

Reading 1

Chemistry plays a vital role in electrical engineering and computing (actually in the entire engineering field), as it is the basis of electronic component design. Transistors, chips, capacitors etc. are all built from some sort of chemical. To effectively design and manufacture them requires a deep knowledge of chemistry.

► The two texts that follow refer to the classification of the elements on the periodic table. The first text provides an overview of the periodic table, whereas the second focuses mostly on metalloids, the group which silicon belongs to. Read the texts and do the activities that go with them.

PERIODIC TABLE OF ELEMENTS

The periodic table shows elements arranged in rows (periods) and columns (groups). Key features include:

- Periods:** 7 main periods, with a double row at the bottom for elements 118 and 119.
- Groups:** 18 groups, numbered 1 to 18 from left to right.
- Blocks:** s-block (groups 1-2), p-block (groups 13-18), d-block (transition metals, groups 3-10), and f-block (lanthanides and actinides, shown separately at the bottom).
- Properties:** Elements are color-coded by their chemical properties: alkali metals (red), alkaline earth metals (orange), transition metals (various blues and greys), metalloids (green), nonmetals (yellow), and noble gases (light blue).

Text A – Description of the Periodic Table

The periodic table of the elements is a grid of 118 known elements, 90 of which occur in nature, while the rest are synthesized. The elements are arranged in 7 rows, called *periods*, and 18 columns, called *groups* (sometimes also referred to as *families*), which are numbered from 1 to 18 from the leftmost column to the rightmost column. Also located at the bottom of the table is a double row of elements, which are placed separately due to their electron configuration.

The properties of the elements change gradually, as we move horizontally across each period and vertically down each group. While the periods show trends in atomic radius, ionization energy, and electron affinity, the groups contain elements with the same electron configuration tending to share similar chemical properties. Electrical conductivity, that is, the capability of a substance to conduct the electric current, changes too, following an increasing trend as we go down the groups due to the increase in the atomic radius. The most electrically conductive element is silver, followed by copper and gold.

The first period consists only of two elements, i.e., hydrogen and helium, while the second and third periods consist of 8 elements each, the former beginning with lithium and ending with neon and the latter beginning with sodium and ending with argon. There follow the fourth and fifth periods

of 18 elements each, the former beginning with potassium and ending with krypton and the latter beginning with rubidium and ending with xenon.

This brings us to the last two periods of the table. The sixth period contains 32 elements, beginning with caesium and ending with radon. The lanthanides, also known as the *rare earths*, are part of this period. The seventh period, beginning with francium and ending with oganesson, also consists of 32 elements, all of which are radioactive. The actinides are part of this period. Lanthanides and actinides are indicated separately towards the bottom of the chart.

Lanthanides (or *lanthanoids*) include the elements from lanthanum through lutetium, while actinides (or *actinoids*) comprise the elements from actinium through lawrencium. The noble gases, i.e., helium, neon, argon, krypton, xenon and radon, on the other hand, occur at the ends of the periods, in the column along the far right side of the table.

Also displayed are four rectangular blocks which are related to the sequence in which the electron shells of the elements are filled. The s-block contains hydrogen, helium, alkali metals and alkaline earth metals. The p-block contains the metalloids, while the d-block comprises transition metals and the f-block lanthanides and actinides.