A-LEVEL CHEMISTRY • EXERCISE SHEET

9.3 Chemical periodicity of other elements

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

Objective

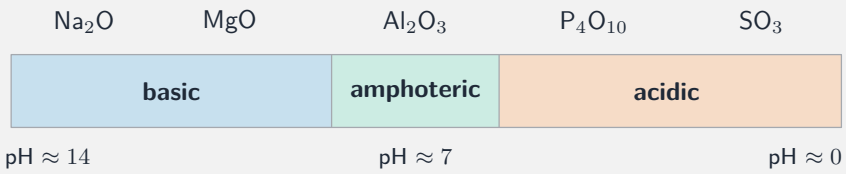
Build the skills to answer exam questions on the **chemical periodicity of other elements** —using periodic trends to **predict** properties from position and **deduce** an unknown element's identity.

You must be able to:

- predict the characteristic properties of an element from its group
- deduce the likely position and identity of an unknown element from its properties

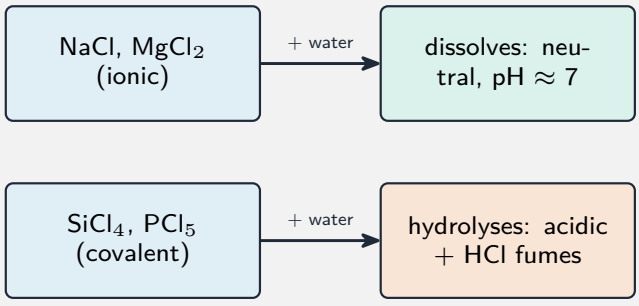
1 Worked examples

Predicting from position



metal oxides (left) are basic; non-metal oxides (right) are acidic

Knowing how properties vary across a period and down a group lets you predict or deduce an element



Period 3 chlorides react differently with water

Use the patterns you know:

- **down a group** —properties change steadily (e.g. Group 1: more reactive, larger atoms going down).
- **across a period** —metal → non-metal; oxides basic → acidic; bonding ionic → covalent.

Predict: a Group 1 element forms a +1 ion, is a reactive metal, and has a basic oxide. **Deduce:** an element with a basic oxide, high conductivity and a +2 ion is a Group 2 metal.

2 Practice

2.1 Predict the charge of the ion formed by an element in Group 2. [1]

2.2 State whether the oxide of a Group 1 element is acidic or basic. [1]

3 Exam-style questions

3.1 An element X has a giant metallic structure, conducts electricity, and forms a basic oxide of formula XO. X is most likely in: [1]

- **A** Group 1
- **B** Group 2
- **C** Group 16
- **D** Group 17

3.2 Going **down** Group 17 (the halogens), the elements become: [1]

- **A** less reactive
- **B** more reactive
- **C** more metallic in their oxides
- **D** smaller atoms

3.3 An unknown element Y forms a chloride that fumes in moist air and gives an acidic solution with water; Y's oxide is acidic.

(a) Deduce whether Y is a metal or a non-metal, and explain. [2]

(b) Suggest the region of the Periodic Table where Y is found. [1]

3.4 Using periodic trends, predict **two** properties of caesium (Cs), in Group 1 below sodium. [2]

4 Go further

You are now ready for the real exam questions on this subtopic. Open the **9.3 Chemical periodicity of other elements** past-paper sheet in the Library, or try this in **Practice mode**:

- 9701/21 N25 —Q1 (periodicity, structured calculation)

Solutions

2.1 2+.

2.2 basic.

3.1 B. A basic oxide XO (+2) and metallic conductivity point to Group 2.

3.2 A. Reactivity decreases down Group 17.

3.3 (a) a non-metal; its oxide and chloride are acidic/covalent and the chloride hydrolyses —typical of non-metals.
(b) the right-hand side (non-metal region) of the Periodic Table.

3.4 any two: it is a (very) reactive metal; forms a +1 ion; has a basic oxide; reacts vigorously with water; larger atom / lower melting point than sodium.