Goa Board
Class X Science
Term 1
Sample Paper – 2 Solution

Time: 3 hrs **Total Marks: 90**

SECTION A

1. **Ans.** Two substances combine to form one compound in combination reactions, and a compound breaks down into two or more substances in decomposition reactions, so they are opposite to each other.

2. **Ans.** On increasing the area of cross-section, resistance decreases. This is because resistance is inversely proportional to area.

3. **Ans.** Energy possessed by the rising and falling water in tides is known as tidal energy.

4. **Ans.** $KCl(aq) + AgNO_3(aq) \rightarrow AgCl(s) + KNO_3(aq)$

   It is a double displacement and precipitation reaction.

5. **Ans.** Total resistance in the circuit = $4\,\Omega + 2\,\Omega = 6\,\Omega$
   Current in the ammeter = V/R = 3/6 = 0.5 A
   Reading of the voltmeter = $2\,\Omega \times 0.5$ A = 1 V

6. **Ans.** Vital functions of the human kidney:
   (i) The human kidney carries out the process of excretion by removing metabolic wastes from the blood.
   (ii) It performs the function of osmoregulation by maintaining normal levels of water and mineral ions in body fluids.

7. **Ans.** Most of the nuclear wastes are radioactive and emit radiations which are dangerous.
   (i) The human body can tolerate the absorption of radiations up to a certain level only. Beyond the tolerance level, radiation can cause irreparable damage to the cells and their nuclei.
   (ii) It may cause cancer or death of human beings.
   (iii) Radiation may cause change in DNA or genes which may produce deformed organs in future generations.

8. Ans.

(a) Digestion of food is a decomposition reaction. When we eat foods such as wheat, rice or potatoes, the starch present in them decomposes to give simple sugars such as glucose in the body, and the proteins decompose to form amino acids.

(b) Energy in the form of heat, light or electricity is required for decomposition reactions to occur; hence, these are endothermic reactions.

(c) A popping sound is produced when a burning candle is brought near the mouth of the test tube containing hydrogen gas because hydrogen burns in air with a popping sound.

9. Ans.

(a) When a strip of lead metal is placed in a solution of copper chloride, lead chloride solution and copper metal are formed.

The green colour of copper chloride fades and the solution becomes colourless. A red brown coating of copper metal is deposited on the lead strip. Lead is more reactive than copper; hence, it is able to displace it from its solution.

$$Pb_{(s)} + CuCl_{2\,(aq)} \rightarrow PbCl_{2\,(aq)} + Cu_{(s)}$$

(b) Any reaction in which an insoluble solid (precipitate) is formed which separates out from the solution is called a precipitation reaction.

$$BaCl_{2\,(aq)} + Na_2SO_{4\,(aq)} \rightarrow BaSO_{4\,(s)} + 2NaCl_{(aq)}$$

10. Ans.

(i) The substance 'X' is calcium oxide. Its chemical formula is CaO.

(ii) Calcium oxide reacts vigorously with water to form calcium hydroxide (slaked lime).

$$\underset{\text{Calcium oxide}}{CaO} + \underset{\text{Water}}{H_2O} \longrightarrow \underset{\text{Calcium hydroxide}}{Ca(OH)_2}$$

(iii) $3BaCl_2 + Al_2(SO_4)_3 \longrightarrow 3BaSO_4 + 2AlCl_3$

11. Ans. Plants require specific pH range for their healthy growth. Excess use of pesticides and fertilisers brings about a change in the pH of soil, which either makes it more acidic or basic. In the long run, the soil becomes infertile. This causes soil erosion, resulting in damage even to the environment. So, the excess use of pesticides and fertilisers should be banned. Fruits and vegetables should be first washed properly before eating to remove traces of any pesticide or fertiliser or any other harmful chemical or dust which may have settled on the surface of the vegetable or fruit.

12. Ans. Metal oxides which are not reduced by carbon are successfully reduced to metals by aluminium. Therefore, a more reactive metal such as aluminium is used as the reducing agent. Aluminium reduces the metal oxide to metal and itself gets oxidised.

Example: The oxides of manganese and chromium metals are not satisfactorily reduced by carbon. So, these metals are extracted by the reduction of their oxides with aluminium powder. Aluminium powder reduces the metal oxide to metal and is itself oxidised to aluminium oxide.

Example: When manganese dioxide is heated with aluminium powder, manganese metal is produced.

$$3MnO_2(s) + 4Al(s) \rightarrow 3Mn(l) + 2Al_2O_3(s) + Heat$$

This reduction reaction of manganese dioxide with aluminium is a highly exothermic reaction.

13. Ans.

(a) Oil- and fat-containing food items are flushed or surrounded with an inert gas such as nitrogen while packing them to prevent their contact with the oxygen of air. This is done to avoid rancidity of fats and oils.

(b) Rust is a soft and porous substance which gradually falls off from the surface of an iron object and then the iron below starts rusting. Its formula is $Fe_2O_3.xH_2O$.

14. Ans.

$$\text{Current in the circuit} = \frac{12V}{10\Omega + \frac{6\Omega \times 3\Omega}{6\Omega + 3\Omega}} = \frac{12V}{10\Omega + 2\Omega} = 1A$$

Since the resistors in the parallel combination (3 ohm and 6 ohm) have values in the ratio 1:2,

1A current will be divided in the ratio of 2:1 , i.e, $\frac{2}{3}A$, $\frac{1}{3}A$

$$\text{Current through } 3\Omega \text{ resistor} = \frac{2}{3}A = 0.67A$$

15. Ans.

(a) Charcoal is a better fuel than wood because

(i) It has higher heat generation efficiency than wood.

(ii) It does not produce smoke when it is burnt, whereas wood produces a lot of smoke.

(b) A biogas plant helps to reduce the problem of pollution because large-scale utilisation of biowaste and sewage materials provides a safe and efficient method of waste disposal.

16. Ans.

(a) Ohm's law

Mathematical form: V/I = Constant or V/I = R

(b) A represents the series combination of B and C. In a series combination, the equivalent resistance becomes greater than either of the individual resistances, and because the slope of A is greater than that of B and C, the resistance of A is greater than that of either B or C.

17. Ans.

(a) Factors on which the direction of force experienced by a current-carrying conductor placed in a magnetic field depend are

(i) The direction of the current and (ii) the direction of the magnetic field.

(b) The force acting on a current-carrying conductor placed in a magnetic field is maximum when the direction of the current is at right angles to the direction of the magnetic field.

(c) Because the proton beam is moving parallel to the direction of the magnetic field, no force acts on it.

18. Ans. Difference between involuntary actions and reflex actions:

Involuntary actions	Reflex actions
1. Occur without the conscious choice of an organism	1. Rapid automatic responses to a stimulus without the conscious involvement of the brain
2. Controlled by the midbrain or medulla oblongata	2. Controlled by the spinal cord
3. Relatively slower	3. Very quick and instantaneous
4. Involve only smooth muscles	4. May involve any muscle or a gland
5. Cannot be influenced by external conditioning	5. Can be conditioned
Examples: Beating of heart, blood circulation	Examples: Blinking of eyes, salivation

19. Ans.

(a) Bleaching powder

(b) $CaOCl_2$

(c) $Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$

(d) Bleaching powder is used:

(i) As an oxidising agent in many chemical industries

(ii) For disinfecting drinking water to make it free of germs

20. Ans.

(a) $ZnCO_3(s) \xrightarrow{heat} ZnO(s) + CO_2(g)$

(b) $2ZnS(s) + 3O_2(g) \xrightarrow{heat} 2ZnO(s) + 2SO_2(g)$

(c) $ZnO(s) + C(s) \xrightarrow{heat} Zn + CO$

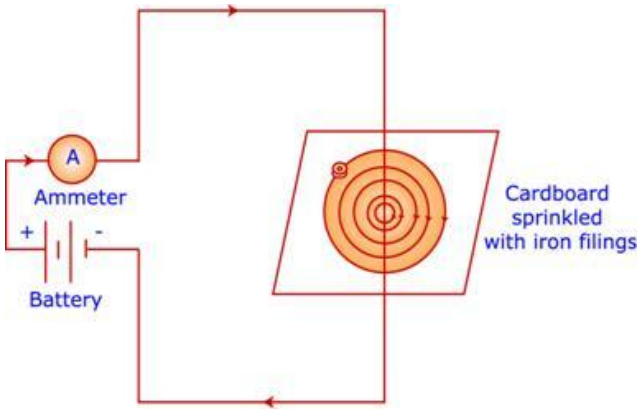
(d) $2HgS(s) + 3O_2(g) \xrightarrow{heat} 2HgO(s) + 2SO_2(g)$

$2HgO(s) \xrightarrow{heat} 2Hg(l) + O_2(g)$

(e) $3MnO_2(s) + 4Al(s) \xrightarrow{heat} 3Mn(l) + 2Al_2O_3(s)$

21. Ans. Brief explanation of activity:

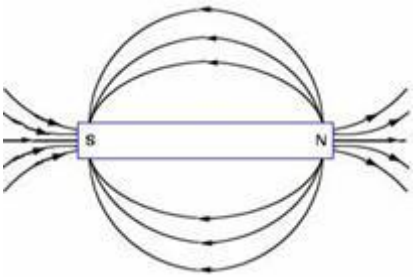
Connect the circuit as shown in the figure below. Switch on the battery so that the current begins to flow. Sprinkle some fine iron filings around the current-carrying wire. Tap the surface gently. The iron filings get arranged in concentric circles which denote the shape of magnetic field lines around the straight current-carrying conductor (i.e. the wire).



When the current decreases, the field also decreases.

When the direction of the current is reversed, the direction of the field is also reversed.

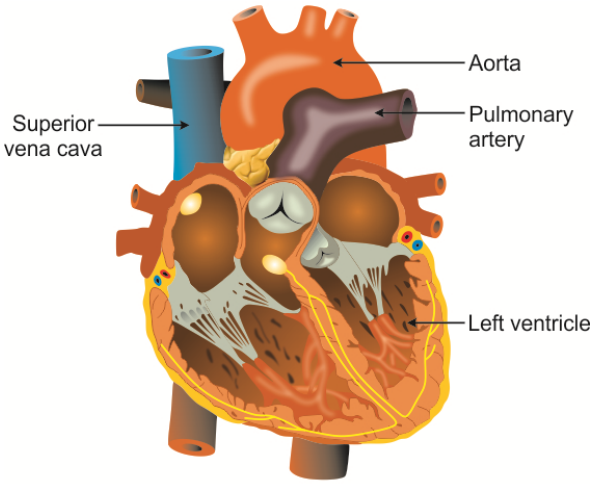
22. Ans. A magnet is placed on a sheet of paper. A compass needle is placed near the North Pole. The position of its two ends is marked with the help of a sharp pencil. Now, the compass is moved in such a way that its south end occupies the position occupied by the north end previously. Again, the two ends are marked with a sharp pencil. In this way, the process goes on step by step till the South Pole of the magnet is reached. Now, all points are joined to get a smooth curve which represents a field line. In this way, many field lines can be drawn.



Region A has a stronger magnetic field because the strength of the field is proportional to the relative closeness of field lines.

23. Ans.

(a)

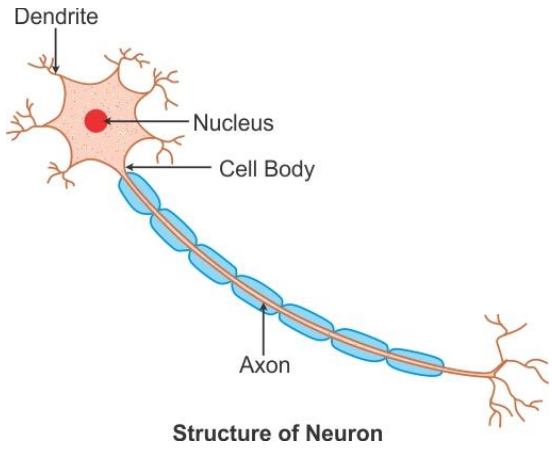


Structure of Human Heart

(b) Double circulation of blood is essential in human beings because in double circulation, there is complete segregation of oxygenated and deoxygenated blood. As a result, the blood passes through the heart twice in one cycle of circulation.

24. Ans.

(a)



Structure of Neuron

(b)

(i) The part of the neuron where information is acquired: Dendrite

(ii) The part of the neuron through which information travels as an electrical impulse: Axon

SECTION B

25. Ans. C. A hissing sound is produced because the reaction is highly exothermic.

26. Ans. B. The colour of the solution changes from colourless to blue because of the basic nature of sodium hydroxide.

27. Ans. C. The mixture turns blue because of the basic nature of sodium hydroxide.

28. Ans. B. In Figure B, the three resistors are connected in parallel.

29. Ans. B. $I = V/R = 6/2 = 3$ A

30. Ans. B. $0.5/20 = 0.025$ V

31. Ans. C. Resistance can be measured immediately after closing the key.

32. Ans. B. The voltmeter should be connected in parallel and the ammeter in series.

33. Ans. A (i) and (v). Guard cells and epidermal cells are labelled correctly. Label (ii) denotes thick wall and not thin wall. Label (iv) is chloroplast and not nucleus.

34. Ans.

(i) A. The level of water in the beaker does not rise because of the absence of any substance in the flask which could absorb the gas given out by the seeds.

(ii) Potassium hydroxide (KOH) should have been present in the flask. KOH absorbs the carbon dioxide gas from the air present in the flask so that no carbon dioxide is left in the air inside the flask.

35. Ans. The iron nail gets coated with reddish brown copper, and the blue colour of the copper sulphate solution fades out. In this reaction, the more reactive iron displaces the less reactive copper from the copper sulphate solution. This reaction is known as a displacement reaction.

Reaction: $Fe_{(s)} + CuSO_{4\,(aq)} \rightarrow FeSO_{4\,(aq)} + Cu_{(s)}$

36. Ans.

(i) C. A voltmeter should be connected in parallel to the two resistances.

(ii) Figure IV can be correct by interchanging the position of the voltmeter and ammeter.