

CHEMISTRY

BOOKS - KUMAR PRAKASHAN

METALS AND NON-METALS

Questions And Answers

1. Classify the elements based on their property of conductivity with suitable examples.



2. Enlist the common properties of metals.



3. Mention the non-metals which exist in solid, liquid and gaseous state.



4. State the common properties of nonmetallic elements.



5. State the exceptions of metallic and non metallic elements.



6. Explain: We cannot classify the elements according to their physical properties alone.



7. What is the nature of products formed on burning magnesium ribbon and sulphur powder? Mention their effect on litmus paper.



8. 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.



9. Explain the meaning of malleable and ductile.



10. What are acidic and basic oxides?



11. Write the balanced equations for the reaction of copper and aluminium, when heated in air.

State the names of the products obtained.



12. What is meant by amphoteric oxide? Give two examples of it and write the equation of its reaction with acid and base.



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13. Which metal oxides dissolve in water to form alkali? Write their balanced chemical equations.



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14. Explain the reactions of metals such as potassium (K), sodium (Na), magnesium (Mg), aluminium (Al), zinc (Zn), lead (Pb), iron (Fe), copper (Cu), silver (Ag) and gold (Au) with oxygen.



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15. Which products are obtained when metals react with water? Explain the reaction of metals such as potassium (K), sodium (Na). calcium (Ca), magnesium (Mg), aluminium (Al), iron (Fe), zinc

(Zn), lead (Pb), copper (Cu), silver (Ag) and gold (Au) with water.



16. Write the balanced equations of reaction of magnesium, aluminium, zinc and iron with dilute sulphuric acid.



17. Which metal does not release hydrogen gas with nitric acid ? Why?



18. Which metals form hydrogen gas on reaction with very dilute nitric acid? Write the equation of the reaction.



19. On which factors the products obtained by the reaction of metal with nitric acid depend ? Explain with examples.



20. Copper does not react with dilute hydrochloric acid (HCI). Why?



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21. Reactivity of magnesium metal with dilute hydrochloric acid is maximum. Why?



22. What is an aqua regia? Which metals can be dissolved in it?



23. What is meant by displacement reaction? Which metal amongst the Fe and Cu is more reactive? Why?



24. What is meant by reactivity or activity series of metals? Arrange different metals in the decreasing order of their reactivity.



25. Why is sodium kept immersed in kerosene oil?



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



27. 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:

Metal	Iron (II) sulphate	Copper (II) sulphate	Zinc sulphate	Silver nitrate
A	No reaction	Displacement		
В	Displacement	Ti Nesi	No reaction	
C	No reaction	No reaction	No reaction	Displacement
D	No reaction	No reaction	No reaction	No reaction

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

(1) Which is the most reactive metal?

- (2) What would you observe if B is added to a solution of copper (II) sulphate ?
- (3) Arrange the metals A, B, C and D in the order decreasing reactivity.



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



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



30. Name two metals which displace hydrogen from dilute acid and name two metals which cannot displace hydrogen from dilute acids.



31. Explain the electronic configuration of noble gases (He, Ne, Ar), metals (Na, Mg, Al, K, Ca) and non metals (N,O,F,P,SCl)



32. What are ionic compounds or electrovalent compounds? Explain with example.



33. Explain the formation of sodium chloride (NaCl).



34. State the formation of magnesium chloride by the transfer of electrons.



35. State the general properties of ionic compounds.



36. Write the electron-dot structures for sodium, oxygen and magnesium.



37. Show the formation of Na_2O and MgO by the transfer of electrons.



38. What are the ions present in these compounds?



39. Why do ionic compounds have high melting points?



40. Define the minerals



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41. Define the ores **View Text Solution** 42. Define the gangue



43. Explain the classification (group) of metals on the basis of reactivity.

44. Mention the steps involved in the extraction of pure metal from its ores in the form of chart.



45. What is called gangue? On which factors, the process used for removing the gangue from the ore depends?



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46. Explain the extraction of metals low in the reactivity series.



47. Explain the extraction of metals in the middle of the reactivity series.



48. Explain: Thermit process (reaction)



49. Explain the extraction of metals remain at the top of the reactivity series.



50. Describe the electrolytic refining method for the purification of metals.



51. Define the minerals



52. Define the ore



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53. Define the gangue



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54. Name two metals which are found in nature in the free state.



55. What chemical process is used for obtaining a metal from its oxide ?



56. Give examples of corrosion.



57. "Iron nails rust in test tube A, but, iron nails do not rust in test tubes B and C." Explain it



58. How can the rusting of iron be prevented?



59. Write a note on 'alloy'.



60. What is the difference between pure gold and 22 carat gold? Which type of gold is used for making ornaments?



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

Metal	Zinc	Magnesium	Copper
Zinc oxide			
Magnesium oxide			
Copper oxide			

In which

cases will you find displacement reactions taking place ?



62. Which metals do not corrode easily?



63. What are alloys?



Questions And Answers Activity

1. How does the surface of samples of metal appear?



2. What happens when the surface of sample of metal is rubbed with sand paper ?



3. How does the surface of metal appear in their pure form?



4. Name the shining property of metal.



5. Can we cut the metals such as an iron, copper, aluminium and magnesium with a knife?



6. Can sodium metal be cut with a knife?



7. Which property of metal is seen in the above activity?



8. Which property of metal is observed in this activity?



9. What is malleability of metals?

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10. Name the metals which are most malleable in nature.



11. What is meant by ductility?



12. Which metal is most ductile?



13. What is the maximum length of wire which can be drawn from one gram of gold ?



14. Why the metals can be given different shapes

?



15. What happens to a pin attached to the wire?



16. Which property of metal is observed in the above activity?



17. Which metal is used as the best conductor of heat?



18. Which metals are poor conductors of heat?



19. Which property of metal is observed in the above activity?



20. Which coating is used on electric wire?



21. Does the bulb glow? What does it indicate?



22. State the physical states of non-metals.



23. State the common properties of non-metals based on the above activities.



24. What is formed on burning magnesium?



25. Is the magnesium oxide acidic or basic?



26. Which product is obtained on burning sulphur?



27. Is the product formed on burning sulphur acidic or basic ?



28. Write the equations of chemical reactions



29. Is the sulphur dioxide acidic or basic?



30. Which metal burns easily in air?



31. What colour does Na, Mg, Cu and Al impart to the oxidising flame?



32. How does the metal surface appear after burning?



33. What is the solubility of product in water obtained by the reaction of Cu, Fe, Zn, Al with oxygen?



34. Arrange the metals such as Al, Cu, Fe, Pb, Mg, Zn and Na in the decreasing order of their reactivity towards oxygen.



35. Which amongst the given metals forms water soluble product after heating it ?



36. Which metals react with cold water?



37. Which metals produce fire on water?



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38. Which metal floats on water?



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39. Which metal does not react with cold water, but reacts with hot water?



40. Which metal does not react with either cold or hot water but reacts with steam?



41. Arrange the given metals (in activity) in the decreasing order of their reactivity with water.



42. Arrange sodium, potassium and calcium metals in the increasing order of their reactivity with water.



43. Which metals do not react with cold water and steam?



44. Which metal reacts vigorously with dilute hydrochloric acid?



45. Which metal does not react with hydrochloric acid ?



46. With which metal the rise of temperature is maximum during the reaction ?



47. Arrange the metals Mg, Al, Zn and Fe in the decreasing order of their reactivity towards dilute hydrochloric acid.



48. In which test tube, reaction has occurred? Write the balanced chemical equation for the reaction.



49. On what basis can you say that a reaction has actually taken place?



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50. Name the type of reaction occurring in the above activity.



51. Why does the reaction not occurred in the test tube containing copper wire dipped in a iron sulphate solution?



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52. In which test tube, iron nails rust?



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53. In which test tube, iron nails will not rust?



Textual Exercise

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: D

2. Which of the following methods is suitable for preventing an iron frying pan from rusting?

A. Applying grease

B. Applying paint

C. Applying a coating of zinc

D. All of the above

Answer: C



3. 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



4. 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



- **5.** 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.



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



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



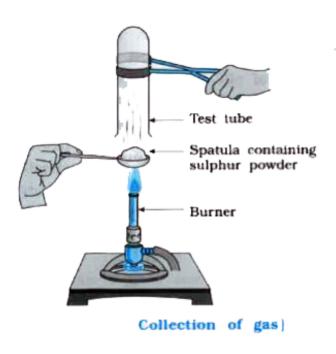
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8. In the electrolytic refining of a metal M, What would you take as an anode, the cathode and the electrolyte?



- **9.** 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 figure 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.





10. State two ways to prevent the rusting of iron.



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



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



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

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



15. Give reasons Carbonate and sulphide ores are usually converted into oxides during the process of extraction.



16. You must have seen tarnished copper vessels being cleaned with lemon or tamarind juice. Explain why these sour substances are effective in cleaning the vessels.



17. Distinguish between metal and non-metal on the basis of their chemical properties.



18. 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?



19. Give reason: Why copper is used to make hot water tanks and not steel (an alloy of iron.)?



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Additional Questions And Answers

1. Give scientific reasons for the statement :Hydrogen gas is not evolved when Al reacts with nitric acid.



2. Give scientific reasons for the statement : Melting points and boiling points of ionic compounds are high.



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3. Give scientific reasons for the statement : Ionic compounds are non-conductor in the solid state, but they conduct electricity in the molten state or in an aqueous solution.



4. Explain: Roasting and Calcination



5. Explain: Alloying of gold



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6. Distinguish between Metals and non-metals on the basis of their physical properties.



7. Distinguish between calcination and roasting



8. Explain: (a) Why copper is used to make taps, hot water tanks and not any other metal? (b) What will happen, if iron nails are kept in a solution containing copper sulphate? (c) Write the balanced chemical equations for the following and balance it:

$$(i)Ca + H_2O \rightarrow$$

$$(iii)Fe+H_2O
ightarrow$$

(ii)Al + HCl
ightarrow



9. How will you prove that zinc is more reactive than copper?



10. 5 mL each of concentrated HCl and concentrated HNO3 are taken in test tubes labelled as A and B while a mixture of

concentrated HCI (15 mL) and concentrated HNO_3 (5 mL) is taken in test tube labelled as C. A small piece of metal is placed in each test tube. No change is observed in test tubes A and B, but metal got dissolved in test tube C. What would be the metal ?



11. The electronic configuration of three elements X, Y and Z are as follows:

X
ightarrow 2,8Y
ightarrow 2,8,6Z
ightarrow 2,8,1

Identify the metal and non-metal.



12. Arrange the elements Au, Fe, Cu, Mg, Ca, Zn,

Ag and K in descending order of their reactivity.



Objective Questions And Answers Answer The Following Questions In Short

1. What is called metallic lustre?



2. State the full form of PVC.



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3. Give the example of metal and nonmetal existing in liquid state.



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4. Which metals will melt, if you keep them on your palm?



5. What is an amphoteric oxide?



6. Which metals react violently with cold water?



7. What is an aqua regia?



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8. State one use of anhydrous calcium chloride.



9. What is meant by activity or reactivity series?



10. Why does the noble gases possess little chemical activity?



11. State the reason for conduction of electricity through a solution.



12. In which forms are the metals obtained from the earth's crust?



13. On what factors does the process (method) used to remove the gangue from ores depend?



14. What type of metals are used as reducing agent in displacement reactions? Mention the examples.



15. Name the two allotropes of carbon.



Objective Questions And Answers Define

1. Define displacement reaction



2. Define Electrovalent compounds



3. Define Ore
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4. Define roasting
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5. Define Calcination
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6. Define anode-mud



7. Define Corrosion



8. Define alloy



Objective Questions And Answers Fill In The Blanks

1. lodine is a but it possesses



2. Metals forms oxide.



3. Solder is an alloy of and.......



4. The process of obtaining metal from its compound is.......



5. Iron (III) oxide is heated with aluminium powder forms iron in the molten state. This process is known as......



Objective Questions And Answers Choose The Correct Option

1. Which of the following is an alloy?

A. Brass

B. Bronze

C. Steel

D. All of the given

Answer: D



2. Height and weight of iron pillar near the Qutub

Minar in Delhi are respectively...

- A. 8 metre, 6 tonnes
- B. 6 metre, 8 tonnes
- C. 6 metre, 6 tonnes
- D. 8 metre, 8 tonnes

Answer: A



3. Which of the following metals is highly malleable?

A. Gold

B. Silver

C. A and B both

D. None of these

Answer: C



4. Which of the following is not useful as a good conductor of heat ?

A. Silver

B. Copper

C. Lead

D. All of the given

Answer: C



5. Which coating is applied on electric wire	?
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A. DDT

B. PVC

C. PTFE

D. PAN

Answer: B



6. Which metal exists as liquid at room temperature?

A. Mercury

B. Bromine

C. Sodium

D. Calcium

Answer: A



7. Which allotrope of carbon is known as the hardest natural substance ?

A. Graphite

B. Diamond

C. Coke

D. Carbon black

Answer: B



8.	Most	of the	metal	oxides	in	water	are	
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- A. Soluble
- B. Insoluble
- C. Partial soluble
- D. Highly soluble

Answer: B



9. Which layer is formed on Al, when it is exposed to air ?

A. Al_3O_2

B. Al_2O_3

 $\mathsf{C}.\,AlO$

D. AlN

Answer: A



10. HNO_3 is reduced in

A. NO

B. NO_2

 $\mathsf{C}.\,N_2O$

D. all of the given

Answer: D



11. Which of the following reactions is called roasting?

A.
$$ZnCO_3(s) \stackrel{\Delta}{\longrightarrow} ZnO(s) + CO_2(g)$$

В.

$$2ZnS(s) + 3O_2(g) \stackrel{\Delta}{\longrightarrow} 2ZnO(s) + 2SO_2(g)$$

C.
$$ZnO(s) + C(s) \stackrel{\Delta}{\longrightarrow} Zn(s) + CO(g)$$

D.
$$Zn(s) + H_2O(g) \stackrel{\Delta}{\longrightarrow} ZnO(s) + H_2(g)$$

Answer: B



12. During which reaction is dihydrogen gas not produced under normal conditions?

- A. Metal + dilute sulphuric acid
- B. Metal + dilute hydrochloric acid
- C. Metal + dilute nitric acid
- D. Metal + water

Answer: D



13. In which of the following, displacement reaction is possible?

A. Solution of NaCl + coin of copper

B. Solution of $MgCl_2$ + coin of aluminium

C. Solution of $FeSO_4$ + coin of silver

D. Solution of $AgNO_3$ + coin of copper

Answer: D



14. Which of the following reactions is not possible?

A.

 $Zn(s) + CuSO_4(aq)
ightarrow ZnSO_4(aq) + Cu(s)$

В.

$$Zn(s) + CuSO_4(aq)
ightarrow ZnSO_4(aq) + Fe(s)$$

$$Fe(s) + CuSO_4(aq)
ightarrow FeSO_4(aq) + Cu(s)$$

 $Cu(s) + FeSO_4(aq)
ightarrow CuSO_4(aq) + Fe(s)$

Answer: D



- **15.** Which of the following statements is incorrect?
 - A. Corrosion of copper takes place by contact with air and water.
 - B. The melting points and boiling points of metals are low.

C. The method to convert carbonate containing ore to metal oxide is called calcination.

D. The displacement of less active metals from their solution takes place by more active metal.

Answer: B



Objective Questions And Answers Answer The Questions In One Word

1. Metals can be hammered into thin sheets. What does this property called?



2. Name two metals which are poor conductors of heat.



3. How many electrons are present in the outermost shell of fluorine ?



4. By which force the anions and cations are held together in ionic compounds ?



5. Which soluble salts are present in sea-water?



6. Which metals are available in free state?



7. Name the metal which can be cut with a knife.



8. Name the solution which is used for dissolving gold.



Objective Questions And Answers Answer The Questions

1. Mention the formulae, names and physical states of the products in the reactions : $2Cu(s) + O_2(g)
ightarrow$



2. Mention the formulae, names and physical states of the products in the reactions :

$$4Al(s)+3O_2(g)
ightarrow$$



3. Mention the formulae, names and physical states of the products in the reactions : $Al_2O_3(s)+6HCl(aq)
ightarrow$



 $Al_2O_3(s) + 2NaOH(aq)
ightarrow$

4. Mention the formulae, names and physical states of the products in the reactions :

5. Mention the formulae, names and physical states of the products in the reactions : $K_2O(s) + H_2O(l) o$



6. Mention the formulae, names and physical states of the products in the reactions : $Ca(s) + 2H_2O(l)
ightarrow$

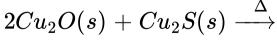


7. Mention the formulae, names and physical states of the products in the reactions : $2HgS(s) + 3O_2(g) \stackrel{\Delta}{\longrightarrow}$



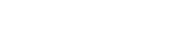
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8. Mention the formulae, names and physical states of the products in the reactions :





9. Mention the formulae, names and physical states of the products in the reactions : ZnO(s) + C(s)
ightharpoonup





10. Mention the formulae, names and physical states of the products in the reactions : $Fe_2O_3(s) + 2Al(s) \stackrel{\Delta}{\longrightarrow}$



11. Mention the formulae, names and physical states of the products in the reactions : $2PbS(s) + 3O_2(g) \rightarrow$



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12. Mention the formulae, names and physical states of the products in the reactions : $Cr_2O_3(s) + 2Al(s) \stackrel{\Delta}{\longrightarrow}$



13. Mention the formulae, names and physical states of the products in the reactions : $3Fe(s) + 4H_2O(g)
ightarrow$



14. Mention the formulae, names and physical states of the products in the reactions : $CO(g) + H_2O(g) \rightarrow$



15. Mention the formulae, names and physical states of the products in the reactions : $3NO_2(g) + H_2O(l)
ightharpoonup$



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Value Based Questions With Answers

1. Arvind delivered a speech in the school assembly on "How to minimise the use of heavy metals?" He told how mercury thermometers when broken and thrown away in the garbage

leads to pollution of soil and underground water pollution. He also showed how cadmium and lead also causes dangerous health problems.

Name two heavy metals which are present in the mobile batteries.



2. Arvind delivered a speech in the school assembly on "How to minimise the use of heavy metals?" He told how mercury thermometers when broken and thrown away in the garbage leads to pollution of soil and underground water

pollution. He also showed how cadmium and lead also causes dangerous health problems.

Name the disease caused due to mercury entering into our food-chain.



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3. Arvind delivered a speech in the school assembly on "How to minimise the use of heavy metals?" He told how mercury thermometers when broken and thrown away in the garbage leads to pollution of soil and underground water pollution. He also showed how cadmium and lead

also causes dangerous health problems.

What value of Arvind is seen in the act?



4. A jeweller made jewellery (ornaments) of 22 carat gold and also charged his customers for the rate of 24 carat gold. His business developed due to this act.

Why can't we make ornaments of 24 carat gold?



5. A jeweller made jewellery (ornaments) of 22 carat gold and also charged his customers for the rate of 24 carat gold. His business developed due to this act.

Name two metals that can be added to make jewellery



6. A jeweller made jewellery (ornaments) of 22 carat gold and also charged his customers for the rate of 24 carat gold. His business developed

due to this act.

What value of the jeweller is reflected in this act?



7. Naman saw his friend riding a cycle which was completely rusted at the edge of the pedal. He advised his friend to weld it and apply a coating of oil paint over it.



Why do iron rust?

8. Naman saw his friend riding a cycle which was completely rusted at the edge of the pedal. He advised his friend to weld it and apply a coating of oil paint over it.

Give two remedies to avoid rusting.



9. Naman saw his friend riding a cycle which was completely rusted at the edge of the pedal. He advised his friend to weld it and apply a coating

of oil paint over it.

What value of Naman is seen in the above act?



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Practice Skill Based Questions With Answers

1. Mention three safety measures essential while performing the reactivity series experiment in the laboratory



2. How will you identify the copper sulphate, iron sulphate and barium sulphate in the laboratory?



3. Write the name and molecular formula of any three metal salts which are white in colour.



4. A student put the spatula of iron in the test tube containing copper sulphate while

performing an experiment in the laboratory.

What will he observe next day?



5. Three solutions of zinc sulphate, magnesium sulphate and aluminium sulphate are prepared in laboratory by a lab assistant. But he forgot to label the reagent bottles. How will you label these bottles by using the metal reactivity studies?

