



Name _____ Class: _____

Start Time _____ End Time _____ Time Taken _____

Time allowed: 51 minutes

INSTRUCTIONS TO CANDIDATES

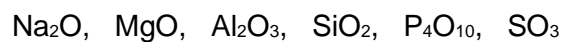
- This document is designed to be used as a practice test.
- Complete the test under exam conditions in one sitting.
- Optional: Before marking it, go through the paper with a set of notes and improve your answers.
- Mark the test using the mark scheme make corrections on the paper.
- Complete the table on the front page.
- Improve your notes so that they better reflect your weaknesses.
- Make a note of your strengths and weaknesses for future revision.

Success Criteria	Questions In Paper	Mark	Out of	%	Rank Order
pH of Period 3 Oxides	1a, 4eii, 4eiii		4		
Equations of Period 3 Oxides	1b, 4d, 4ei, 2bii	3, 2, 1, 1	7		
Physical Properties of Period 3 Oxides	1c, 3a, 3b 4b, 4c	4, 4, 4, 1, 2	15		
Structure of Period 3 Oxides	2ai, 4b	3, 1	4		
Testing for Period 3 Oxides	2aii	3	3		
General Chemistry	2bi, 2biii	3	3		
Chemical Calculations	3c	5	5		
Reactions of Period 3 Elements	4a, 5	1, 6	7		
Total			49		



Q1.

Consider the following oxides.



(a) Identify one of the oxides from the above which

(i) can form a solution with a pH less than 3 _____

(ii) can form a solution with a pH greater than 12 _____

(2)

(b) Write an equation for the reaction between

(i) MgO and HNO_3

(ii) SiO_2 and NaOH

(iii) Na_2O and H_3PO_4

(3)

(c) Explain, in terms of their type of structure and bonding, why P_4O_{10} can be vaporised by gentle heat but SiO_2 cannot.

(4)

(Total 9 marks)

**Q2.**

- (a) The melting points of some of the oxides formed by Period 3 elements are given in a random order below.

Oxide	A	B	C	D	E
$T_m/^\circ\text{C}$	2852	-73	1610	1275	300

- (i) Using the letters **A** to **E**, give **two** oxides which have simple molecular structures.

Explain your answer.

Oxide 1 _____

Oxide 2 _____

Explanation _____

- (ii) Give a simple chemical test which could be used to show which of the oxides in the table is sodium oxide. State the observation you would make.

Chemical test _____

Observation _____

(6)

- (b) The base calcium oxide can be used to remove sulfur dioxide from flue-gases produced when fossil fuels are burnt in coal-fired power stations. Calcium oxide is produced when calcium carbonate, is decomposed by heat.

- (i) Write an equation for the action of heat on calcium carbonate.

- (ii) Identify the product formed when sulfur dioxide reacts with calcium oxide.

- (iii) Despite the additional cost, operators of power stations are encouraged to remove the sulfur dioxide from flue-gases. Explain why this may not be environmentally beneficial.

(4)

(Total 10 marks)



Q3.

- (a) State and explain the trend in electronegativities across Period 3 from sodium to sulfur.

(4)

- (b) Explain why the oxides of the Period 3 elements sodium and phosphorus have different melting points. In your answer you should discuss the structure of and bonding in these oxides, and the link between electronegativity and the type of bonding.

(6)



- (c) Explain why phosphorus(V) oxide has a higher melting point than sulfur(VI) oxide.

(2)

- (d) Write an equation for the reaction of P_4O_{10} with water to form phosphoric(V) acid. Give the approximate pH of the final solution.

Equation _____

pH _____

(2)

- (e) A waste-water tank was contaminated by P_4O_{10} . The resulting phosphoric(V) acid solution was neutralised using an excess of magnesium oxide. The mixture produced was then disposed of in a lake.

- (i) Write an equation for the reaction between phosphoric(V) acid and magnesium oxide.

(1)

- (ii) Explain why an excess of magnesium oxide can be used for this neutralisation.

(1)

- (iii) Explain why the use of an excess of sodium hydroxide to neutralise the phosphoric(V) acid solution might lead to environmental problems in the lake.

(1)

(Total 9 marks)

**Q5.**

- (a) Write an equation for the reaction that occurs when magnesium is heated in steam. Describe what you would observe when this reaction occurs.

Equation _____

Observations _____

(3)

- (b) Write an equation for the reaction that occurs when sodium is heated in oxygen. Describe what you would observe when this reaction occurs.

Equation _____

Observations _____

(3)**(Total 6 marks)**