gas**. It can increase the incidence of asthma and bronchitis. Nitrogen oxides are soluble in water. This forms **acid rain.** The pH of rainwater is lowered and this can cause the following problems: • Destroys plant and animal life in lakes and streams. • Damages forests and crops. • Endangers marine life in coastal areas. • Erodes buildings. • Corrodes vehicles. • Contaminates drinking water. **Photochemical Smog** Conditions - temperature inversion layer - nitrogen dioxides (and other pollutants) usually from vehicle exhausts. - land enclosed by hills. People - irritates respiratory tract - causes asthma - respiratory diseases - unconsciousness - death. Environment - inhibits plant growth - degrades plastics - visual pollution. Can cause the **formation of ozone at lower levels** of the atmosphere (poisonous to living things).	Describes TWO effects.	Links ONE property to an effect on people or the environment.	Applies understanding of TWO properties to their effects on people and the environment.

(c)	$2NO_2(g) + H_2O(\ell) \rightarrow HNO_3(aq) + HNO_2(aq)$	The formula for ONE of the products is correct.	The equation is correctly balanced. States are not required.	
TWO (a)	Sodium hydroxide + chlorine → sodium hypochlorite + sodium chloride + water	Correct	Correct	Correct
(b)	Sodium hypochlorite has a pH of 11, so is alkaline in nature. It can whiten clothes (acts as a bleach), removing stains and can act as a disinfectant. It bleaches clothes (or removes stains) by oxidising the dyes and converting them into colourless compounds. (Breaks the chemical bonds of a chromophore – part of a molecule that has colour – so the molecule is changed and can no longer absorb light.) It acts as a disinfectant by killing bacteria. It acts as an oxidising agent and oxidises the cell membrane of bacteria, killing them. (It has no effect on viruses.)	**OR** Describes that sodium hypochlorite is an oxidising agent.	**OR** Describes oxidising properties of sodium hypochlorite. **AND** Links ONE property of NaOCl to its ability to act as a bleach **OR** a disinfectant.	**AND** Describes oxidising properties of sodium hypochlorite. **AND** Links TWO properties of NaOCl to its ability to act as a bleach **AND** a disinfectant.
THREE (a)	Solid at room temperature. Yellow at room temperature. Insoluble in water. Low melting point. Non-conductor. (Or other suitable property.)	Any TWO correct.		
(b)	Rhombic crystals Monoclinic crystals Plastic sulfur	Any TWO correct.		

(c)	$S(s) + O_2(g) \rightarrow SO_2(g)$	Correct. (States are not required.)	Correct	Correct
(d)	Sulfur dioxide is used as a preservative to prolong the life of the dried fruit. Sulfur dioxide acts as a reductant. It removes oxygen from micro-organisms, destroying them / preventing them from growing. ($SO_2(g) + {}^1\!/_2O_2(g) \rightarrow SO_3(g)$) This stops the food from decolourising and rotting and means it will keep for longer. (Sulfur dioxide is not harmful to people if consumed in small quantities.)		**AND** Describes how Sulfur dioxide acts as a reductant / antioxidant/ removes O_2. **AND** Links ONE property of sulfur dioxide to its effect **OR** the chemistry. Eg: it destroys micro-organisms / preventing micro-organisms from growing **OR** By removing oxygen from micro-organisms. $(SO_{2(g)} + {}^1\!/_2O_{2(g)} \rightarrow SO_{3(g)}$ *Equation or description of how it removes O_2 required.*	**AND** Describes how Sulfur dioxide acts as a reductant / antioxidant/ removes O_2. **AND** Links ONE property of sulfur dioxide to its effect **AND** the chemistry. It destroys micro-organisms / preventing micro-organisms from growing **AND** By removing oxygen from micro-organisms. $(SO_{2(g)} + {}^1\!/_2O_{2(g)} \rightarrow SO_{3(g)}$ *Equation or description of how it removes O_2 required.*
FOUR (a)	Acts as a fertiliser **OR** It supplies phosphorus/phosphate to soils. **OR** (The P in the soil encourages growth of legumes, which increases their ability to fix nitrogen from the air.)	Correct		
(b)	Calcium dihydrogen phosphate and calcium sulfate.	Both correct (accept correct formulae).		
(c)	Rock phosphate is insoluble in water. Superphosphate is a lot more soluble in water. Superphosphate is therefore able to dissolve into water in the soil and be absorbed by plants.	Identifies rock phosphate as insoluble and superphosphate is a lot more soluble in water.	Identifies rock phosphate as insoluble and superphosphate is a lot more soluble in water. **AND** Explains why this is necessary.	

(d)	$Ca_3(PO_4)_{2(aq)} + 2H_2SO_{4\ (l)} \rightarrow Ca(H_2PO_4)_{2(s)} + 2CaSO_{4(s)}$	THREE formulae are correct.	ALL formulae are correct.	Equation is correctly balanced. (States are not required.)

Judgement Statement — 2007

Achievement	Achievement with Merit	Achievement with Excellence
SIX opportunities answered at Achievement level (or higher). Minimum of 6 × A	SEVEN opportunities answered including at least THREE at Merit level (or higher) and FOUR at Achievement level (or higher). Minimum 3 × M + 4 × A	EIGHT opportunities answered including at least TWO at Excellence level plus TWO at Merit level (or higher) and FOUR at Achievement level (or higher). Minimum 2 × E + 2 × M + 4 × A