

# 3.2 Oxides, Group 1 & Group 17

## Question Paper

Course	DPIB Chemistry
Section	3. Periodicity
Topic	3.2 Oxides, Group 1 & Group 17
Difficulty	Hard

**Time allowed:** 20  
**Score:** /10  
**Percentage:** /100

### Question 1

G and J are oxides of different Period 3 elements.

If one mole of J is added to water, the solution formed is neutralised by exactly one mole of G.

What could be the identities of G and J?

	G	J
<b>A</b>	$\text{Na}_2\text{O}$	$\text{SO}_3$
<b>B</b>	$\text{Na}_2\text{O}$	$\text{P}_4\text{O}_{10}$
<b>C</b>	$\text{Al}_2\text{O}_3$	$\text{SO}_3$
<b>D</b>	$\text{Al}_2\text{O}_3$	$\text{P}_4\text{O}_{10}$

[1 mark]

### Question 2

An element is found in group I of the periodic table, below lithium and sodium. From this information it is likely that the element is a metal with

- A. A high melting point and which reacts slowly with water
- B. A low melting point and which reacts vigorously with water
- C. A high melting point and which reacts vigorously with water
- D. A low melting point and which reacts slowly with water

[1 mark]

### Question 3

A student opens a freezer in their lab to remove a test tube containing an oxide of a Period 3 element. The oxide is a solid and forms a solution with a low pH when dissolved in water.

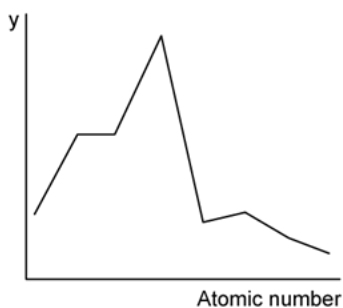
Identify the element.

- A. S
- B. Al
- C. Si
- D. Mg

[1 mark]

### Question 4

The x-axis of the graph below is the atomic number of the elements in Period 3.



Which variable could represent the y-axis?

- A. Melting point
- B. Electronegativity
- C. Ionic radius
- D. Atomic radius

[1 mark]

### Question 5

The first ionisation energies and reactions with water for sodium and caesium are compared below.

Which set of statements, comparing sodium and caesium, are correct?

	Na first ionisation energy	Cs first ionisation energy	Na reaction with water	Cs reaction with water
<b>A</b>	Lower	Higher	Faster	Slower
<b>B</b>	Lower	Higher	Slower	Faster
<b>C</b>	Higher	Lower	Faster	Slower
<b>D</b>	Higher	Lower	Slower	Faster

[1 mark]

### Question 6

An element Z has the same oxidation state as a common iron ion but the Z ion has the same number of electrons as Ne. An oxide of element Z reacts with a strong acid to produce a chloride salt but does not dissolve in water.

What is the correct identity of element Z?

- A. Magnesium
- B. Silicon
- C. Sodium
- D. Aluminium

[1 mark]

### Question 7

X, Y and Z represent different halogens. The table shows the results of nine experiments in which aqueous solutions of  $X_2$ ,  $Y_2$  and  $Z_2$  were separately added to separate aqueous solutions containing  $X^-$ ,  $Y^-$  and  $Z^-$  ions.

	$X^-$ (aq)	$Y^-$ (aq)	$Z^-$ (aq)
$X_2$ (aq)	no reaction	no reaction	no reaction
$Y_2$ (aq)	$X_2$ formed	no reaction	$Z_2$ formed
$Z_2$ (aq)	$X_2$ formed	no reaction	no reaction

What is the correct order to show the decreasing strength of the ions  $X^-$ ,  $Y^-$  and  $Z^-$  as reducing agents?

- A.  $X^- > Y^- > Z^-$
- B.  $X^- > Z^- > Y^-$
- C.  $Y^- > Z^- > X^-$
- D.  $Z^- > X^- > Y^-$

[1 mark]

### Question 8

A student wants to identify an unknown alkali metal halide salt,  $MX$ . The student performs experiments on the alkali metal,  $M$ , and halogen,  $X_2$ , which make up the salt.

The student's results and observations are shown.

Test	Observation
The metal, $M$ , is added to water	The metal reacts violently with water producing a lilac flame
The halogen, $X_2$ , is bubbled through a solution of the metal bromide, $MBr$	The solution changes from colourless to orange
The halide ion, $X^-$ , is added to a solution of silver ions	A white precipitate forms

What is the identity of the unknown alkali metal,  $MX$ ?

- A. Lithium chloride
- B. Potassium iodide
- C. Potassium chloride
- D. Lithium iodide

[1 mark]

### Question 9

A dark red/brown solution is formed when a halide salt containing the halide ion  $Y^-$  reacts with aqueous chlorine. This solution then forms a violet solution when shaken with a cyclohexane solution.

What is halogen,  $Y$ ?

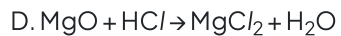
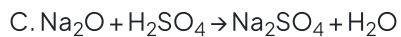
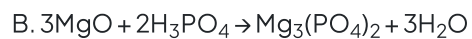
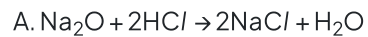
- A. Fluorine
- B. Iodine
- C. Iodide
- D. Bromide

[1 mark]

**Question 10**

A student reacts the most basic period 3 oxide with the strongest acid formed from a period 3 element.

Identify the correct equation for this reaction



[1 mark]