



CHEMISTRY

BOOKS - U-LIKE CHEMISTRY (HINGLISH)

METALS AND NON METALS

Ncert Questions

1. Give an example of a metal which

(i) is a liquid at room temperature. (ii) can be

easily cut with a knife. (iii) is the best conductor of heat. (iv) is a poor conductor of heat.



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2. Explain the meanings of malleable and ductile.



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3. Why is sodium kept immersed in kerosene oil ?



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4. Write equations for the reactions of (i) iron with steam (ii) calcium and potassium with water.



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5. Samples of four metals A, B, C and D were taken and added to the following solution one by one. The results obtained have been tabulated as follows:

<i>Metal</i>	<i>Iron(II) sulphate</i>	<i>Copper(II) sulphate</i>	<i>Zinc sulphate</i>	<i>Silver nitrate</i>
<i>A</i>	No reaction	Displacement	—	—
<i>B</i>	Displacement	—	No reaction	—
<i>C</i>	No reaction	No reaction	No reaction	Displacement
<i>D</i>	No reaction	No reaction	No reaction	No reaction

Use the Table given above to answer the following questions about metals A, B, C and D:

(i) Which is the most reactive metal ? (ii) What would you observe if B is added to a solution of Copper(II) sulphate ? (iii) Arrange the

metals A, B, C and D in the order of decreasing reactivity.



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6. Which gas is produced when dilute hydrochloric acid is added to a reactive metal ? Write the chemical reaction when iron reacts with dilute sulphuric acid H_2SO_4



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7. What would you observe when zinc is added to a solution of iron(II) sulphate ? Write the chemical reaction that takes place



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8. (i) Write the electron-dot structures for sodium, oxygen and magnesium. (ii) Show the formation of Na_2O and MgO by the transfer of electrons. (iii) What are the ions present in these compounds ?



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9. Why do ionic compounds have high melting points ?

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10. Metallic oxides of zinc, magnesium and copper were heated with the following metals

:

<i>Metal</i>	<i>Zinc</i>	<i>Magnesium</i>	<i>Copper</i>
Zinc oxide			
Magnesium oxide			
Copper oxide			

In which cases will you find displacement reactions taking place ?



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Ncert Exercises

1. Which of the following pairs will give displacement reactions ?

A. NaCl solution and copper metal.

B. $MgCl_2$ solution and aluminium metal.

C. $FeSO_4$ solution and silver metal.

D. $AgNO_3$ solution and copper metal.

Answer:



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2. An element reacts with oxygen to give a compound with a high melting point. This compound is also soluble in water. The element is likely to be

A. Calcium

B. Carbon

C. Silicon

D. Iron

Answer: A



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3. Food cans are coated with tin and not with zinc because

A. zinc is costlier than tin.

B. zinc has a higher melting point than tin.

C. zinc is more reactive than tin

D. zinc is less reactive than tin

Answer: C



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4. You are given a hammer, a battery, a bulb, wires and a switch.

(a) How could you use them to distinguish

between samples of metals and non-metals ?

(b) Assess the usefulness of these tests in distinguishing between metals and non-metals ?



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5. What are amphoteric oxides ? Give two examples of amphoteric oxides.



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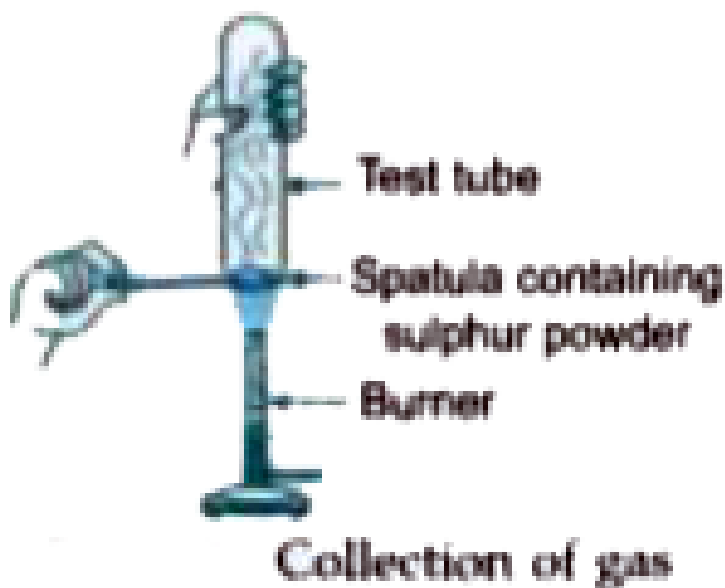
6. Name two metals which will displace hydrogen from dilute acids, and two metals which will not.



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7. Pratyush took sulphur powder on a spatula and heated it. He collected the gas evolved by inverting a test tube over it as shown in Fig. below : (a) What will be the action of gas on (i) dry litmus paper ? (ii) moist litmus paper ?

(b) Write a balanced chemical equation for the reaction taking place



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8. What type of oxides are formed when non-metals combine with oxygen ?



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9. Give reasons : Platinum, gold and silver are used to make jewellery.



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10. Give reasons : Sodium, potassium and lithium are stored under oil.



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11. Give reasons : Aluminium is a highly reactive metal, yet it is used to make utensils for cooking.



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12. Differentiate between metal and non-metal on the basis of their chemical properties.



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13. A man went door to door posing as a goldsmith. He promised to bring back the glitter of old and dull gold ornaments. An unsuspecting lady gave a set of gold bangles to him which he dipped in a particular solution. The bangles sparkled like new but

their weight was reduced drastically. The lady was upset but after a futile argument the man beat a hasty retreat. Can you play the detective to find out the nature of the solution he had used ?



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14. Give reasons why copper is used to make hot water tanks and not steel (an alloy of iron).



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Case Based Source Based Integrated Questions

1. Answer question on the basis of your understanding of the following paragraph and related studied concepts.

You will find that some metals can be beaten into thin sheets. This property is called malleability. Gold and silver are the most malleable metals. The ability of metals to be drawn into thin wires is called ductility. Gold is the most ductile metal. You will be surprised

to know that a wire of about 2 km length can be made from one gram of gold. It is because of their malleability and ductility that metals can be given different shapes according to our needs.

Name the property that is associated with the beating of metals into thin sheets.



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2. Answer question on the basis of your understanding of the following paragraph and

related studied concepts.

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You have got a piece of gold that weight 200

mg. What is the maximum length of wire approximately that you can obtain from it ?



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Other than gold and silver, name two metals that are efficiently malleable and ductile.



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4. Answer question on the basis of your understanding of the following paragraph and related studied concepts.

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can be given different shapes according to our needs.

Name some household articles which make use of the malleability and ductility of metals.



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5. Answer question on the basis of your understanding of the following paragraph and related studied concepts.

Sodium atom has one electron in the outermost shell. If it loses the electron from

its M-shell, then its L-shell now becomes the outermost shell and that has a stable octet. The nucleus of this atom still has 11 protons but the number of electrons has become 10, so there is a net positive charge giving us a sodium cation Na^+ . On the other hand, chlorine provides us a negative ion, Cl^- by gaining the electron from Na atom. In this way the octet of Cl is also completed. These two atoms have a give and-take relationship. Thus Na^+ and Cl^- being oppositely charged in nature form a bond between them called ionic bond. The compounds obtained in this

manner are called ionic compounds.

Write the electronic configuration of sodium.



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Write the electronic configuration of fluorine.



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7. Answer question on the basis of your understanding of the following paragraph and related studied concepts.

Sodium atom has one electron in the outermost shell. If it loses the electron from its M-shell, then its L-shell now becomes the outermost shell and that has a stable octet.

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Show the formation of bond between Na and F.



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8. Answer question on the basis of your understanding of the following paragraph and related studied concepts.

Sodium atom has one electron in the outermost shell. If it loses the electron from its M-shell, then its L-shell now becomes the outermost shell and that has a stable octet.

The nucleus of this atom still has 11 protons but the number of electrons has become 10, so there is a net positive charge giving us a sodium cation Na^+ . On the other hand, chlorine provides us a negative ion, Cl^- by

gaining the electron from Na atom. In this way the octet of Cl is also completed. These two atoms have a give and-take relationship. Thus Na^+ and Cl^- being oppositely charged in nature form a bond between them called ionic bond. The compounds obtained in this manner are called ionic compounds.

Give two properties of ionic compounds.



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Multiple Choice Questions

1. What happens when calcium is treated with water ?

(i) It does not react with water. (ii) It reacts violently with water. (iii) It reacts less violently with water. (iv) Bubbles of hydrogen gas formed stick to the surface of calcium.

A. (i) and (iv)

B. (ii) and (iii)

C. (i) and (ii)

D. (iii) and (iv)

Answer: D



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2. The ability of the metals to be drawn into thin wires is known as

A. ductility

B. malleability

C. sonorosity

D. conductivity

Answer: A



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3. Which of the following metals exist in their native state in nature ?

(i) Cu (ii) Au (iii) Zn (iv) Ag

A. (i) and (ii)

B. (ii) and (iii)

C. (ii) and (iv)

D. (iii) and (iv)

Answer: C



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4. Generally, non-metals are not lustrous.

Which of the following non-metal is lustrous ?

A. Sulphur

B. Oxygen

C. Nitrogen

D. Iodine

Answer: D



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5. The electronic configurations of three elements X, Y and Z are X—2,8, Y—2,8, 7 and 2-2,8, 2. Which of the following is correct ?

- A. X is a metal.
- B. Y is a metal.
- C. Z is a non-metal.
- D. Y is a non-metal and Z is a metal.

Answer: D



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6. Which of the following are not ionic compounds ?

(i) KCl (ii) HCl (iii) CCl_4 (iv) NaCl

A. (i) and (ii)

B. (ii) and (iii)

C. (iii) and (iv)

D. (i) and (iii)

Answer: B



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7. Although metals form basic oxides, which of the following metals form an amphoteric oxide ?

A. Na

B. Ca

C. Al

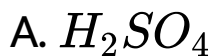
D. Cu

Answer: C



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8. Generally metals react with acids to give salt and hydrogen gas. Which of the following acids does not give hydrogen gas on reacting with metals (except Mn and Mg)?



D. All of the these

Answer: C



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9. Electrical wires have a coating of an insulating material. The material, generally used is

A. Sulphur

B. Graphite

C. PVC

D. All can be used

Answer: C



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10. Which one of the following properties is not generally exhibited by ionic compounds ?

A. Solubility in water

B. Electrical conductivity in solid state

C. High melting and boiling points

D. Electrical conductivity in molten state

Answer: B



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11. Which one of the following metals do not react with cold as well as hot water ?

A. Na

B. Ca

C. Mg

D. Fe

Answer: D



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12. Which among the following statements is incorrect for magnesium metal ?

A. It burns in oxygen with a dazzling white flame.

B. It reacts with cold water to form magnesium oxide and evolves hydrogen gas.

C. It reacts with hot water to form magnesium hydroxide and evolves hydrogen gas.

D. It reacts with steam to form magnesium hydroxide and evolves hydrogen gas.

Answer: B



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13. Aluminium is used for making cooking utensils. Which of the following properties of aluminium are responsible for the same ?

(i) Good thermal conductivity (ii) Good electrical conductivity (iii) Ductility (iv) High melting point

A. (i) and (ii)

B. (i) and (iii)

C. (ii) and (iii)

D. (i) and (iv)

Answer: D



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14. Metals are

A. malleable

B. ductile

C. sonorous

D. all the above

Answer: D



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15. Which of the following is not a non-metal ?

A. coal

B. sulphur

C. iodine

D. sodium

Answer: D



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16. Which of the following is an amphoteric oxide ?

- A. calcium oxide
- B. sulphur dioxide
- C. aluminium oxide
- D. nitrogen dioxide

Answer: C



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17. Metals lead and copper, do not react with

A. oxygen

B. water

C. dil. HCl

D. dil. HNO_3

Answer: B



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True Or False

1. Gold and silver are the most malleable metals.



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2. Lead and mercury are comparatively poor conductors of heat.



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3. A less reactive metals displaces a more reactive metal from its salt solution.



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4. Ionic compounds conduct electricity only in solution.



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5. The metals at the bottom of activity series are the least reactive.



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Fill In The Blanks

1. Metals are solid at room temperature, except __ which is a liquid.



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2. Non-metals are bad conductors of electricity, except for __ which is a good

conductor of electricity.

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3. Metals occur in nature as free elements or in the form of their _____

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4. A list of common metals arranged in order of decreasing reactivity is known as _____

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5. Metals can form positive ions by ___
electrons to non-metals



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6. The conduction of electricity through a
solution involves the movement of _____



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Assertion Reason Questions

1. Assertion (A): Electrovalent compounds are generally insoluble in water.

Reason (R) : Copper is lower than aluminium in the reactivity series.

A. Both (A) and (R) are true and (R) is correct explanation of the assertion

B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.

C. (A) is true but (R) is false.

D. (A) is false but (R) is true.

Answer: D



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2. Assertion (A): Metals above hydrogen in activity series can displace hydrogen from dilute acids.

Reason (R) : Metals occur in nature only in the form of their compounds.

- A. Both (A) and (R) are true and (R) is correct explanation of the assertion
- B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.
- C. (A) is true but (R) is false.
- D. (A) is false but (R) is true.

Answer: C



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3. Assertion (A): Potassium chloride is insoluble in kerosene.

Reason (R) : Ionic compounds are insoluble in organic solvents.

A. Both (A) and (R) are true and (R) is correct explanation of the assertion

B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.

C. (A) is true but (R) is false.

D. (A) is false but (R) is true.

Answer: A



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4. Assertion (A): Atoms forming an ionic bond are said to have a give-and-take relation.

Reason (R) : The number of shells present in the atom of phosphorus is three.

A. Both (A) and (R) are true and (R) is correct explanation of the assertion

B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.

C. (A) is true but (R) is false.

D. (A) is false but (R) is true.

Answer: B



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5. Assertion (A): Lead is more reactive than aluminium in the reactivity series.

Reason (R) : Aqua regia is a mixture of conc.

HCl and conc. HNO_3 mixed together in the ratio of 1:3

- A. Both (A) and (R) are true and (R) is correct explanation of the assertion
- B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.
- C. (A) is true but (R) is false.
- D. (A) is false but (R) is true.

Answer: C



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Very Short Answer Questions

1. Name one metal which reacts with very dilute HNO_3 to evolve hydrogen gas.



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2. A non-metal X exists in two different forms Y and Z. Y is the hardest natural substance,

whereas Z is a good conductor of electricity.

Identify X, Y and Z.



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3. An element A forms two oxides AO and AO_2 . The oxide AO is neutral whereas the oxide AO_2 is acidic in nature. Would you call element A a metal or a non-metal ?



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4. Identify the most reactive and the least reactive metal amongst the following: Al, K, Cu, Au.



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5. Name a non-metal which conducts electricity.



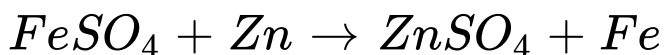
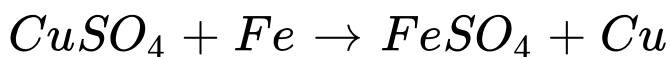
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6. An element X on reacting with oxygen forms an oxide X_2O . This oxide dissolves in water and turns blue litmus red. State whether element X is metal or non-metal



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7. Identify the most reactive and least reactive metals from the reaction below:





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8. How do we know whether a given element is a non-metal if we know its electronic configuration ?



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



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10. Choose the amphoteric oxides amongst the following:

Na_2O , ZnO , Al_2O_3 , CO_2 , H_2O



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11. What kind of compounds are called ionic compounds ?



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12. How are ionic compounds formed ?



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13. An element forms an oxide A_2O_3 which is acidic in nature. Identify A as a metal or non-metal.



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14. Name the metal which has very low melting point and can melt with the heat of your palm.



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15. What is meant by 18 carat gold ?



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Short Answer Questions

1. A substance X which is an oxide of a metal is used intensively in the cement industry. This element is present in bones also. On treatment with water it forms a solution which turns red litmus blue. Identify X and also write the chemical reactions involved.



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2. A metal A which is used in thermite process, when heated with oxygen gives an oxide B,

which is amphoteric in nature. Identify A and B. Write down the reactions of oxide B with HCl and NaOH.



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3. (a) What do you see when a magnesium ribbon is burnt ? Is magnesium oxidised or reduced in this reaction ? (b) Define corrosion.



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4. What are amphoteric oxides ? Give two examples of amphoteric oxide with balanced chemical equation.



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

(b) Why are ionic compounds usually hard ?

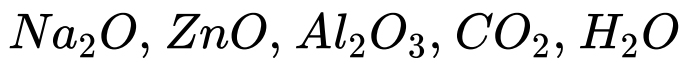
(c) How is it that ionic compounds in the solid

state do not conduct electricity and they do so when in molten state ?



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6. (a) What are amphoteric oxides ? Choose the amphoteric oxides from amongst the following oxides :



(b) Why is it non-metals do not displace hydrogen from dilute acids ?



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



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8. (a) Name a metal for each case : (i) It does not react with cold as well as hot water but reacts with steam. (ii) It does not react with

any physical state of water.

(b) When calcium metal is added to water, the gas evolved does not catch fire but the same gas evolved on adding sodium metal to water catches fire. Why is it so ?



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9. Give reasons for the following:

(i) Platinum, gold and silver are used to make jewellery (ii) To make hot water tanks, copper is used and not steel (an alloy of iron). (iii)

Lemon is used for restoring the shine of tarnished copper decorations.



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10. State reasons for the following: (i) Metals are good conductors of heat. (ii) Addition of some silver to pure gold for making ornaments. (iii) Inability of non-metals for displacing hydrogen from dilute sulphuric acid.



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11. Give reasons for the following: (i) Zinc oxide is considered an amphoteric oxide. (ii) Non-metals in general do not displace hydrogen from dilute acids. (iii) Metals conduct electricity.



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12. List in a tabular form, the changes in colour observed and the name of the compound

formed when silver, copper and iron are said to be corroded.



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13. Give reasons : (i) Silver metal does not easily combine with oxygen but silver jewellery tarnishes after sometime. (ii) Iron grills are frequently painted. (iii) Gold ornaments retain their luster even after several years of use.



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14. (a) Compare the properties of a typical metal and a non-metal on the basis of the following: (i) Nature of the oxide formed by them. (ii) Conductivity.

(b) Name a non-metal which is lustrous and a metal which is liquid at room temperature.



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15. A non-metal A is an important constituent of food and forms two oxides B and C. Oxide of B is toxic whereas C causes global warming. (a)

Identify A, B and C. (b) To which group of Periodic Table does A belong ?



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16. A metal 'X' combines with a non-metal 'Y' by the transfer of electrons to form a compound Z.

(i) State the type of bond in compound Z.

(ii) What can you say about the melting point and boiling point of compound Z?

(iii) Will this compound dissolve in kerosene or petrol ?



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17. Write the chemical name and formula of gypsum. What happens when gypsum is heated at 373 K ? Write chemical equation for the reaction.



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18. A gas is produced when conc. H_2SO_4 is added to solid sodium chloride taken in a test tube. The gas coming out of the delivery tube is passed over a dry blue litmus paper and then over a moist blue litmus paper. What would you observe ? Explain reason with the help of a chemical equation.



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19. Which three chemical substances are obtained when electricity is passed through an aqueous solution of brine ? Write one industrial use of each.



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20. Write one example of each of the following: (a) A metal and a non-metal which are liquids at room temperature. (b) A metal which is very soft and a non-metal which is

very hard. (c) A metal which has very low melting point and a non-metal which has very high melting point.



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21. Give reason for the following: (a) Sodium is kept immersed in kerosene oil. (b) Iron, the most widely used metal, is never used in its pure state. (c) Hydrogen is not evolved when a metal reacts with nitric acid (except Mn and Mg).



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22. Describe how sodium and chlorine form sodium chloride ? Name the type of bonding shown in the structure. (Atomic number : Na = 11, Cl = 17)



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23. State two properties of each of the following metals which make them suitable for :

(i) Copper and aluminium for making electric wires. (ii) Gold, platinum and silver are used to make jewellery. (iii) Copper to make hot water tank.



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Long Answer Questions

1. An element A burns with golden flame in air. It reacts with another element B, atomic number 17 to give a product C. An aqueous

solution of the product C on electrolysis gives a compound D and liberates hydrogen. Identify A, B, C and D. Also write down the equations for the reactions involved.



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2. (a) Describe an activity to show that metals are good conductors of electricity.

(b) Account for the following: (i) Hydrogen gas is not evolved when a metal reacts with nitric acid. (ii) For storing sodium metal, it is kept

immersed in kerosene. (iii) The reaction of iron (III) oxide with aluminium is used to join cracked iron part machines.



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3. (a) When calcium metal is added to water, the gas evolved does not catch fire but the same gas evolved on adding potassium metal to water catches fire. Explain why?

(b) Name a metal for each case : (i) It displaces hydrogen gas from nitric acid. (ii) It does not

react with any physical state of water. (iii) It does not react with cold as well as hot water but reacts with steam.



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4. In the formation of a compound XY_2 , atom X donates one electron to each Y atom. Show the electron dot structure of X and Y and the formation of XY_2 . What is the nature of bond in XY , ? Write any three properties of compound XY_2 . The electronic configurations

of the elements X and Y are as follows:

X-2,8,2 Y-2,7



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5. Give reasons for the following: (i) Ionic compounds have generally high melting points. (ii) Hydrogen is not a metal, but it has been assigned a place in the reactivity series of metals. (iii) The galvanised iron article is protected against rusting even if the zinc layer

is broken. (iv) The wires carrying current in homes have a coating of PVC.



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