Materials: Metals and Non-metals

1. Which of the following can be beaten into thin sheets?

(a) Zinc (b) Phosphorus (c) Sulphur (d) Oxygen

Answer :

(a) Zinc can be beaten into thin sheets because it is metals and other options are nonmetals. Metals have ductility and malleability properties.

2. Which of the following statements is correct?

(a) All metals are ductile.

(b) All non-metals are ductile.

(c) Generally, metals are ductile.

(d) Some non-metals are ductile.

Answer: (c) Generally, metals are ductile.

3. Fill in the blanks :

(a) Phosphorus is very _____ non-metal.

(b) Metals are good conductors of heat and _____.

(c) Iron is _____ reactive than copper.

(d) Metals react with acids to produce _____gas.

Answer:

(a) Phosphorus is very <u>reactive</u> non-metal.

(b) Metals are good conductors of heat and electricity.

(c) Iron is less reactive than copper.

(d) Metals react with acids to produce hydrogen gas.

4. Mark 'T' if the statement is true and 'F' if it is false.

(a) Generally, non-metals react with acids. (F)

(b) Sodium is a very reactive metal. (T)



(c) Copper displaces zinc from zinc sulphate solution. (F)

(d)	Coal	can	be	drawn	into	wires. (΄F)
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Answer:

(a) Generally, non-metals react with acids.	(F)
(b) Sodium is a very reactive metal.	(T)
(c) Copper displaces zinc from zinc sulphate solution.	(F)
(d) Coal can be drawn into wires.	(F)

5. Some properties are listed in the following Table. Distinguish between metals and non-metals on the basis of these properties.

Properties	Metals	Non-metals		
Appearance	Metals have luster	Non-Metals do not have lustrous		
Hardness	Metals are hard except sodium and potassium which are soft	Non-Metals are generally soft except diamond which which is very hard		
Malleability	Metals are malleable and can be beaten into thin sheets through heating and hammering	Non-Metals are non-malleable, brittle and can not be beaten into thin sheets through heating and hammering		
Ductility	Metals are ductile and can be drawn into wires	Non-Metals are not ductile and can not be drawn into wires		
Conduction of heat and electricity	Metals are good conductors of heat and electricity	Non-Metals are poor heat and conductor of electricity		
Examples	Iron, copper, silver	Carbon, oxygen, chlorine		



6. Give reasons for the following :

(a) Aluminium foils are used to wrap food items.

(b) Immersion rods for heating liquids are made up of metallic substances.

(c) Copper cannot displace zinc from its salt solution.

(d) Sodium and potassium are stored in kerosene.

Answer:

(a) Aluminium foils are used to wrap food items: The property of metals by which they can be beaten into thin sheets, is called malleability. Aluminum is a metal. Aluminium foils are made exploiting this property. They keep food items warm and safe from contamination.

(b) Immersion rods for heating liquids are made up of metallic substances : Metal are good conductors of electricity and heat. So when we supply electric power to immersion rods, inside element gets heated. Heat so generated is transferred from metallic surface of rod to water.

(c) Copper cannot displace zinc from its salt solution: Zinc is more reactive than copper. A more reactive metal can replace a less reactive metal, but a less reactive one cannot replace a more reactive metal. There for Copper cannot displace zinc from its salt solution.

(d) Sodium and potassium are stored in kerosene: Sodium metal is very reactive. It reacts vigorously with oxygen and water. A lot of heat is generated in the reaction. It is, therefore, stored in kerosene.

7. Can you store lemon pickle in an aluminium utensil? Explain.

Answer:

No. Metals react with acids and produce metal salts and hydrogen gas. Aluminium is a metal and lemon contains citric acid. So if we store lemon pickle in an alumnium utensil after some time utensil metal will get corroded due to reaction and lemon pickle inside will not be fit for human consumption.



8. In the following Table some substances are given in Column I. In Column II

some uses are given. Match the items in column I with those in Column II.

Column I	Column II	
(i) Gold	(a) Thermometers	
(ii) Iron	(b) Electric wire	
(iii) Aluminium	(c) Wrapping food	
(iv) Carbon	(d) Jewellery	
(v) Copper	(e) Machinary	
(vi) Mercury	(f) Fuel	

Answer :

Column I	Column II	
(i) Gold	(d) Jewelery	
(ii) Iron	(e) Machinery	
(iii) Aluminium	(c) Wrapping food	
(iv) Carbon	(f) Fuel	
(v) Copper	(b) Electric wire	
(vi) Mercury	(a) Thermometers	

9. What happens when

(a) Dilute sulphuric acid is poured on a copper plate?

(b) Iron nails are placed in copper sulphate solution?

Write word equations of the reactions involved.

Answer :

(a) When diluted sulphuric acid is poured on a copper plate, copper as a metals reacts with acids and produce metal salts like $CuSO_4$ (a blue crystalline solid) and hydrogen gas (H₂).

Cu (Copper) + H_2SO_4 (Sulphuric Acid) \rightarrow CuSO₄(Copper sulphate) + H_2 (Hydrogen gas)

(b) When Iron nails are placed in copper sulphate solution, Iron (Fe) replaces copper (Cu) from copper sulphate (CuSO₄). That is why, nails come out copper plated and the blue colour of copper sulphate disappears and the solution turns from blue to light yellowish.



Copper sulphate (CuSO₄) + Iron nail (Fe) \rightarrow Iron Sulphate (FeSO₄) + Copper (Cu)

10. Saloni took a piece of burning charcoal and collected the gas evolved in a test tube.

(a) How will she find the nature of the gas?

(b) Write down word equations of all the reactions taking place in this process.

Answer :

Saloni has to place a thumb over the tube, making sure that the test tube is upright. After this she has to carefully pour a small amount of clear lime- water into the tube, if the lime-water will turn milky, the gas produced is carbon dioxide.

(b) Burning charcoal will produce carbon dioxide as shown in equation below :

 $C + O_2 \rightarrow CO_2$

11. One day Reeta went to a jeweller's shop with her mother. Her mother gave old gold jewellery to the goldsmith to polish. Next day when they brought the jewellery back, they found that there was a slight loss in its weight. Can you suggest a reason for the loss in weight?

Answer :

Nitric acid is used as a cheap means in jeweller's shops to quickly spot low-gold alloys and to rapidly assess the gold purity. Gold which is not pure such as colored gold or artificial gold, can be easily oxidized and dissolved by nitric acid, leading to colour changes of the gold-alloy surface along with loss in weight.

So here, in first probability, their gold jewellery is not pure.

In another probability, if they had pure gold jewellery, then, they have been cheated by goldsmith in the guise of polishing the old jewellery. Pure gold do not react with any acid including nitric acid, but pure gold does react with aqua regia, a mixture of concentrated nitric acid and hydrochloric acid. Goldsmith, who are not fair in dealing, make use of aqua regia to wash the gold jewellery. In this cleaning process, a small amount of gold along with surface impurities, if any, gets dissolved in the aqua regia -acids mixture solution. For polishing they use buffing machines. Gold jewellery so polished is returned to customers which is of less weight as a part of it already dissolved in aqua regia. The dissolved gold is extracted by them later.

