CHEMISTRY
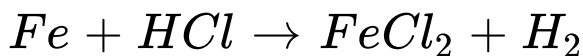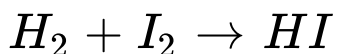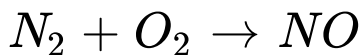
BOOKS - V PUBLICATION

REDOX REACTION AND RATE OF CHEMICAL REACTIONS

Question Bank

1. Some chemical equations are give below:

$$C + O_2 \rightarrow CO_2$$

$$CH_4 + 2O_2 \rightarrow CO_2 + H_2O$$

$$N_2 + O_2 \rightarrow NO$$

$$CaCO_3 \rightarrow CaO + CO_2$$

$$H_2 + I_2 \rightarrow HI$$

$$Fe + HCl \rightarrow FeCl_2 + H_2$$

$$CO + C \rightarrow CO$$
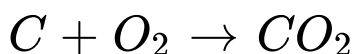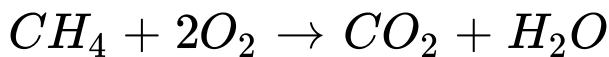
a) Which of these are balanced equations?

b) Balance the unbalanced equations.

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2. The chemical reaction between marble and dilute HCl is given.

$$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$$

a) Which gas is formed here? How can you identify the gas?

b) Suggest any two ways you would choose to increase the rate of this chemical reaction. Explain the reason.

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3. Sulphur pieces does not react with the cold concentrated nitric acid. But sulphur powder reacts.

a) Explain the reason why the rate of chemical reaction is increased here?

b) Suppose you want to increase the rate of reaction again. Which way would you choose? Gice reason.

4. Small amounts of phosphoric acid is usually added to hydrogen peroxide to prevent its decomposition.

a) What is the function of phosphoric acid here?

b) By which name are these types of substances known?

c) Which substance would you add to increase the rate of decomposition of hydrogen peroxide?

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5. Find the oxidation number of the elements which are underlined in the compounds given below. Among these find out the elements which show variable oxidation numbers.

MnO_2, Mn_2O_7, $K_2Cr_2O_7$, $KCrO_3$, $MnCl_2$, MgO, $MgCl_2$, Al_2O_3, $AlCl_3$
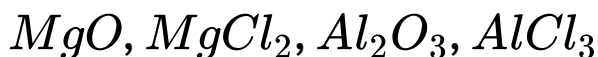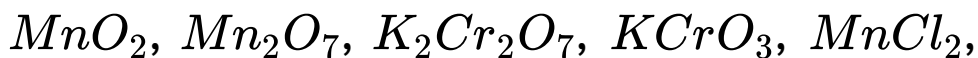
(Hint : Oxidation number O= -2, Cl=-1, K=+1)

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6. Some apparatus and chemicals are given.

Zn, Mg, dilute HCl, 'CaCO_3', test tube, water

a) Design an experiment to prove that the nature of reactants can influence the rate of reaction.

Write the equations for the chemical reactions.

Write the expression for the rate of the reaction.

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7. The experiments conducted by two students are given below:

Experiment 1

2 mL of sodium thiosulphate solution is taken in a test tube, heated and to it 2mL of HCl solution is added.

Experiment 2

2mL of sodium thiosuphate solution is taken in a test tube and to it 2mL of HCl solution is added.

a) In which experiment is the precipitate formed quickly? Justify your answer.

b) Write the balanced equation for the reaction.

8. Some materials available in the laboratory are given below.

Magnesium ribbon, marble powder, Marble pieces, dilute HCl, concentrated HCl.

a) Which materials will you choose for the preparation of more CO_2 in less time?

b) Write the balanced chemical equation for the reaction.

9. 2g hydrogen reacts with 71g chlorine to form 73g of hydrogen chloride. Which is the law related to this?

10. 4g hydrogen reacts with ....g of oxygen to form 36g water.

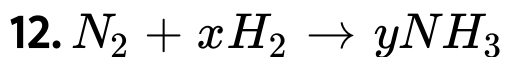**11.** The scientist who proposed the law of conservation of mass.

12. $N_2 + xH_2 \rightarrow yNH_3$

Find out the x and y.

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13. The process in which the gain of electrons is called ....

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14. $Mg + F_2 \rightarrow MgF_2$. In this reaction which element undergoes reduction.

(Hint: Atomic number Mg- 12, F-9)

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15. $2Na^0 + Cl_2^0 \rightarrow 2Na^{+1}Cl^{-1}$. In their reaction which atoms acts as a reducing agent?

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16. What is the oxidation state of Mn in MnO_2

[-4, +2, +4, -2]

(Hint: Oxidation state of oxygen is -2)

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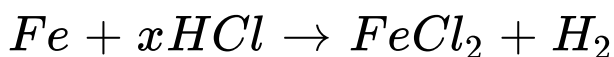**17.** Which is the catalyst used to reduce the reaction rate of H_2O_2 decomposition.?

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18. Which of the following does not affect the rate of reaction?

(Temperature, Catalyst, Colour of reactants, concentration)

19. The chemical equation of a reaction is given below

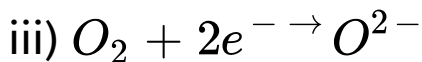$$Fe + xHCl \rightarrow FeCl_2 + H_2$$

a) Find the value of x and balance the chemical

equation.

b) Which are the reactants of this reaction?

20. Choose oxidation reactions from the following and write them.

i) $Zn \rightarrow Zn^{2+} + 2e^-$

ii) $Cl + 1e^- \rightarrow Cl^-$

iii) $O_2 + 2e^- \rightarrow O^{2-}$

iv) $Mg \rightarrow Mg^{2+} + 2e^-$

21. Equation showing the reaction between zinc and hydrochloride acid is given.

$$Zn^0 + 2H^{+1}Cl^{-1} \rightarrow Zn^x Cl_2^{-1} + H_2^0$$
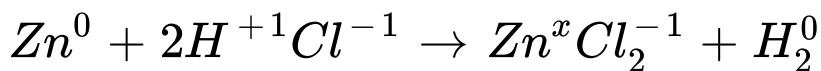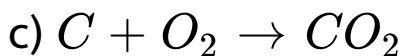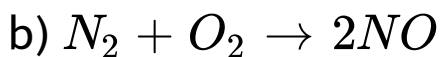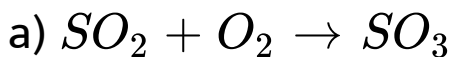
a) What is the oxidation state (x) of zinc in $ZnCl_2$.

b) Which is the oxidising agent in this reaction?
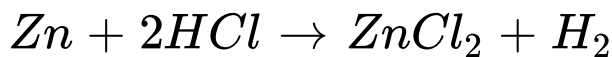
22. Some chemical equations are given below.

a) $SO_2 + O_2 \rightarrow SO_3$

b) $N_2 + O_2 \rightarrow 2NO$

c) $C + O_2 \rightarrow CO_2$

Balance the unbalanced equations.

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23. Consider the reaction.

$$Zn + 2HCl \rightarrow ZnCl_2 + H_2$$

Which of the following methods can be used

to increase the rate of reaction.

a) Larger Zn pieces are used

b) Concentration of HCl is increased.

c) Powdered Zn is used.

d) Concentration of HCl is decreased.
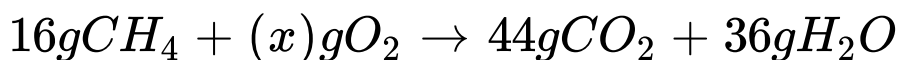
24. a) What is the functions of a positive catalyst?

b) Which catalyst is used in the manufacture of sulphuric acid?

25. Methane and oxygen react together to form carbon dioxide and water.

$$16gCH_4 + (x)gO_2 \rightarrow 44gCO_2 + 36gH_2O$$

a) Find out the calue of x.

b) State the law which is used to complete the equation.

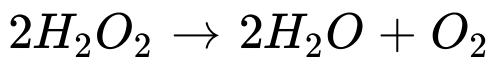**26.** Given below is the chemical equation of reaction between $CaCO_3$ and HCl.

$$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + (A)$$

i) Complete the equation.

ii) Suggest a method to increase the rate of reaction.

27. Given below is the chemical equation of decomposition of H_2O_2.

$$2H_2O_2 \rightarrow 2H_2O + O_2$$

a) Which catalyst is used for decomposition of

H_2O_2.?

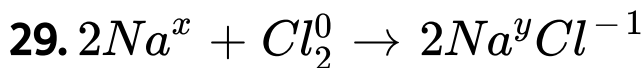b) Which substrate will reamain in the test

tube after the completion of the reaction.

28. Find out the oxidation state of Mn in the

following compound.

a) Mn_2O_7 b) Mn_2O_3

(Hint: Oxidation state of oxygen O= -2)

29. $2Na^x + Cl_2^0 \rightarrow 2Na^yCl^{-1}$
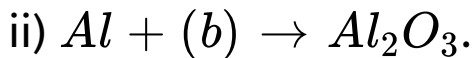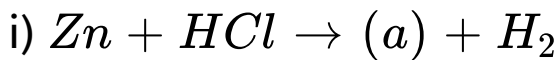
a) Find out x and y.

b) Write the equation of reduction reaction.

c) Which is the reducing agent in this reaction.

30. Unbalanced and incomplete chemical equations are given. Complete the equation. Also balance the equations.

i) $Zn + HCl \rightarrow (a) + H_2$

ii) $Al + (b) \rightarrow Al_2O_3$.

31. Take 5mL of hydrogen peroxide (H_2O_2) solution in a test tube. Add some magnesium dioxide (MnO_2) in to it.

a) What is the gas evolved?

b) What is the function of MnO_2 in this reaction?

c) Which are the substances remaining in the test tube when the reaction is over?

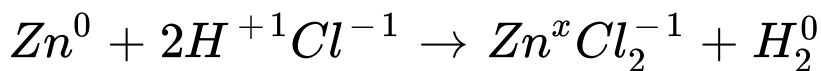**32.** Take cold water in one test tube and hot water in another test tube. Put Mg ribbon of equal mass in two test tubes.

a) In which test tube is the rate of reaction faster?

b) Which factor influence the rate of chemical reaction?Explain the reason.

33. Examine the given equation and answer the follwing question:

$$Zn^0 + 2H^{+1}Cl^{-1} \rightarrow Zn^x Cl_2^{-1} + H_2^0$$

Are the statements given below correct? Justify your answer.

a) Zn gets oxidised.

b) HCl is the oxidising agent.

34. $Fe^0 + Cu^{+2}SO_4^{-2} \rightarrow Fe^{+2}SO_4^{-2} + Cu^0$
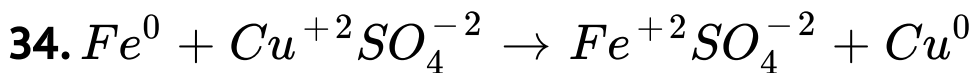
Does the chemical equation given above represent a redox reaction? Give reason.

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35. Take two test tubes A and B. Take equal volume of sodium thiosulphate solutions in both the test tubes. Heat the test tube A. Add equal volumes of dilute hydrochloric acid in both the test tubes.

a) In which test tube the reaction is faster?

b) Which is the factor that affects the rate of reaction here?

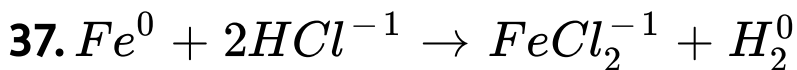c) Explain why the rate of reaction is faster in this test tube.

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36. $Mg + F_2 \rightarrow MgF_2$,in this reaction which element undergoes oxidation .

Hints: Atomic number Mg- 12 F-9)

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37. $Fe^0 + 2HCl^{-1} \rightarrow FeCl_2^{-1} + H_2^0$

a) Find the oxidising state of Fe in $FeCl_2$ and

H in HCl.

b) Identify the oxidising agent and reducing

agent in the given equation.

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38. A small amount of MnO_2 is added to

H_2O_2 taken in a test tube.

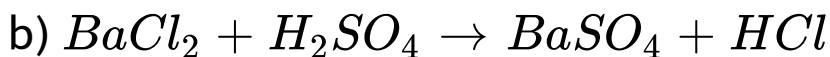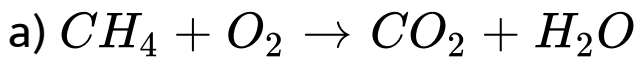a) Suggest an experiment to identify the gas

liberated.

b) Write the chemical equation of the reaction taking place?

c) What is the role of MnO_2 in the chemical reaction.

39. Some chemical equations are given below.

a) $CH_4 + O_2 \rightarrow CO_2 + H_2O$

b) $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + HCl$

i) Balance he above equations

ii) Find out the oxidation state of Ba in $BaCl_2$

and sulphur in H_2SO_4.

(Hint: Oxidation state Cl=-1, H=+1, O=_2)

40. What is the oxidation state of Cu in Cu_2O.

[-2, +2, +1, -1]

41. $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$.which are reactants in this reaction?

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42. Reaction which lose electron is called ....

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43. Some materials available in the laboratory are given below.

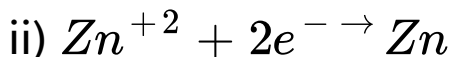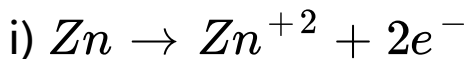Magnesium ribbon, marble powder, Marble pieces, dilute HCl, concentrated HCl.

a) Which materials will you choose for the preparation of more CO_2 in less time?

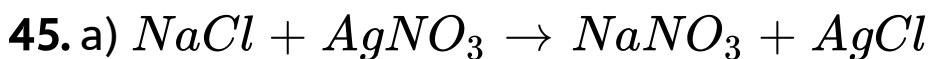b) Write the balanced chemical equation for the reaction.

44. Choose the reducation reactions from the following and write them

i) $Zn \rightarrow Zn^{+2} + 2e^{-}$

ii) $Zn^{+2} + 2e^{-} \rightarrow Zn$

iii) $Cu \rightarrow Cu^{+2} + 2e^{-}$

iv) $Cu^{+2} + 2e^{-} \rightarrow Cu$

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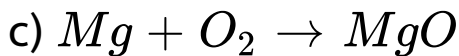**45.** a) $NaCl + AgNO_3 \rightarrow NaNO_3 + AgCl$
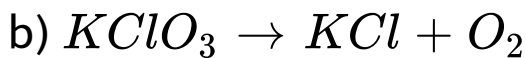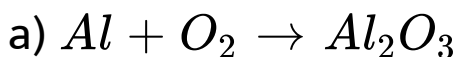
When 58.5 g NaCl reacts with 170g $AgNO_3$,

85g $NaNO_3$ is formed. Calculate the mass of

AgCl formed in this reaction?

State the law of conservation of mass?

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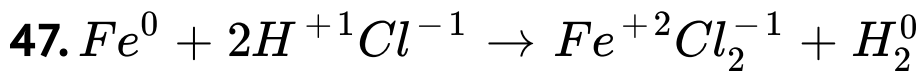**46.** Balance the following chemical equations.

a) $Al + O_2 \rightarrow Al_2O_3$

b) $KClO_3 \rightarrow KCl + O_2$

c) $Mg + O_2 \rightarrow MgO$

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47. $Fe^0 + 2H^{+1}Cl^{-1} \rightarrow Fe^{+2}Cl_2^{-1} + H_2^0$

Does this represent a redox reaction? Justify

your answer.

48. Take two test tubes A and B. Take equal

volume of sodium thiosulphate solutions in

both the test tubes. Heat the test tube A. Add

equal volumes of dilute hydrochloric acid in

both the test tubes.

a) In which test tube the rate of the reaction is

faster?

b) Which is the factor that influences the rate of reaction in this case?

c) Write down the balanced chemical equation of the reaction taking place here.

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49. Take 5mL of hydrogen peroxide (H_2O_2) solution in a test tube. Add some magnesium dioxide (MnO_2) in to it.

a) What is the gas evolved?

b) What is the function of MnO_2 in this reaction?

c) Which are the substances remaining in the test tube when the reaction is over?

50. The materials required to conduct as the experiment to study the relation between temperature and speed of chemical reaction are given.

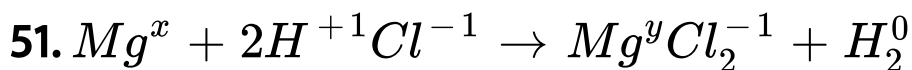Boiling tubes, Sodium thiosulphate, Dil. HCl,

Spirit Lamp, Beaker, water

a) Write down the procedure of the experiment.

b) Explain how the temperature influences the speed of the chemical reaction.

51. $Mg^x + 2H^{+1}Cl^{-1} \rightarrow Mg^yCl_2^{-1} + H_2^0$

Find out x and y.

b) Identify the oxidising agent and reducing agent in the given equation.

c) Write the equation of oxidation reaction in this reaction.