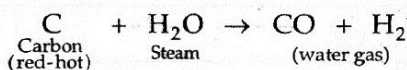


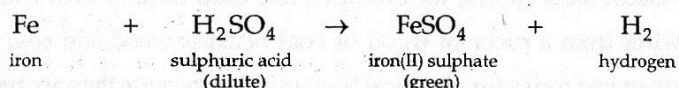
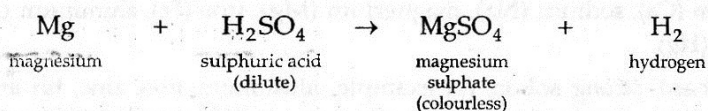
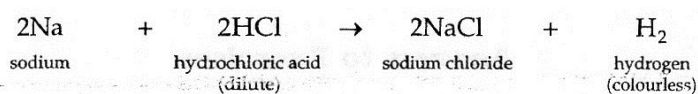
6 Metals and Nonmetals

Answers to Exercises

- A.
- Potassium (K), calcium (Ca), sodium (Na), magnesium (Mg), iron (Fe), aluminum (Al), zinc (Zn), copper (Cu), tin (Sn) and mercury (Hg)
 - Metals are generally hard, strong solids, for example, aluminum, iron, zinc, tin and copper. They are strong enough to bear heavy loads. Steel cables, for example, are used to carry heavy loads.
 - (a) We cannot draw wires from a piece of wood or coal because wood and coal are brittle, not flexible.
(b) We cannot use nylon or jute ropes for electrical transmission because they are bad conductors of electricity.
(c) We cannot use a cooking utensil made of cardboard because it is a bad conductor of heat.
 - Hydrogen, nitrogen, oxygen, fluorine and chlorine
 - Potassium and sodium react vigorously even with cold water, while magnesium continues to burn in steam if ignited.
 - (a) All combustion processes need oxygen.
(b) Oxygen is used in the manufacture of sulphuric and nitric acids.
(c) Liquid oxygen is used to burn rocket fuel.
 - (a) Plants use nitrogen to manufacture proteins.
(b) Liquid nitrogen is used to preserve blood, corneas or other donated organs.
(c) Nitrogen is used in the manufacture of ammonia and urea.
 - Alloys are homogeneous solid mixtures of metals or of metals and nonmetals. Alloying is done to make the parent metal stronger. Steel, brass and bronze are alloys.
- B.
- Metals have lustre, known as metallic lustre. They are sonorous. When struck, they produce a sound called a metallic sound. Metals are also malleable, i.e., they can be beaten or rolled into sheets. They are ductile, i.e., they are flexible and can be drawn into wires. Metals are good conductors of electricity.
 - In contrast to metals, nonmetals are not known for strength. They are usually lustreless (dull), except graphite and iodine, brittle (if solid), bad conductors of heat, bad conductors of electricity (except graphite) and nonsonorous (i.e., they do not produce a metallic clink).
 - Carbon, when red-hot, reacts with steam. When steam is passed over red-hot coke (carbon), a gaseous mixture of carbon monoxide and hydrogen is formed. This mixture, called water gas, has many industrial uses.



- Copper wires are generally used for domestic wiring and aluminum wires for long-distance electrical transmission. Aluminium is lighter and cheaper than copper. Iron is a very useful metal as it is tough, strong and cheap. It is used for making tools, machines and agricultural equipment. Mercury does not stick to glass. It is also a good conductor of heat. So it is used in thermometers.
 - Carbon is found in two crystalline forms—diamond and graphite. Diamond is used as a gem and also for cutting rocks or glass. Since graphite is a good conductor of electricity, it is used as an electrode. Graphite is a good lubricant. Since its melting point is high, it can be used as a lubricant in machines that acquire high temperatures while being operated.
- 2.
- Metals along with hydrogen (a nonmetal) are arranged in order of their activity in a series, called the activity series. This series helps us understand the reactions of metals. Metals higher than hydrogen in the activity series displace hydrogen from dilute hydrochloric and sulphuric acids, but those below hydrogen do not. Also, the reactivity of the metal decreases down the series.
For example, (a) iron displaces hydrogen from dilute sulphuric acid, and (b) magnesium reacts more vigorously with an acid than iron does.



Copper or silver do not liberate hydrogen from dilute acids because they are less active than hydrogen.

2. Using an electrical circuit, we can easily test whether or not something conducts electricity. Sharpen a small pencil at both ends, and connect the two naked ends of the 'lead' to the circuit. The bulb will glow, showing that the 'lead' of the pencil conducts electricity. The 'lead' of a pencil is made of a mixture of clay and graphite, and graphite (a form of carbon) is a good conductor of electricity. Replace the pencil by some sulphur. The bulb does not glow showing that sulphur is a bad conductor of electricity.

- D. 1. iodine 2. metals 3. clay, graphite 4. liquid 5. Argon 6. nitrogen
- E. 1. (d) 2. (d) 3. (a) 4. (d) 5. (d)
- F. 1. Neon-B, s 2. Graphite-B, C, u 3. Iodine-B, C, r 4. Aluminium-A, C, p
5. Diamond-B, C, t 6. Mercury-A, D, u