Class 10 Science · Chapter 3: Metals and Non-metals

Answer key and marking scheme · 20 marks · about 40 minutes · based on NCERT

Scan for the free Class 10 Science test

1. Temple bells and school bells are cast from metals and not from wood or plastic, chiefly because metals [1]

(a) are good conductors of heat
(b) are sonorous
(c) have high melting points
(d) are lustrous

Answer: (b) A bell must ring when struck. Metals that produce a sound on striking a hard surface are sonorous.

2. An oxide Y dissolves in dilute hydrochloric acid and also in sodium hydroxide solution, and in each case a salt and water are formed. Y could be [1]

(a) MgO
(b) ZnO
(c) Na_2O
(d) CO_2

Answer: (b) An oxide that reacts with both acids and bases to give salt and water is amphoteric; zinc oxide is one. MgO and Na_2O are basic and react only with acids; CO_2 is acidic.

3. An electrician holds the bare end of a copper wire in a gas flame for a minute. The end does not burn but turns black. The black coating is [1]

(a) copper(II) oxide, CuO
(b) copper sulphide, Cu_2S
(c) basic copper carbonate
(d) soot from the flame

Answer: (a) Copper does not burn, but on heating in air it combines with oxygen and is coated with black copper(II) oxide: $2Cu + O_2 \rightarrow 2CuO$.

4. Sodium oxide is added to water. The equation for the change is [1]

(a) $Na_2O + H_2O \rightarrow 2NaOH$
(b) $Na_2O + H_2O \rightarrow 2Na + H_2O_2$
(c) $Na_2O + H_2O \rightarrow NaOH + H_2$
(d) $Na_2O + H_2O \rightarrow$ no reaction, as metal oxides are insoluble

Answer: (a) Most metal oxides are insoluble, but sodium oxide dissolves to form the alkali sodium hydroxide: $Na_2O + H_2O \rightarrow 2NaOH$. No hydrogen is formed, and option c is not balanced.

5. Which statement about the allotropes of carbon is correct? [1]

(a) Diamond conducts electricity and graphite is the hardest natural substance.
(b) Both diamond and graphite conduct electricity.
(c) Diamond is the hardest natural substance and graphite conducts electricity.
(d) Diamond has a low melting point because it is a non-metal.

Answer: (c) Diamond is the hardest natural substance known, with a very high melting and boiling point; graphite conducts electricity. The other options swap or deny these facts.

6. Element E has the electronic configuration 2, 8, 7. (a) Will E form a positive or a negative ion? Give a reason. (b) Write the configuration of the ion formed. [2]

(a) Negative. E has seven outer electrons and gains one to complete its octet; non-metals form negative ions by gaining electrons. (b) 2, 8, 8 (this is the chloride ion, Cl^-).

- negative ion, gains one electron to complete the octet (1)
- 2, 8, 8 (1)

Every question original, written from NCERT, checked by a second reviewer · photocopy freely for your class

7. An electrician says the copper core of a house wire must be covered with PVC. (a) Which property of copper makes it the core? (b) Why is PVC used for the cover? [2]

(a) Copper, like other metals, is a good conductor of electricity. (b) PVC is an insulator and does not conduct electricity, so the current stays inside the wire.

- copper conducts electricity (1)
- PVC is an insulator, keeps current in the wire (1)

8. Mercury is obtained from its sulphide ore, cinnabar, by heating alone. Write the two balanced equations for the steps. [2]

Roasting in air: $2HgS + 3O_2 \rightarrow 2HgO + 2SO_2$. Further heating decomposes the oxide: $2HgO \rightarrow 2Hg + O_2$.

- $2HgS + 3O_2 \rightarrow 2HgO + 2SO_2$ (1)
- $2HgO \rightarrow 2Hg + O_2$ (1)

9. In a copper refinery, current is passed for several hours through a tank holding a thick plate of impure copper and a thin plate of pure copper in copper sulphate solution. The thick plate becomes thinner, the thin plate becomes thicker, and a sludge collects on the floor of the tank below the thick plate. (a) Which plate is the anode and which the cathode? (b) What is the sludge, and what does it contain? (c) What happens to the impurities that do not form the sludge? [3]

(a) The thick impure plate is the anode; it dissolves. The thin pure plate is the cathode; pure copper deposits on it. (b) The sludge is anode mud: the insoluble impurities, which settle below the anode. (c) The soluble impurities pass into the solution.

- impure plate anode, pure plate cathode (1)
- anode mud of insoluble impurities (1)
- soluble impurities go into solution (1)

10. A white crystalline solid X shatters when hit with a hammer, melts only at a very high temperature, dissolves in water but not in petrol, and conducts electricity in solution but not as a dry solid. (a) What kind of compound is X? (b) Why is its melting point so high? (c) Why does it conduct in solution but not as a solid? [3]

(a) An ionic compound: brittle, high-melting, soluble in water and insoluble in petrol. (b) A considerable amount of energy is needed to break the strong attraction between its oppositely charged ions. (c) In the solid the rigid structure keeps the ions from moving; in solution the ions move freely and carry the current.

- ionic compound (1)
- strong inter-ionic attraction needs much energy to break (1)
- ions fixed in solid, free to move in solution (1)

11. A railway gang mends a gap between two rail ends by igniting a mixture of iron(III) oxide and aluminium powder in a mould over the joint. (a) Write the equation for the reaction. (b) Why does aluminium take the oxygen from iron(III) oxide? (c) Why does the iron run into the gap? [3]

(a) $Fe_2O_3 + 2Al \rightarrow 2Fe + Al_2O_3$ + heat (the thermit reaction). (b) Aluminium is a highly reactive metal and displaces the less reactive iron from its compound, so it acts as the reducing agent. (c) The reaction is so exothermic that the iron is produced molten, and flows into the gap.

- balanced thermit equation (1)
- Al more reactive, displaces iron / reducing agent (1)
- highly exothermic, iron formed molten (1)

Every question original, written from NCERT, checked by a second reviewer · photocopy freely for your class