

3.1 The Periodic Table

Understandings:

- The Periodic Table is arranged into four blocks associated with the four sub-levels: s, p, d, and f.
- The Periodic Table consists of groups (vertical columns) and periods (horizontal rows).

Guidance

The group numbering scheme from group 1 to group 18, as recommended by IUPAC, should be used.

- The period number (n) is the outer energy level that is occupied by electrons.
- The number of the principal energy level and the number of the valence electrons in an atom can be deduced from its position on the Periodic Table.
- The Periodic Table shows the positions of metals, non-metals and metalloids.

Guidance

The terms alkali metals, halogens, noble gases, transition metals, lanthanoids and actinoids should be known.

Exercises

1 Use the IB Periodic Table to identify the position of the following elements:

	Element	Period	Group
(a)	helium		
(b)	chlorine		
(c)	barium		
(d)	francium		

2 Phosphorus is in Period 3 and Group 15 of the Periodic Table.

- (a) Distinguish between the terms 'period' and 'group'.
 (b) State the electron configuration of phosphorus and relate it to its position in the Periodic Table.

3 How many valence (outer shell) electrons are present in the atoms of the element with atomic number 51?

s ¹	s ²	d ¹	d ²	d ³	d ⁴ s ¹	d ⁵	d ⁶	d ⁷	d ⁸	d ⁹ s ¹	d ¹⁰	p ¹	p ²	p ³	p ⁴	p ⁵	p ⁶
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Alkali metals? Halogens? Noble gases? Lanthanoids? Actinoids? Metalloids?

The metalloid elements have the characteristics of both metals and non-metals. Their physical properties and appearance most resemble the metals, although chemically they have more in common with the non-metals. In the Periodic Table the metalloid elements silicon, germanium, arsenic, antimony, tellurium, and polonium form a diagonal staircase between the metals and non-metals.



◀ Silicon is a metalloid. There is enough silicon in this piece to make many hundreds of computers.



▶ Europium (Eu), is one of the lanthanoids. It is a hard silvery-white metallic element and is used in television screens and fluorescent light bulbs.

Exercises

- 4 Which of the following elements is a metalloid?
 A calcium B manganese C germanium D magnesium
- 5 Which of the following materials is the best conductor of electricity in the solid state?
 A silicon B graphite C phosphorus D antimony
- 6 Which of the following properties is used to arrange the elements in the modern Periodic Table?
 A relative atomic mass B number of valence electrons
 C atomic number D effective nuclear charge