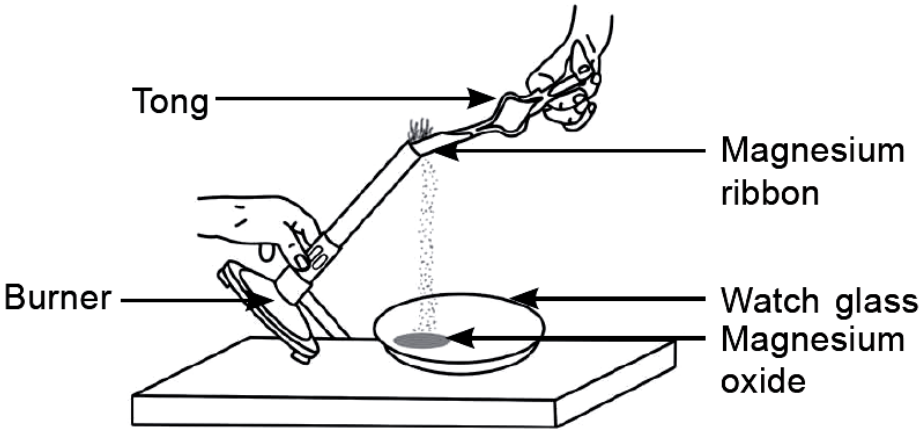
PRACTICE PAPER 01
CHAPTER 01 CHEMICAL REACTION AND EQUATIONS

SUBJECT: SCIENCE **MAX. MARKS : 40**
CLASS : X **DURATION : 1½ hrs**

General Instructions:
(i). **All** questions are compulsory.
(ii). This question paper contains 2**0** questions divided into five Sections A, B, C, D and E.
(iii). **Section A** comprises of **10 MCQs** of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** each and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.
(iv). There is no overall choice.
(v). Use of Calculators is not permitted

SECTION – A
Questions 1 to 10 carry 1 mark each.

1. Which of the following is correct observation of the reaction shown in below set up?



(a) Brown powder of magnesium oxide is formed.
(b) Colourless gas which turns lime water milky is evolved.
(c) Magnesium ribbon burns with brilliant white light.
(d) Reddish brown gas with a smell of burning sulphur has evolved.

2. A student took sodium sulphate solution in a test tube and added barium chloride solution to it. He observed that an insoluble substance has formed.
The colour and molecular formula of the insoluble substance is:
(a) Grey, Ba_2SO_4 (b) Yellow, $Ba(SO_4)_2$ (c) White, $BaSO_4$ (d) Pink, $BaSO_4$

3. $C_6H_{12}O_6(aq) + 6O_2(aq) \rightarrow 6CO_2(aq) + 6H2O(l)$
The above reaction is a/an
(a) displacement reaction (b) endothermic reaction
(c) exothermic reaction (d) neutralisation reaction

4. It is important to balance the chemical equations to satisfy the law of conservation of mass. Which of the following statements of the law is incorrect?
(a) Total total mass of the elements present in the reactants is equal to the total mass of the elements presents in the products.
(b) The number of atoms of each element remains the same, before and after a chemical reaction.
(c) The chemical composition of the reactants is the same before and after the reaction.
(d) Mass can neither be created nor can it be destroyed in a chemical reaction.

5. Which one of the following reactions is categorised as thermal decomposition reaction?
(a) $2H_2O(l) \rightarrow 2H_2(g) + O_2(g)$ (b) $2AgBr(s) \rightarrow 2Ag(s) + Br_2(g)$
(c) $2AgCl(s) \rightarrow 2Ag(s) + Cl_2(g)$ (d) $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$

6. When hydrogen sulphide gas is passed through a blue solution of copper sulphate, a black precipitate of copper sulphide is obtained and the sulphuric acid so formed remains in the solution.
The reaction is an example of a:
(a) Combination reaction (b) Displacement reaction
(c) Decomposition reaction (d) Double displacement reaction

7. Calcium oxide reacts vigorously with water to produce slaked lime.

$$CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq)$$

This reaction can be classified as:
(A) Combination reaction (B) Exothermic reaction
(C) Endothermic reaction (D) Oxidation reaction
Which of the following is a correct option? [CBSE 2020]
(a) (A) and (C) (b) (C) and (D) (c) (A), (C) and (D) (d) (A) and (B)

8. Which of the following statements about the reaction given below are correct?
$MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$
(i) HCl is oxidised to Cl_2
(ii) MnO_2 is reduced to $MnCl_2$
(iii) $MnCl_2$ acts as an oxidising agent
(iv) HCl acts as an oxidising agent
(a) (ii), (iii) and (iv) (b) (i), (ii) and (iii)
(c) (i) and (ii) only (d) (iii) and (iv) only

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:
(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

9. **Assertion (A):** $MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$ is redox reaction.
Reason (R): MnO_2 oxidises HCl to Cl_2 and gets reduced to $MnCl_2$.

10. **Assertion (A):** After white washing the walls, a shiny white finish on the walls is obtained after two to three days.
Reason (R): Calcium oxide reacts with carbon dioxide to form calcium hydrogen carbonate which gives shiny finish.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. A clear solution of slaked lime is made by dissolving $Ca(OH)_2$ in an excess of water. This solution is left exposed to air. The solution slowly goes milky as a faint white precipitate forms. Explain why a faint white precipitate forms. Support your response with the help of a chemical equation.

12. Give the chemical name of the reactants as well as the products of the following chemical equation:

$$2HNO_3 + Ca(OH)_2 \rightarrow Ca(NO_3)_2 + 2H_2O$$

13. Why is respiration considered an exothermic reaction?

14. A zinc plate was put into a solution of copper sulphate kept in a glass container. It was found that blue colour of the solution gets fader and fader with the passage of time. After a few days when zinc plate was taken out of the solution, a number of holes were observed on it.
(a) State the reason for changes observed on the zinc plate.
(b) Write the chemical equation for the reaction involved.

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. The following diagram displays a chemical reaction. Observe carefully and answer the following questions:
(a) Identify the type of chemical reaction that will take place and define it. How will the colour of the salt change?
(b) Write the chemical equation of the reaction that takes place.
(c) Mention one commercial use of this salt.

16. (a) Classify the following reactions into different types:
(i) $AgNO_3(aq) + NaCl(aq) \rightarrow AgCl(s) + NaNO_3(aq)$
(ii) $CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq)$
(iii) $2KClO_3(s) \xrightarrow{\Delta} 2KCl(aq) + 3O_2(g)$
(b) Which of the above reaction(s) is/are precipitation reaction(s)? Why is a reaction called precipitation reaction?

17. What is redox reaction? Identify the substance oxidised and the substance reduced in the following reactions:
(a) $2PbO + C \rightarrow Pb + CO_2$
(b) $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

SECTION – D

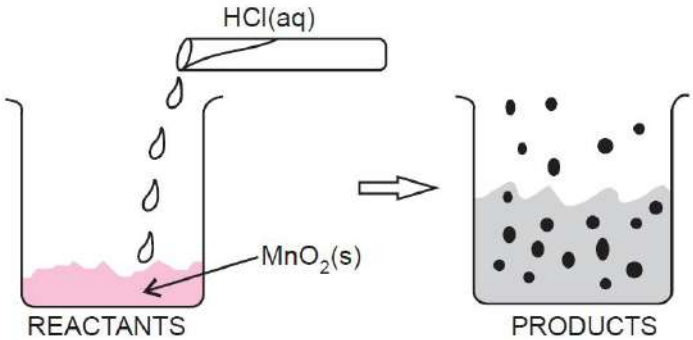
Questions 18 carry 5 marks.

18. (a) Define a balanced chemical equation. Why should an equation be balanced?
(b) Write the balanced chemical equation for the following reaction:
(i) phosphorus burns in presence of chlorine to form phosphorus pentachloride.
(ii) burning of natural gas.
(iii) the process of respiration.

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. Read the given passage and answer the questions based on passage and related studied concepts. The reaction between MnO_2 with HCl is depicted in the following diagram. It was observed that a gas with bleaching abilities was released.



(a) What type of reaction is between MnO_2 and conc. HCl?

(b) Which compound reacts with Cl_2 to form bleaching powder?
(c) Identify oxidising agent, reducing agent, substance oxidised and substance reduced in reaction of MnO_2 and HCl.

OR

(c) What will happen if we take dry HCl instead of aqueous HCl? What is colour of MnO_2?

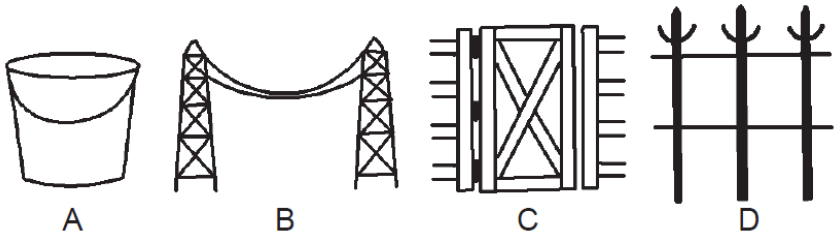
20. Two students decided to investigate the effect of water and air on iron object under identical experimental conditions. They measured the mass of each object before placing it partially immersed in 10 ml of water. After a few days, the object were removed, dried and their masses were measured. The table shows their results.

Student	Object	Mass of Object before Rusting in g	Mass of the coated object in g
A	Nail	3.0	3.15
B	Thin plate	6.0	6.33

(a) What might be the reason for the varied observations of the two students?
(b) In another set up the students coated iron nails with zinc metal and noted that, iron nails coated with zinc prevents rusting. They also observed that zinc initially acts as a physical barrier, but an extra advantage of using zinc is that it continues to prevent rusting even if the layer of zinc is damaged. Name this process of rust prevention and give any two other methods to prevent rusting.

Or

(b) In which of the following applications of Iron, rusting will occur most? Support your answer with valid reason.



A - Iron Bucket electroplated with Zinc
B - Electricity cables having iron wires covered with aluminium
C - Iron hinges on a gate
D - Painted iron fence

PRACTICE PAPER 01
CHAPTER 01 CHEMICAL REACTION AND EQUATIONS
(ANSWERS)

SUBJECT: SCIENCE **MAX. MARKS : 40**
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(iv). There is no overall choice.
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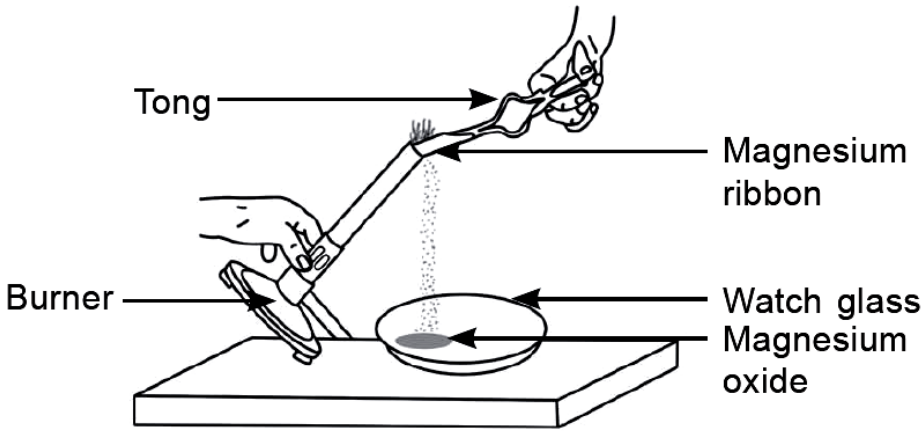
SECTION – A
Questions 1 to 10 carry 1 mark each.

1. Which of the following is correct observation of the reaction shown in below set up?



(a) Brown powder of magnesium oxide is formed.
(b) Colourless gas which turns lime water milky is evolved.
(c) Magnesium ribbon burns with brilliant white light.
(d) Reddish brown gas with a smell of burning sulphur has evolved.
Ans: (c) Magnesium ribbon burns with brilliant white light.
$2Mg(s) + O_2(g) \rightarrow 2MgO(s)$ + heat + light

2. A student took sodium sulphate solution in a test tube and added barium chloride solution to it. He observed that an insoluble substance has formed.
The colour and molecular formula of the insoluble substance is:
(a) Grey, Ba_2SO_4 (b) Yellow, $Ba(SO_4)_2$ (c) White, $BaSO_4$ (d) Pink, $BaSO_4$
Ans: (c) White, $BaSO_4$
$BaCl_2\ (aq) + Na_2SO_4\ (aq) \rightarrow BaSO_4(s) + 2NaCl\ (aq)$

3. $C_6H_{12}O_6(aq) + 6O_2(aq) \rightarrow 6CO_2(aq) + 6H2O(l)$
The above reaction is a/an
(a) displacement reaction (b) endothermic reaction
(c) exothermic reaction (d) neutralisation reaction
Ans: (c) exothermic reaction as Heat is evolved.

4. It is important to balance the chemical equations to satisfy the law of conservation of mass. Which of the following statements of the law is incorrect?

(a) Total total mass of the elements present in the reactants is equal to the total mass of the elements presents in the products.
(b) The number of atoms of each element remains the same, before and after a chemical reaction.
(c) The chemical composition of the reactants is the same before and after the reaction.
(d) Mass can neither be created nor can it be destroyed in a chemical reaction.
Ans: (c) The chemical composition of the reactants is the same before and after the reaction.

5. Which one of the following reactions is categorised as thermal decomposition reaction?
(a) $2H_2O(l) \rightarrow 2H_2(g) + O_2(g)$ (b) $2AgBr(s) \rightarrow 2Ag(s) + Br_2(g)$
(c) $2AgCl(s) \rightarrow 2Ag(s) + Cl_2(g)$ (d) $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$
Ans: (d) $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$
(a) is electrical, (b) and (c) are photochemical decomposition.

6. When hydrogen sulphide gas is passed through a blue solution of copper sulphate, a black precipitate of copper sulphide is obtained and the sulphuric acid so formed remains in the solution.
The reaction is an example of a:
(a) Combination reaction (b) Displacement reaction
(c) Decomposition reaction (d) Double displacement reaction
Ans: (d) Double displacement reaction

7. Calcium oxide reacts vigorously with water to produce slaked lime.
$CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq)$
This reaction can be classified as:
(A) Combination reaction (B) Exothermic reaction
(C) Endothermic reaction (D) Oxidation reaction
Which of the following is a correct option? [CBSE 2020]
(a) (A) and (C) (b) (C) and (D) (c) (A), (C) and (D) (d) (A) and (B)
Ans: (d) (A) and (B)
It is exothermic as well as combination reaction.

8. Which of the following statements about the reaction given below are correct?
$MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$
(i) HCl is oxidised to Cl_2
(ii) MnO_2 is reduced to $MnCl_2$
(iii) $MnCl_2$ acts as an oxidising agent
(iv) HCl acts as an oxidising agent
(a) (ii), (iii) and (iv) (b) (i), (ii) and (iii)
(c) (i) and (ii) only (d) (iii) and (iv) only
Ans: (c) (i) and (ii) only
MnO_2 is oxidising agent and HCl is reducing agent

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:
(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

9. **Assertion (A):** $MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$ is redox reaction.
Reason (R): MnO_2 oxidises HCl to Cl_2 and gets reduced to $MnCl_2$.
Ans: (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

10. Assertion (A): After white washing the walls, a shiny white finish on the walls is obtained after two to three days.
Reason (R): Calcium oxide reacts with carbon dioxide to form calcium hydrogen carbonate which gives shiny finish.
Ans: (c) Assertion (A) is true but reason (R) is false.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. A clear solution of slaked lime is made by dissolving $Ca(OH)_2$ in an excess of water. This solution is left exposed to air. The solution slowly goes milky as a faint white precipitate forms. Explain why a faint white precipitate forms. Support your response with the help of a chemical equation.
Ans: Calcium hydroxide reacts with carbon dioxide present in the atmosphere to form calcium carbonate which results in milkiness/white ppt.
$Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

12. Give the chemical name of the reactants as well as the products of the following chemical equation:

$$2HNO_3 + Ca(OH)_2 \rightarrow Ca(NO_3)_2 + 2H_2O$$

Ans. Chemical name of reactants:
HNO_3 → Nitric acid
$Ca(OH)_2$ → Calcium hydroxide
Chemical name of products:
$Ca(NO_3)_2$ → Calcium nitrate
H_2O → Water

13. Why is respiration considered an exothermic reaction?
Ans. Respiration is considered an exothermic reaction because, in respiration process, oxidation of glucose takes place which produces a large amount of heat energy, which is stored in the form of ATP.
The chemical equation shown below:
$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + energy

14. A zinc plate was put into a solution of copper sulphate kept in a glass container. It was found that blue colour of the solution gets fader and fader with the passage of time. After a few days when zinc plate was taken out of the solution, a number of holes were observed on it.
(a) State the reason for changes observed on the zinc plate.
(b) Write the chemical equation for the reaction involved.
Ans. (a) A number of holes were observed because zinc has displaced copper from CuSO4. Zinc metal has been used to form zinc sulphate, therefore, number of holes were observed.
(b) $Zn(s) + CuSO_4(aq) \rightarrow ZnSO_4(aq) + Cu(s)$

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. The following diagram displays a chemical reaction. Observe carefully and answer the following questions:
(a) Identify the type of chemical reaction that will take place and define it. How will the colour of the salt change?
(b) Write the chemical equation of the reaction that takes place.
(c) Mention one commercial use of this salt.

Ans: (a) Photochemical decomposition reaction. Those reactions in which a compound breaks down into simple substances in presence of light are called photochemical decomposition reaction. The colour of salt will change from white to grey.

(b) $2AgCl(s) \xrightarrow{\text{Sunlight}} 2Ag(s) + Cl_2(g)$

(c) Silver chloride is used in photography.

16. (a) Classify the following reactions into different types:

(i) $AgNO_3(aq) + NaCl(aq) \rightarrow AgCl(s) + NaNO_3(aq)$

(ii) $CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq)$

(iii) $2KClO_3(s) \xrightarrow{\Delta} 2KCl(aq) + 3O_2(g)$

(b) Which of the above reaction(s) is/are precipitation reaction(s)? Why is a reaction called precipitation reaction?

Ans: (a) (i) Precipitation reaction (Double displacement reaction)

(ii) Combination reaction

(iii) Decomposition reaction

(b) (i) is precipitation reaction because one of the products formed is insoluble in water.

17. What is redox reaction? Identify the substance oxidised and the substance reduced in the following reactions:

(a) $2PbO + C \rightarrow Pb + CO_2$

(b) $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

Ans: Those reaction in which oxidation and reduction takes place simultaneously are called redox reactions.

(a) PbO is getting reduced and C is getting oxidised.

(b) MnO_2 is getting reduced. HCl is getting oxidised.

SECTION – D

Questions 18 carry 5 marks.

18. (a) Define a balanced chemical equation. Why should an equation be balanced?

(b) Write the balanced chemical equation for the following reaction:

(i) phosphorus burns in presence of chlorine to form phosphorus pentachloride.

(ii) burning of natural gas.

(iii) the process of respiration.

Ans: (a) Balanced chemical equation has an equal number of atoms of different elements in the reactants and products. According to law of conservation of mass, matter can neither be created nor be destroyed in a chemical reaction.

(b) (i) $P_4(s) + 10Cl_2(g) \rightarrow 4PCl_5(s)$

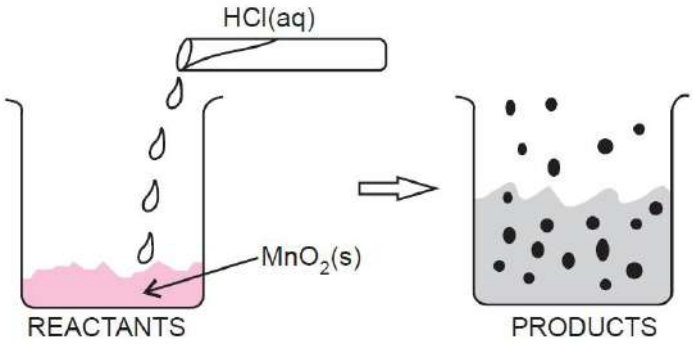
(ii) $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$ + Heat energy

(iii) $C_6H_{12}O_6(aq) + 6O_2(q) \rightarrow 6CO_2(aq) + 6H_2O(l)$ + Heat energy

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. Read the given passage and answer the questions based on passage and related studied concepts. The reaction between MnO_2 with HCl is depicted in the following diagram. It was observed that a gas with bleaching abilities was released.



(a) What type of reaction is between MnO_2 and conc. HCl?
(b) Which compound reacts with Cl_2 to form bleaching powder?
(c) Identify oxidising agent, reducing agent, substance oxidised and substance reduced in reaction of MnO_2 and HCl.

OR

(c) What will happen if we take dry HCl instead of aqueous HCl? What is colour of MnO_2?

Ans: (a) It is redox reaction.
(b) Dry $Ca(OH)_2$ (slaked lime)
(c) (i) MnO_2 is oxidising agent
(ii) HCl is reducing agent
(iii) HCl is getting oxidised
(iv) MnO_2 is getting reduced

OR

(c) Reaction will not take place because MnO_2 solid will not react with HCl gas. MnO_2 is black in colour.

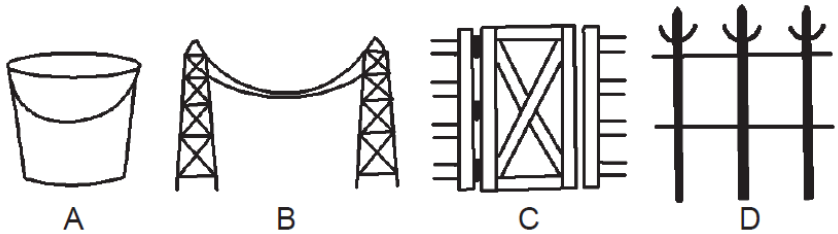
20. Two students decided to investigate the effect of water and air on iron object under identical experimental conditions. They measured the mass of each object before placing it partially immersed in 10 ml of water. After a few days, the object were removed, dried and their masses were measured. The table shows their results.

Student	Object	Mass of Object before Rusting in g	Mass of the coated object in g
A	Nail	3.0	3.15
B	Thin plate	6.0	6.33

(a) What might be the reason for the varied observations of the two students?
(b) In another set up the students coated iron nails with zinc metal and noted that, iron nails coated with zinc prevents rusting. They also observed that zinc initially acts as a physical barrier, but an extra advantage of using zinc is that it continues to prevent rusting even if the layer of zinc is damaged. Name this process of rust prevention and give any two other methods to prevent rusting.

Or

(b) In which of the following applications of Iron, rusting will occur most? Support your answer with valid reason.



A - Iron Bucket electroplated with Zinc
B - Electricity cables having iron wires covered with aluminium
C - Iron hinges on a gate
D - Painted iron fence
Ans: (a) Rusting occurs in both A and B so there is an increase in mass.
As the surface area of B is more, extent of rusting is more
(b) Galvanization Oiling/greasing/painting/alloying/chromium plating or any other

OR

(b) C - Iron hinges on a gate -
Iron is in contact with both atmospheric oxygen and moisture/water vapour.