



# SECOND TERM EXAMINATION

## SCIENCE

*(Class X)*

(Life processes, Sustainable Management of Natural Resources, Periodic classification of elements, Metals and non-metals)

### **Solutions**

#### **SECTION-A**

(20 × 1 = 20)

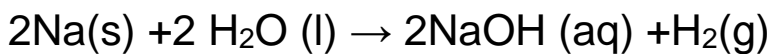
1. (b)
2. (a)
3. (c)
4. (d)
5. (b)
6. (a)
- 7.(b)
8. (C)
9. (d)
10. (b)
11. (b)
12. (c)
13. (a)
14. (a)

15. (d)
16. (c)
17. (b)
18. (a)
19.  $\text{GeCl}_4$ ,  $\text{GaCl}_3$
20. (b)

### Section B

15X3 =45

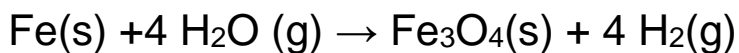
1. (a) Na reacts with cold water.



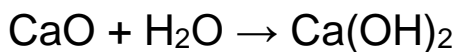
(b) Mg reacts with hot water.



(c) Fe reacts with steam.

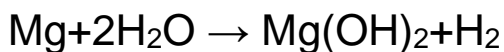


2. (a) The element is Calcium and the substance X is Calcium Oxide ( $\text{CaO}$ ). Calcium oxide is used extensively in the cement industry and Calcium is present in our bones in the form of Calcium Phosphate.



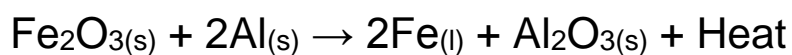
Calcium oxide dissolves in water to form a basic solution which turns red litmus blue.

(b) Magnesium reacts only with hot water. Product formed is magnesium hydroxide.



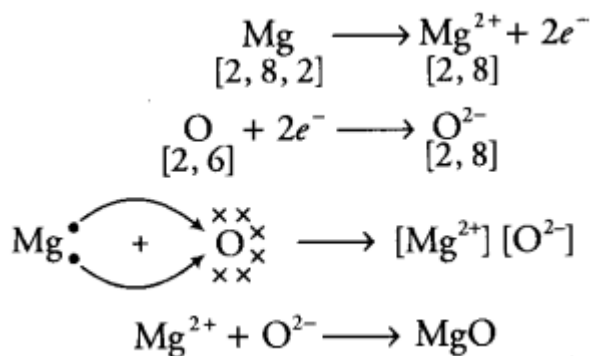
3. The reduction of a metal oxide to form metal by using aluminium powder as a reducing agent is called a thermite reaction. It is an exothermic reaction in which a large amount of heat is evolved. This reduction property of aluminium is used in thermite welding for joining the broken pieces of heavy iron objects like girders, railway tracks or cracked machine parts.

Example: A mixture of iron (III) oxide and aluminium powder is ignited with a burning magnesium ribbon. Aluminium reduces iron oxide to produce molten iron metal with the evolution of heat.



The molten iron produced is then poured between the broken iron pieces to weld them.

4. (a) Magnesium (Mg) loses two electrons from its outermost shell and becomes  $\text{Mg}^{2+}$ , while oxygen (O) gains two electrons to become  $\text{O}^{2-}$ .



(b) Magnesium oxide is an ionic compound with the chemical formula  $\text{MgO}$ . Thus the ions which constitute one unit of magnesium oxide are:-

- 1) Cation-magnesium ion
- 2) Anion-oxide ion

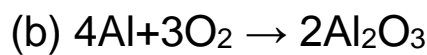
(c) A solution of ionic compounds contain ions since electricity conduction requires movement of charged particles they conduct electricity.

(i) Soluble in water

(ii) good conductor electricity in molten state and aqueous solution.

(iii) High melting and boiling point.

5. (a) Iodine is a non-metal which is lustrous. Iron is a metal which is a non-lustrous.



(c) Movement of ions in the solid state is not possible due to their rigid structure.

6.

| S. No. | Blood Vessels | Function  |
|--------|---------------|---|
| (i)    | Arteries      | They carry blood away from the heart to various organs of the body.   |
| (ii)   | Veins         | They collect the blood from different organs and bring it back to the heart.                                    |
| (iii)  | Capillaries   | Exchanges of material between the blood and surrounding cells takes place across the thin walls of capillaries. |

7. (i) Nasal passage

(ii) Bronchioles

(iii) Alveoli

(iv) Diaphragm

(b) Since the amount of dissolved oxygen is fairly low as compared to amount of oxygen in the air, the rate of breathing in aquatic organisms is much faster than that in terrestrial organisms.

8. (a) Electronic configuration of Li is 2,1 and that of Na is 2,8,1. Since sodium has more number of shells, thus a larger size.

(b) E.C. of Cl = 2,8,7

E.C. of S = 2,8,6.

As sulphur is placed before chlorine in the periodic table, so it has a bigger size and its tendency to gain electrons is lesser than Cl.

9. (a) B and C, beryllium (Be) and magnesium (Mg) respectively belong to group 2.

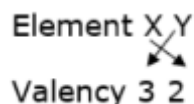
(b) A and B, lithium (Li) and beryllium (Be) respectively belong to second period.

(c) D (Helium) is inert.

10. (a) Since it belongs to group 13, therefore no. of valence electrons-3

The Valency of element X is 3

(b) When 'X' reacts with element 'Y', the compound formed will be:



Therefore, the Molecular formula of compound formed is  $X_2Y_3$ .

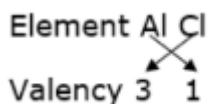
(c) When X combines with chlorine:

Atomic no of X = 13

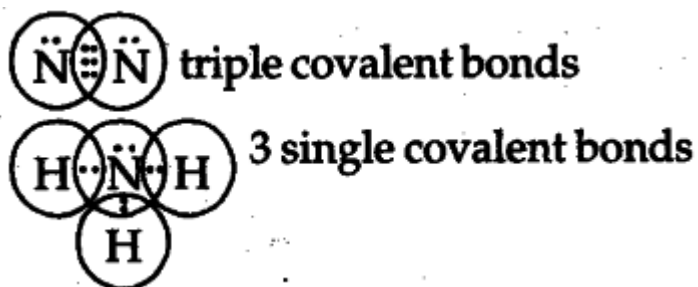
i.e. X is Aluminum Al

Valency of X is 3 Valency of chlorine is 1

Therefore, the molecular formula will be:



11. (a) Nitrogen (atomic no. 7)  
2,5; it has 5 valence electrons



12. Ozone: It is a gas whose one molecule consists of three atoms of oxygen.

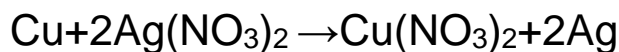
The higher energy UV radiations at the higher levels of atmosphere spit apart some molecular oxygen into free oxygen (O) atoms. These oxygen atoms combine with molecular oxygen to form ozone.

The UV radiations will reach the earth's surface.

Harmful effects: Skin cancer in humans, damage to eyes, immune system affected.

13. (a) We can store copper sulphate in silver vessel(container) because silver is less reactive than copper. So, displacement reaction does not occur.

But we cannot store silver nitrate solution in copper container because copper is more reactive than silver. So it displaces silver from its salt.



(b) Nitric acid ( $\text{HNO}_3$ ) is a strong, oxidising agent. It oxidised the produced hydrogen to water and itself reduced to ( $\text{NO}$ ,  $\text{NO}_2$ ,  $\text{N}_2\text{O}$ ).

(c) Tin is less reactive metal than zinc. So it is not easily attacked by components of food items.

14. Liver: Produces bile juices. Bile salts present in it break large globules of fats to smaller globules, stores excess of glucose in the form of glycogen.

Gallbladder: Stores bile juices

Villi: Present in inner-lining of small intestine as numerous finger like projections which, increase the surface area for

absorption of digested food. The villi are richly supplied with blood vessels which take the absorbed food to each and every cell of the body.

15. (a) Mucus protects the inner lining of the stomach from the action of the acid under normal conditions.

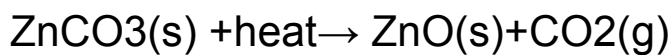
(b) The exit of food from the stomach is regulated by sphincter muscles which release it in small amounts into the small intestine.

(c) From stomach, food enters into the small intestines.

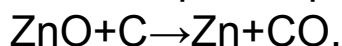
### Section C

7X5 =35

1. (a) A metal is obtained from its carbonate ore by converting it into its oxide by the process of Calcination. In Calcination, the ore is heated to a high temperature in the absence of air.

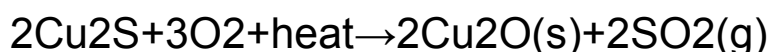


The metal oxides obtained by calcination are converted into the free metal by using reducing agents like carbon, aluminium which depend upon the reactivity of the metal.



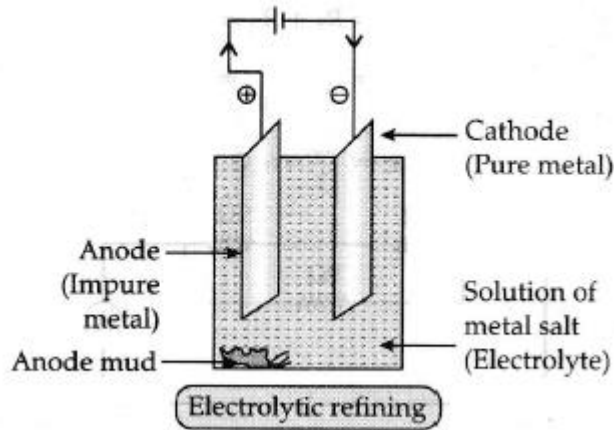
Impure Zn obtained is refined by the electrolysis process.

(b) In the extraction of copper from its Sulphide Ore, when ore is subjected to roasting some of it is oxidised to  $\text{Cu}_2\text{O}$  which reacts with the remaining  $\text{Cu}_2\text{S}$  to give copper metal. In this process,  $\text{Cu}_2\text{S}$  behaves as reducing agent.





In electrolytic refining of copper, the impurities left behind at anode called anode mud contain valuable metals such as gold and silver which can be recovered in the native state.



2. (a) Due to discovery of different elements, it was difficult to organize the information and properties of the elements, so there was a strong need to find some pattern in the properties of different elements so that they can be grouped together. That's why we classify elements.

(b) Mendeleev used atomic mass and similarities in chemical properties to classify the elements.

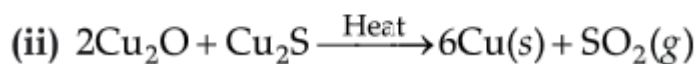
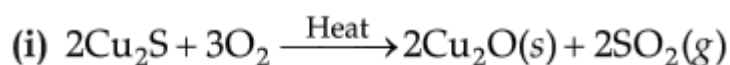
(c) Mendeleev predicted existence of some elements in the periodic table which were not discovered at that time, so he left place for those elements in the periodic table.

(d) Nobel gases are inert and are present in extremely low concentration in the atmosphere. That's why Mendeleev didn't place Nobel gases in the periodic table. When they were discovered, they were placed in a different group so that they don't create any difference in the periodic table.

(e) Since Mendeleev used atomic mass and similar properties as a criteria to classify elements but Cl-35 and Cl-37 have

different atomic masses, so they should be placed at different places but the two isotopes have similar chemical properties, so they should be placed in same slot. This was a contradiction and therefore, the position of the isotopes of an element was not clear in the Mendeleev's periodic table.

3. Following are the steps for extraction of copper from its sulphide ore.

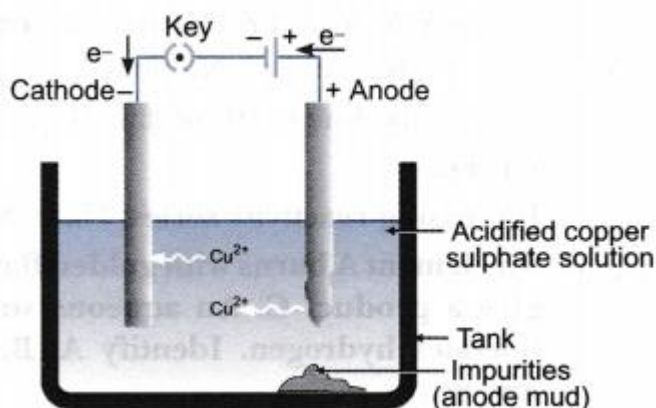


(ii) Refining - Removal of impurities from the metal.

Cathode - Pure metal

Anode - Impure metal

Electrolyte - Salt solution of the metal.



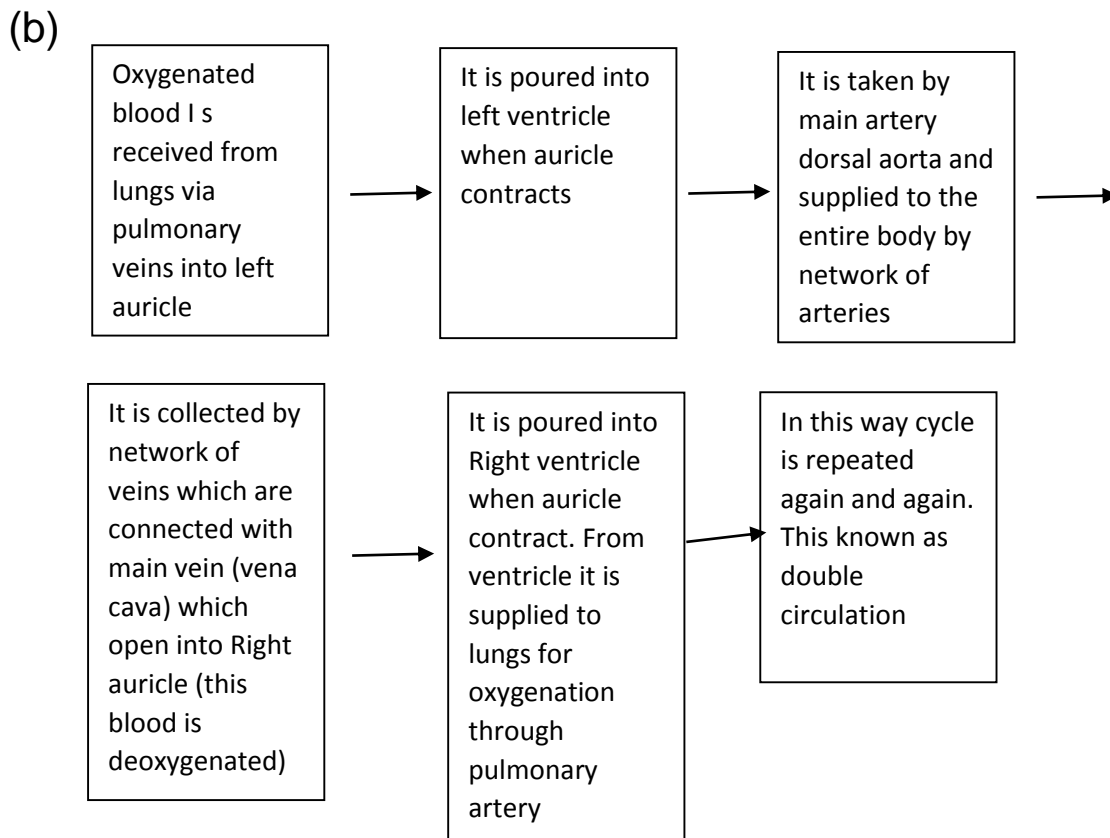
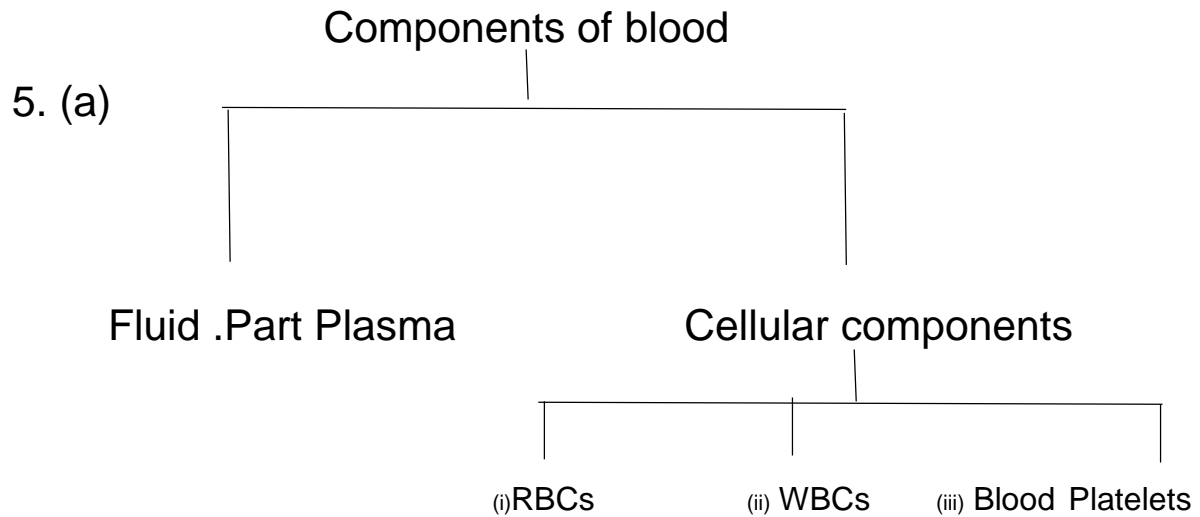
4. (a) Due to the formation of a layer of oxide i.e.,  $\text{Al}_2\text{O}_3$

(b) Na or Mg are more reactive metals as compared to carbon.

(c) In solid NaCl, the movement of ions is not possible due to its rigid structure but in aqueous solution or molten state, the ions can move freely.

(d) To protect from corrosion.

(e) They are highly reactive.

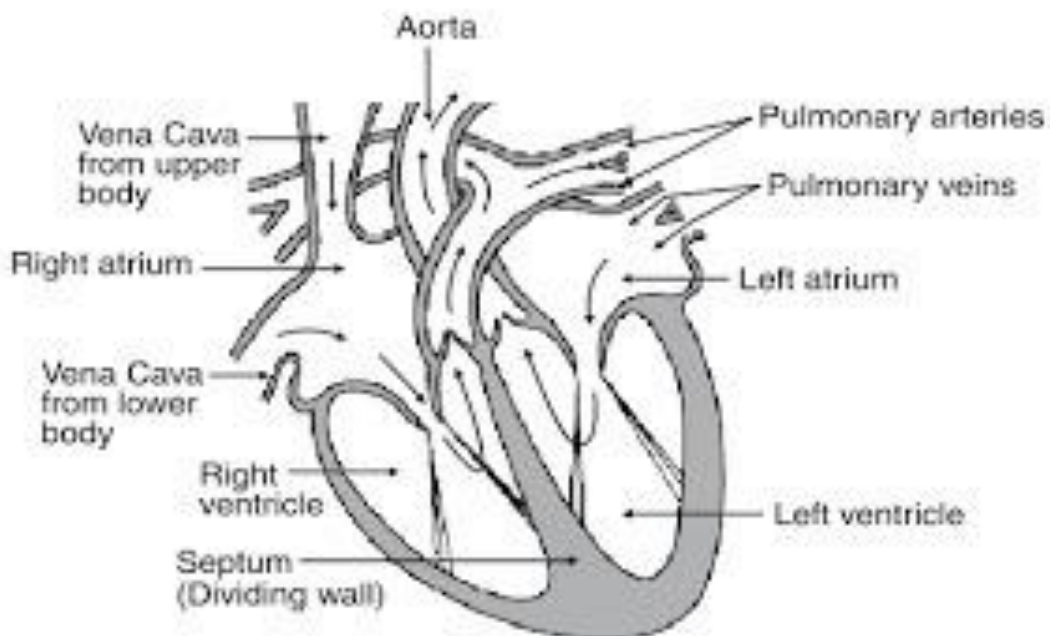


(c) Valve present backflow of blood and help in contraction of auricles and ventricles by opening and closing.

(d) Arteries: Arteries have thick, elastic, muscular walls.

Veins: Veins have thin walls with few elastic fibres.

6. (a)



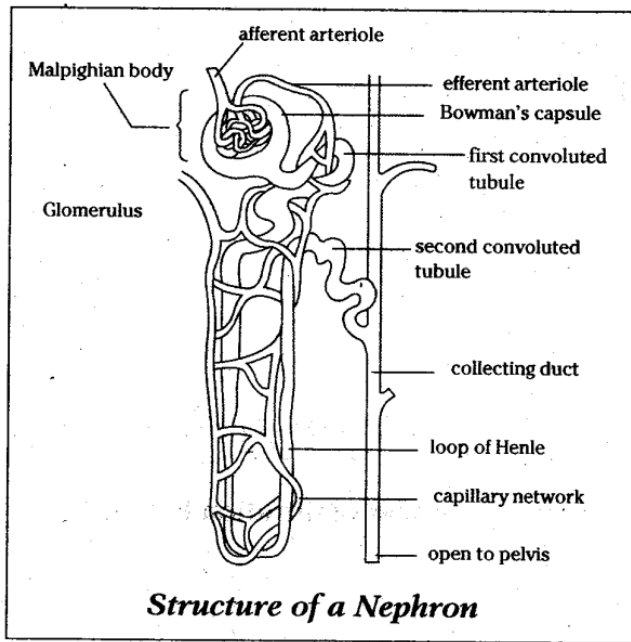
(b) Double circulation of blood is necessary to :

(i) Separate deoxygenated blood from oxygenated blood.

(ii) meet high energy and oxygen demands.

(iii) maintain constant body temperature.

7.



### Structure of Nephron:

The filtration units in the kidney are called nephrons. Each kidney has a large number of nephrons which are packed close together. Nephron consists of a cup shaped structure called Bowman's capsule in which a cluster of very thin walled blood capillaries form glomerulus. This cup shaped structure is followed by long tubular structure which is convoluted, twisted and finally leads to the collecting duct.

### Functioning of nephron:

Nephrons help in filtering nitrogenous waste form the blood. The blood entering the glomerulus contains waste which are filtered in the Bowman's capsule. The filtrate formed may contain some useful substances such as glucose, amino acids, salts and a major amount of water. These are selectively reabsorbed as the urine flows along the tube. The amount of water reabsorbed depends on how much excess water there is in the body and on how much of dissolved waste there is to be excreted.