Board – CBSE	Class – 10th	Topic – Metals and Non- metals

Q1. Write balanced equations for the reaction of:

(i) Aluminium when heated in air. Write the name of the product.

(ii) Iron with steam. Name the product obtained.

(iii) Calcium with water. Why does calcium start floating in water?

Ans: (*i*) $4Al + 3O_2 \xrightarrow{heat} 2Al_2O_3$.

The product formed is aluminium oxide.

(*ii*) $3Fe + 4H_2O$ (steam) $\longrightarrow Fe_3O_4 + 4H_2$

The product obtained is iron(II) iron (III) oxide.

(*iii*) $Ca + 2H_2O \longrightarrow Ca(OH)_2 + H_2$

The bubbles of hydrogen stick to the surface of metal that is why it floats.

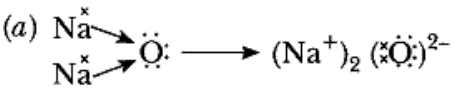
Q2. What is meant by 'rusting'?

Ans: The process in which iron reacts with oxygen in the presence of moisture to form reddish brown coating of hydrated ferric oxide [Iron (III) oxide]. $Fe_2O_3 \times H_2O$

Q3. (a) Show the formation of Na_2O by the transfer of electrons between the combining atoms.

(b) Why are ionic compounds usually hard?

(c) How is it that ionic compounds in the solid state do not conduct electricity but they do so when in molten state?

Ans: (*a*) 

(b) It is due to strong force of attraction between oppositely charged ions.

(c) In solid state, ions are not free to move whereas in molten state ions are free to move, therefore, they conduct electricity in molten state.

Q4. What are amphoteric oxides? Choose the amphoteric oxides from amongst the following oxides:

Na_2O, ZnO, Al_2O_3, CO_2, H_2O

Ans: Those oxides which reacts with acids as well as bases to produce salts and water are called amphoteric oxides, e.g. Na_2O, ZnO, are amphoteric oxides among given oxides.

Q5. Define the terms:

(i) mineral

(ii) ore, and

(iii) gangue.

Ans: (i) Mineral: It is a naturally occurring substance from which metal may or may not be extracted profitably or economically, e.g. A1 cannot be extracted profitably from mica.

(ii) Ore: It is a rocky material which contains sufficient quantity of mineral so that metal can be extracted profitably, e.g. zinc blende is an ore of zinc from which zinc can be extracted profitably.

(iii) Gangue: Impurities such as soil, sand, dust particles are called gangue.

Q6. (a) Write the chemical name of the coating that forms on silver and copper articles when these are left exposed to moist air.

(b) Explain what is galvanization. What purpose is served by it?

(c) Define an alloy. How are alloys prepared? How do the properties of iron change?

when:

(i) small quantity of carbon,

(ii) nickel and chromium are mixed with it.

Ans: (a) Ag_2S (silver sulphide) is formed on silver, basic copper carbonate $CuCO_3$. Cu $(OH)_2$ is formed on copper.

(b) The process of coating zinc over iron is called galvanization. It is used to prevent rusting of iron.

(c) Alloy is a homogeneous mixture of two or more metals. One of them can be non-metal. Alloys are prepared by melting two or more metals together.

(i) Iron does not rust on adding small quantity of carbon.

(ii) When we form alloy of iron with nickel and chromium, we get stainless steel which is malleable and does not get rusted.

Q7. Give reasons for the following:

(i) Silver and copper lose their shine when they are exposed to air. Name the substance formed on their surface in each case.

(ii) Tarnished copper vessels are cleaned with tamarind juice.

(iii) Aluminium is more reactive than iron yet there is less corrosion of aluminum as compared to iron when both are exposed to air.

Ans: (i) These metals get corroded. Silver forms black Ag_2S (silver sulphide) and copper form greenish layer of basic copper carbonate $CuCO_3$. Cu $(OH)_2$.

(ii) Tamarind contains acid which reacts with basic copper carbonate and product gets dissolved and removed from copper vessel.

(iii) Aluminium forms oxide layer on its surface which does not further react with air.

Q8. What are alloys? How are they made? Name the constituents and uses of brass, bronze and solder.

Ans: Alloys are homogeneous mixtures of two or more metals. One of them can be a non-metal also. They are made by melting a metal which is in large amount first and then adding the other metal. , Brass contains copper and zinc. It is used for making decorative articles. Bronze contains copper and tin. It is used for making statues and medals. Solder contains lead and tin. It is used for soldering purposes.

Q9. What is an alloy? State the constituents of solder. Which property of solder makes it suitable for welding electrical wires?

Ans: Alloy is a homogeneous mixture of two or more metals. One of them can be a non-metal also. Solder consists of lead and tin. It has low melting point which makes it suitable for welding electrical wires.

Q10. Name one metal and one non-metal which exist in liquid state at room temperature.

Ans: Metal - Mercury.

Non-metal - Bromine.

Q11. (a) Name the most abundant metal in the earth's crust.

(b) Name the most abundant non-metal in the earth's crust.

Ans: (a) Aluminium.

(b) Oxygen.

Q12. Why metals are called electropositive elements whereas non-metals are called electronegative elements?

Ans: Metals are electropositive elements because they can form positive ions by losing electrons.

Non-metals are electronegative elements because they can form negative ions by gaining electrons.

Q13. What changes in the colour of iron nails and copper sulphate solution do you observe after keeping the iron nails dipped in copper sulphate solution for about 30 minutes?

Ans: Iron nail gets covered with a red-brown coating of copper metal; the blue colour of copper sulphate solution fades gradually.

Q14. What is aqua-regia? Name two special metals which are insoluble in common reagents but dissolve in aqua-regia.

Ans: Aqua-regia is a freshly prepared mixture of one part of concentrated nitric acid and 3 parts of concentrated hydrochloric acid. Gold and platinum dissolve in aqua-regia

Q15. Give the names and formulae of (a) two acidic oxides, and (b) two basic oxides.

Ans: (a) Carbon dioxide and Sulphur dioxide.

(b) Sodium oxide and magnesium oxide.

16. A copper coin is kept immersed in a solution of silver nitrate for some time. What will happen to the coin and the colour of the solution?

Ans: Copper coin will get a shining greyish white coating of silver metal. The colour of the solution will turn blue.

Q17. Which property of copper and aluminum makes them suitable:

(a) For making cooking utensils and boilers?

(b) For making electric wires?

Ans: (a) High thermal conductivity.

(b) High electrical conductivity.

18. What is meant by "brittleness"? Which type of elements usually shows brittleness: metals or non-metals?

Ans: Brittleness is the property of being brittle i.e. breaking easily.

Non-metals show brittleness.

19. Name two metals which react violently with cold water. Write any three observations you would make when such a metal is dropped into water. How would you identify the gas evolved, if any, during the reaction?

Ans: Sodium and potassium metals react violently with cold water.

Observations:

1. Metal starts moving over the surface of water making a hissing sound.
2. Metal starts reacting with water causing little explosions.
3. Soon the metal catches fire and starts burning.

20. (a) What type of oxides is formed when non-metals react with oxygen? Explain with an example.

(b) What type of oxides is formed when metals combine with oxygen? Explain with the help of an example.

Ans: (a) When non-metals react with oxygen, they form acidic oxides or neutral oxides.

Example: Carbon reacts with oxygen to form an acidic oxide called carbon dioxide. Hydrogen reacts with oxygen

(b)When metals combine with oxygen, they form basic oxides.

Example: Sodium reacts with oxygen to form a basic oxide called sodium oxide.

21. State five uses of metals and five of non-metals.

Ans: Uses of metals:

(i) Lead metal is used in making car batteries.

(ii) Zinc is used for galvanizing iron to protect it from rusting.

(iii) Iron, copper and aluminium are used to make utensils.

(iv) Copper and aluminium metals are used to make electrical wires.

(v) Aluminium is used to make aluminium foil for packaging materials.

Uses of non-metals:

(i) Hydrogen is used in the hydrogenation of vegetable oils.

(ii) Carbon is used to make electrodes of electrolytic cells and dry cells.

(iii) Nitrogen is used in the manufacture of ammonia, nitric acid and fertilizers.

(iv) Sulphur is used for producing sulphuric acid.

(v) Liquid hydrogen is used as rocket fuel.

Q22. In an electrolytic tank, aluminium metal is being extracted by the electrolysis of molten aluminium oxide using carbon electrodes. It is observed that one of the carbon electrodes is gradually burnt away and has to be replaced.

(a) Which carbon electrode (cathode or anode) is burnt away?

(b) Why is this carbon electrode burnt away?

Ans: (a) Positively charged carbon electrode (Anode)

(b) This carbon electrode is burnt away because oxygen produced during the electrolysis of molten aluminium oxide reacts gradually with the carbon of carbon anode to form carbon dioxide gas.