

**CBSE**  
**Class X Science**  
**Sample Paper 5 – Solution**

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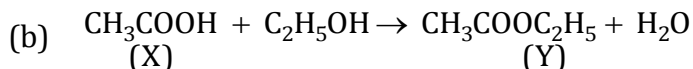
**Section A**

1. When the plastic insulation of the live wire and neutral wire gets torn, the two wires come in contact with each other and cause a short circuit.

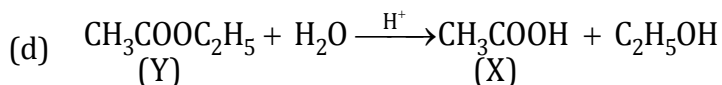
2. Menopause

3.

(a) Compound 'X' is ethanoic acid. Dilute solution of acetic acid called vinegar is used as a preservative.



(c) Compound X (ethanoic acid) will form when compound Y (ethyl ethanoate) will react with water in the presence of dilute HCl.



The above process is known as Ester hydrolysis.

4.

(a) Substance E can be used as an insulator.

(b) Substances A and C can be used for the purpose of domestic wiring.

(c) Substance D can be used to make solar cells.

(d) An alloy has resistivity higher than a pure metal but lesser than a semiconductor.  
Thus, substance B is an alloy.

5. (iii) 7.5 m

To be 5 m away from his image, the man must be standing 2.5 m away from the mirror.

Thus, image distance + object distance = 2.5 m + 2.5 m = 5 m

Initially, he is 10 m away from the mirror. So, the man must walk a distance of 10 m – 2.5 m = 7.5 m.

**OR**

(i) the focus

If an object is placed at infinity in front of a concave mirror, the image is formed at the focus.

6. (ii) geographical north

The South Pole of the Earth's magnet is in the geographical north.

7. i) a decrease in volume and an increase in pressure

As the volume increases, the pressure inside the lungs decreases, and thus, the air flows into the lungs by the process of inspiration or inhalation.

8. i) Man

As we go higher and higher in the trophic levels, the concentration of chemicals keeps on increasing. Since man is at the top level as compared to fish, birds and aquatic plants, the concentration of DDT would be maximum in man, and hence, he would be affected the most.

**OR**

- iv) Recycle them

It is best to recycle the used tyres as they are made of rubber which take a long time to decompose and can pollute the environment.

9. iii) Nissl's granules

The cell body has certain granular bodies called Nissl's granules. Dendrites also contain Nissl's granules and neurofibrils.

10. i) Bleaching powder gives the smell of chlorine because it produces chlorine on exposure to air.

11. ii) Aluminium oxide reacts with sulphuric acid to form aluminium sulphate and water.

12. iii) Mutations and sexual reproduction

Mutations result in a change in genetic material which results in a new combination of genes, thereby producing variation. Sexual reproduction involves crossing over and recombination which results in variation.

**OR**

- ii) Scion

The scion is generally taken from plants having superior characters. The scion becomes a part of the plant (stock) onto which it is grafted. Since the scion bears superior characters, the successfully grafted plant bears flowers and fruits characteristic of the scion.

13. i) Both A and R are true, and R is the correct explanation of the assertion.

Coliform bacteria are mainly present in human excreta. Dumping of wastes such as garbage and excreta can increase the level of coliform bacteria in water.

14. i) Both A and R are true, and R is the correct explanation of the assertion.

## Section B

15. A large number of alveoli in the lungs provides a large surface area for the exchange of gases. Walls of alveoli contain an extensive network of blood vessels. The walls are extremely thin and made of a single layer of cells.
16. In a food chain, the trophic levels are consecutive steps followed in the process of energy flow and each step or level is dependent on the other for food. Different trophic levels are
- Producers: They form the first trophic level and are able to manufacture their own food (green plants).
  - Primary consumers: They form the second trophic level and are generally plant eaters (herbivores).
  - Secondary consumers: They form the third trophic level and are flesh eaters (carnivores).
  - Tertiary consumers: They form the fourth trophic level and feed on secondary consumers.

OR

The hindbrain controls involuntary actions. It consists of pons, medulla and cerebellum. Functions of the medulla and cerebellum:

- The medulla helps in controlling involuntary actions such as blood pressure, salivation and vomiting.
- The cerebellum is responsible for the precision of voluntary actions and maintaining the posture and balance of the body.

17.

(a) Total resistance in arm CE

$$CE = 5\Omega + 4\Omega = 9\Omega$$

(b) Current in arm AB

$$= \frac{4.5V}{9\Omega} = 0.5A$$

(c) Current in arm CE=

$$\frac{4.5A}{9\Omega} \\ = 0.5A$$

So, the potential difference across the  $4\Omega$  resistor

$$= 4\Omega \times 0.5A = 2V$$

18.

- (a) Sodium hydrogen carbonate and tartaric acid.
- (b) Baking powder is a mixture of baking soda and tartaric acid, whereas baking soda is only sodium hydrogen carbonate.

- (c) When baking powder mixes with water, sodium hydrogen carbonate reacts with tartaric acid to evolve carbon dioxide which gets trapped in the wet dough and bubbles out slowly making the cake soft and spongy.

19.

- (a)
- (i) The quality of the environment was maintained due to conservation of forests.
  - (ii) The local people could use the forest resources in suitable ways.
- (b) Conservation of wildlife helps in maintaining the ecological balance of the biosphere and provides a gene bank for the improvement of domesticated plants and animals.
- (c) IUCN stands for 'International Union for Conservation of Nature and Natural Resources'.

20.

- (a) Two characters.  
They are shape of seed and colour of seed.
- (b) A dominant trait is a genetic trait which is considered dominant if it is expressed in a person who has only one copy of that gene.  
A recessive trait is a genetic trait which is expressed only when two copies of the same gene are present.

21.

- (a)
- $$2\text{NaHCO}_3 \xrightarrow{\text{Heat}} \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$$
- |            |            |
|------------|------------|
| ( sodium   | (Sodium    |
| hydrogen   | carbonate) |
| carbonate) |            |

When CO<sub>2</sub> gas escapes as bubbles it leaves behind pores which make the cake or bread soft and spongy.

- (b) It is a salt of a strong base, so the pH of the solution will be more than 7.

**OR**

- (a)  $2\text{CH}_3\text{COOH} + \text{Zn} \rightarrow (\text{CH}_3\text{COO})_2\text{Zn} + \text{H}_2$
- (b)  $\text{CH}_3\text{COOH} + \text{NaOH} \rightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O}$
- (c)  $2\text{CH}_3\text{COOH} + \text{Na}_2\text{CO}_3 \rightarrow 2\text{CH}_3\text{COONa} + \text{H}_2\text{O} + \text{CO}_2$

22.

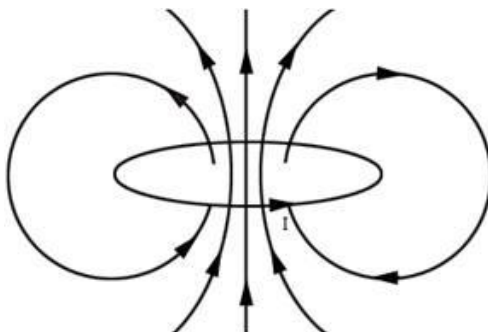
- (a) The strength of the magnetic field (B) is inversely proportional to the radius of the circular loop (r).

$$B \propto \frac{1}{r}$$

- (b) The strength of the magnetic field (B) is directly proportional to the number of turns in the coil (N).

$$B \propto N$$

- (c) The magnetic field lines will be as shown below.

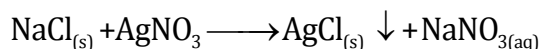


**OR**

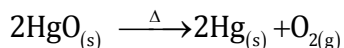
- (a) Factors on which the direction of force experienced by a current-carrying conductor placed in a magnetic field depend are  
 (i) Direction of current and (ii) direction of magnetic field
- (b) The force acting on a current-carrying conductor placed in a magnetic field is maximum when the direction 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.

**23.**

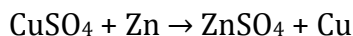
- (a) Double decomposition reaction: This is a type of chemical reaction in which two compounds in a solution react to form two new compounds by mutual exchange of radicals.



- (b) Thermal decomposition reaction: A decomposition reaction brought about by heat is known as thermal decomposition.



- (c) Displacement reaction: It is a chemical reaction in which a more active element displaces a less active element from its salt solution.



**24.**

- (a) When the object lies between the optical centre and the focus of the lens, a convex lens forms an erect and virtual image.
- (b) When a parallel beam of light falls on a smooth and highly polished surface, the reflected beam is also parallel and directed in a fixed direction. Such reflection of light is called regular reflection.

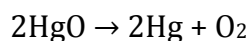
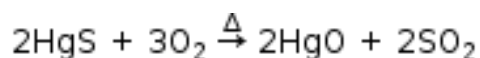
- (c) Concave mirrors are used as shaving mirrors to see a large image of the face. This is because when the face is held within the focus of a concave mirror, an enlarged image of the face is seen in the concave mirror. This helps in getting a smooth shave.

### Section C

25.

- (a) Hg - Mercury  
(b) HgS - Cinnabar  
(c) When heated in air, cinnabar is first converted to mercuric oxide (HgO) which is reduced to mercury on further heating.

(d)

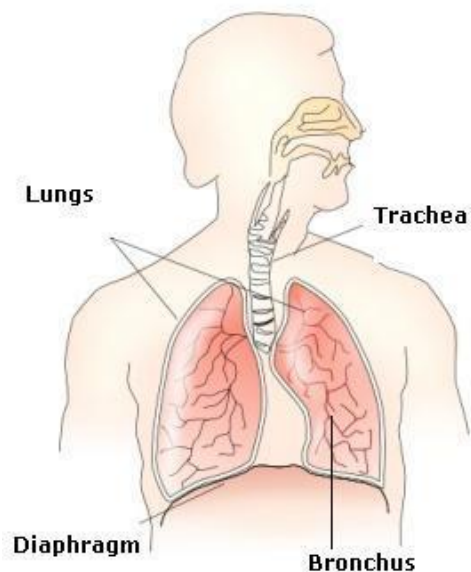


OR

- (a) If we bring a lighted matchstick near the gas, it will burn very brightly, accompanied by explosion along with a 'pop sound'. This shows that the gas evolved is hydrogen.  
(b) The reaction takes place as follows:  
$$\text{Mg} + 2\text{H}_2\text{O} \longrightarrow \text{Mg}(\text{OH})_2 + \text{H}_2 \uparrow$$
  
(c) Magnesium will lose all its shine and a deposit of magnesium hydroxide will be formed on the surface of the metal after a week's time.  
(d) As the solution contains  $\text{Mg}(\text{OH})_2$  which is slightly basic, the indicator will acquire blue colour indicating that the pH of the solution is more than 7.

26.

- (a) Respiratory system:



(b) Haemoglobin

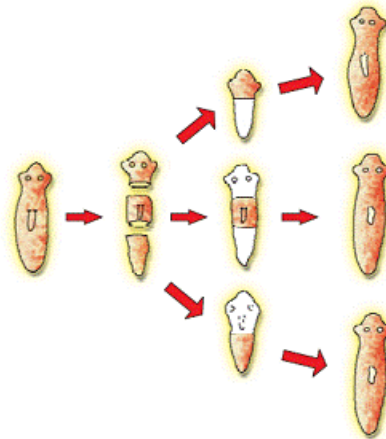
Role of haemoglobin: It is an iron-protein compound in red blood cells which gives blood its red colour and transports oxygen and carbon dioxide.

- (c) The rate of breathing in aquatic organisms is much faster than that in terrestrial organisms because the amount of dissolved oxygen in water is fairly low compared to the amount of oxygen in the air.

**OR**

- (a) Planaria can be cut into any number of pieces, and each piece grows into a complete organism. This process is called regeneration. It is carried out by specialised cells in the organism.

**Regeneration in Planaria**



- (b) The embryo gets nutrition from the mother's blood with the help of a special tissue called the placenta. It provides a large space and area for glucose and oxygen to pass from the mother to the embryo. The developing embryo also produces waste substances which can be moved by transferring them into the mother's blood through the placenta.
- (c) The ovule develops a tough coat and is gradually converted to a seed. The ovary grows rapidly and ripens to form a fruit.

**27.**

- (a) Humans have cultivated wild cabbage and produced different vegetables. Example:

- (i) Some farmers wanted a short distance between the leaves of wild cabbage and so produced the common variety of cabbage.
- (ii) When farmers opted for the arrested flower development of wild cabbage, it led to the production of broccoli.
- (iii) Some farmers went in for sterile flowers of wild cabbage and developed another variety of cabbage called cauliflower.
- (iv) When farmers opted for the swollen part of wild cabbage, it led to the production of kohlrabi.
- (v) Finally, farmers wanted to grow large leaves of wild cabbage and ended up producing the leafy vegetable kale.

(b) Tools used to trace evolutionary relationships among species:

- (i) Excavating
- (ii) Time-dating
- (iii) DNA sequencing
- (iv) Fossil study

**28.**

(a)

- (i) Right-hand thumb rule: If one holds a wire carrying current in the right hand in such a way that the thumb indicates the direction of current, then the folded fingers indicate the direction of the magnetic field surrounding the wire.
- (ii) Fleming's left-hand rule: If we stretch the first three fingers of the left hand mutually perpendicular to each other such that the forefinger points along the direction of the magnetic field and the middle finger points along the direction of the current, then the thumb indicates the direction of the force experienced by the conductor.
- (iii) Fleming's right-hand rule: If the forefinger, middle finger and thumb of the right hand are stretched at right angles to each other, with the forefinger in the direction of the field and the thumb in the direction of the motion of the wire, then the induced current in the wire is in the direction of the middle finger.

(b) The direction of AC changes after equal intervals of time. The direction of DC does not change. Advantage of AC over DC is that AC can be transmitted over long distances without much loss of energy.

**29.**

- (a) Elements with comparatively filled shells are noble gas elements and they belong to Group 18. Since the element has two shells, it must be present in neon (Ne) with electronic configuration 2, 8.
- (b) The electronic configuration suggests that this element belongs to the third period and second group, i.e. magnesium (Mg).
- (c) The element with three shells is present in the third period and has four valence electrons. It must belong to Group 14. So, it is silicon with electronic configuration 2, 8, 4.
- (d) The element with two shells is expected to be present in the second period and it has three electrons in its valence shell. This means it is in Group 13 and is boron (B) with electronic configuration 2, 3.
- (e) This element has two shells, and the first shell has only two electrons. Therefore, as the given second shell has twice the electrons present in first shell, i.e. four, the electronic configuration is 2, 4, and the element is carbon (C).



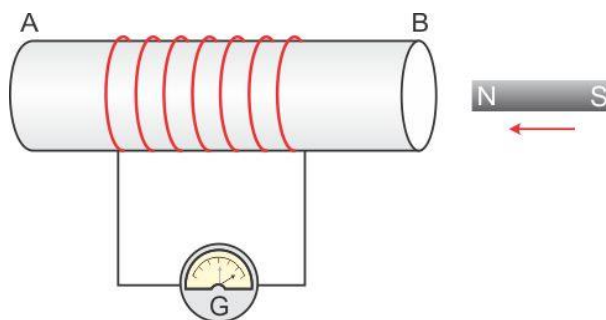
30.

(a) The process by which a changing magnetic field in a conductor induces a current in another conductor is called electromagnetic induction.

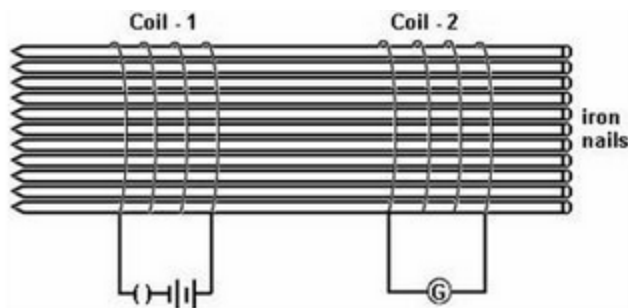
(b)

(i) By moving a magnet towards or away from a coil

We take a coil with several turns and it is connected to a sensitive galvanometer. When a bar magnet is moved towards the coil, we see a deflection in the galvanometer. This deflection dies down after some time. The deflection is because of the induced current.



(ii) By varying current in one coil, an induced emf is produced in the other coil.



Two coils of insulated copper wire are wrapped on few long iron rods. Coil-1 is connected to a battery through a switch and Coil-2 is connected to a galvanometer. Now, the current is switched on in Coil-1. A momentary deflection is seen in the galvanometer attached to Coil-2. The deflection is due to current induced in Coil-2 momentarily as the magnetic field builds up along the axis of Coil-1 when the current is switched on.

(c) When a bar magnet is held stationary inside the coil, there will be no deflection in the galvanometer indicating that no current is produced in the coil.

**OR**

(a) Total resistance  $R = R_1 + R_2 = 18\ \Omega + 6\ \Omega = 24\ \Omega$

(b) Current flowing through the circuit,  $I = V/R = 6/24 = 0.25\ \text{A}$

(c) Potential difference across the lamp,  $V_1 = IR_1 = 0.25 \times 18 = 4$

Potential difference across the resistor  $R_2$ ,  $V_2 = IR_2 = 0.25 \times 6 = 1.5\ \text{V}$