

**ACIDS, BASES AND SALTS WS1**

**Class 10 - Science**

**Section A**

1. Metal compound A reacts with dilute hydrochloric acid to produce effervescence. The gas evolved extinguishes a burning candle. Write a balanced chemical equation for the reaction if one of the compounds formed is calcium chloride. [2]
2. Soham adds a spoon full of powdered sodium hydrogen carbonate to a flask containing ethanoic acid. [2]
  - i. List two main observations that he/she must note in his/her notebook about the reaction that takes place.
  - ii. Write chemical equation for the reaction.
3. When a piece of limestone reacts with dilute HCl, a gas X is produced. When gas X is passed through lime water then a white precipitate Y is formed. On passing excess of gas X, the white precipitate dissolves forming a soluble compound Z. [2]
  - a. What are X, Y and Z?
  - b. Write equations for the reactions which take place :
    - i. When limestone reacts with dilute HCl.
    - ii. When gas X reacts with lime water to form white precipitate Y.
4. a. What happens when dilute hydrochloric acid is added to sodium carbonate ? Write a balanced chemical equation of the reaction involved. [2]  
b. Which gas is liberated when dilute hydrochloric acid reacts with sodium carbonate ? How will you test for the presence of this gas?
5. Solution X turns universal indicator blue to purple whereas solution Y turns universal indicator orange to red. [2]
  - a. What will be the action of solution X on litmus?
  - b. What will be action of solution Y on litmus?
  - c. Name any two substances which can give solutions like X.
6. a. If you have phenolphthalein as an indicator, how will you test for acid and base? [2]  
b. What will be the colour of a blue litmus paper on bringing it in contact with a drop of dil. NaOH?
7. Amol took a magnesium ribbon (cleaned) and burned it on a flame. The white powder formed was taken in a test tube and water was added to it. He then tested the solution formed with blue and red litmus paper. What change was seen? Why? [2]
8. What happens when zinc granules are added to dil NaOH solution? Also write the chemical equation for the reaction. [2]
9. Write two precautions which should be observed while carrying any reaction of zinc metal with dil HCl. [2]
10. Student added a few drops of phenolphthalein to an unknown solution A and B. Solution A acquired pink color. And solution B was added to it drop wise and the solution ultimately became colorless. Predict the nature of the solution A and B. [2]
11. Match the following Column A with Column B: [2]

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Column A	Column B
(a) Acid	(i) Hydroxide ions
(b) Olfactory indicators	(ii) Hydrogen ions
(c) Base	(iii) Neutralisation reaction
(d) Salt	(iv) Odour changes

12. What is observed when a pinch of sodium hydrogen carbonate is added to 2 mL of acetic acid taken in a test tube? Write chemical equation for the reaction involved in this case. [2]
13. What is the action of metal hydrogen carbonate with acid ? Give one example. [2]
14. Name the gas which is liberated when an acid reacts with a metal. Illustrate with an example. How will you test the presence of this gas? [2]
15. What is the action of zinc with dilute sulphuric acid ? [2]
16. A student prepared solutions of (i) an acid and (ii) a base in two separate beakers but forgot to label the solutions and litmus paper is not available in the laboratory. Since both the solutions are colourless, how will he distinguish between the two using (a) phenolphthalein and (b) methyl orange? [2]
17.
  - i. What is an indicator? Name three common indicators. [2]
  - ii. Name the acid-base indicator extracted from lichen.
  - iii. What colour does the turmeric paper turn when put in an alkaline solution?
18. Give balanced chemical equation for [2]
  - i. Reaction of acids with metals.
  - ii. Reaction of acids with metal carbonate.
  - iii. Reaction of acid with hydrogen carbonates (bicarbonates)
  - iv. Reaction of acid with bases
19. What will be the action of the following substance in litmus paper? [2]  
Lemon Juice, Carbonated soft drink
20. A substance X is used as a building material and insoluble in water. When reacts with dil. HCl, it produces a gas which turns lime water milky. Predict the substance and write the chemical equation involved. [2]
21. What happens when nitric acid is added to an egg shell? [2]
22. A few drops of phenolphthalein indicator were added to an unknown solution A. It acquired a pink colour. Now another unknown solution B was added to it drop by drop and the solution becomes colourless. Predict the nature of A & B. [2]
23. What happens when an metal reacts with dil HCl or dil  $H_2SO_4$  ? Give two examples. [2]
24. Give some practical uses of neutralization. [2]
25. Why is copper sulphate pentahydrate coloured? [2]
26. Name the gas evolved when dilute HCl reacts with sodium hydrogen carbonate. How is it recognised? [2]
27. What is observed when sulphur dioxide is passed through (i) lime water (ii) water? Also write chemical equations for the reactions that takes place. [2]
28. A compound X is bitter in taste. It is a component of washing powder & reacts with dil. HCl to produce brisk effervescence due to colourless, odourless gas Y which turns lime water milky due to formation of Z. When excess of this gas is passed, the milkiness disappears due to the formation of P. Identify X, Y, and Z & P. [2]

29. Write equations for the following reactions [2]
- Dilute sulphuric acid reacts with zinc granules
  - Dilute hydrochloric acid reacts with magnesium ribbon.
  - Dilute sulphuric acid reacts with aluminum powder.
30. Define neutralization reaction. Give two examples. [2]
31. Explain the action of dilute hydrochloric acid on the following with chemical equation: [2]
- Magnesium ribbon
  - Sodium hydroxide
  - Crushed eggs
32. What do you understand by basic oxide ? Give two examples [2]
33. The oxide of a metal M was water soluble. When a blue litmus strip was dipped in this solution, it did not undergo any change in colour. Predict the nature of the oxide. [2]
34. What happens when a base is dissolved in water? Name the reaction. [2]
35. Complete the following equation: [2]
- $$\text{NaOH} + \text{Zn} \rightarrow \text{_____} + \text{_____}$$
36. What would a student report nearly after 30 minutes of placing duly cleaned strips of aluminium, copper, iron and zinc in freshly prepared iron sulphate solution taken in four beakers? [2]
37. a. You are provided with concentrated sulphuric acid. Describe the process of preparing a dilute solution of sulphuric acid. [2]
- b. What is the effect of dilution on  $(\text{H}_3\text{O}^+/\text{OH}^-)$  ratio?
- c. If the  $\text{H}_3\text{O}^+$  ion concentration is increased in a solution, will the pH increase or decrease? What are the probable colours of pH paper if the pH range is 0.5 to 2.0?
38. a. Arrange the following metals in the increasing order of their reactivities: Copper, Zinc, Aluminium and Iron [2]
- b. List two observations you would record in your notebook 30 minutes after adding iron filings to copper sulphate solution.
39. Equal lengths of magnesium ribbons are taken in test tubes A and B. Hydrochloric acid is added to test tube A, [2] while acetic acid is added to test B. In which test tube will the fizzing occur more vigorously and why?
40. How do metal carbonate react with acids ? Give one example. [2]
41. Fill in the missing data in the following table. [2]

Name of the salt	Formula	Base	Acid
(i) Ammonium chloride	$\text{NH}_4\text{Cl}$	$\text{NH}_4\text{OH}$	_____
(ii) Copper sulphate	_____	_____	$\text{H}_2\text{SO}_4$
(iii) Sodium chloride	$\text{NaCl}$	$\text{NaOH}$	_____
(iv) Magnesium nitrate	$\text{Mg}(\text{NO}_3)_2$	_____	$\text{HNO}_3$
(v) Potassium sulphate	$\text{K}_2\text{SO}_4$	_____	_____
(vi) Calcium nitrate	$\text{Ca}(\text{NO}_3)_2$	$\text{Ca}(\text{OH})_2$	_____

42. A solution X gives orange colour when a drop of it falls on pH paper, while another solution Y gives bluish colour when a drop of it falls on pH paper. What is the nature of both the solutions? Determine the pH of [2]

solutions **X** and **Y**.

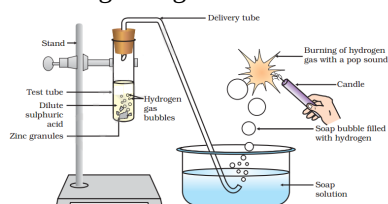
43. You have been provided with three test tubes. One of them contains distilled water and the other two contain an acidic solution and a basic solution respectively. If you are given only red litmus paper, how will you identify the contents of each test tube? [2]
44. Give two application of the reaction of neutralization in daily life. [2]
45. A road tanker carrying an acid was involved in an accident and its contents spilled on the road. At the side of the road iron drain cover began melting and fizzing as the acid ran over them. A specialist was called to see if the acid actually leaked into the nearby river. [2]
- (a) Explain why specialist could carry out sample test to see if the river water contains some acid or not (b) Suggest a better report name for the word 'melting'
- (c) Explain why the drain covers began fizzing as the acid ran over them.
46. List two observations when a pinch of sodium hydrogen carbonate is added to acetic acid in a test tube. Write a chemical equation for the reaction that occurs. [2]
47. A student added few pieces of aluminium metal to two test tubes A and B containing aqueous solution of iron sulphate and copper sulphate. In the second part of her experiment, she added iron metal to another test tube C and D containing aqueous solution of aluminium sulphate and copper sulphate. [2]
- In which test tube or test tubes will she observe colour change? On the basis of this experiment state which one is the most reactive metal and why?
48. Complete the following table by inserting the name of gas evolved when hydrochloric acid reacts with the following substances: [2]

	$\text{Na}_2\text{CO}_3$	$\text{NaHCO}_3$	Na	Mg
HCl	_____	_____	_____	_____

49. What do you understand by acidic oxide? Give two examples. [2]
50. What happens when an acid reacts with a metal oxide? Explain with the help of an example. Write a balanced equation for the reaction involved. [2]
51. A student dropped few pieces of marble in dilute hydrochloric acid contained in a test tube. The evolved gas was then passed through lime water. What change would be observed in lime water? Write balanced chemical equation for both the change observed? [2]

### Section B

52. Write uses of [3]
- I. Acids
- II. Bases
- III. Salts
53. In the following schematic diagram for the preparation of hydrogen gas as shown in fig, what would happen if following changes are made? [3]



In place of zinc granules, same amount of zinc dust is taken into the test tube.

54. A dry pellet of a common base B, when kept in open, absorbs moisture and turns sticky. The compound is also a [3]

by-product of chlor-alkali process. Identify B. What type of reaction occurs when B is treated with an acidic oxide? Write a balanced chemical equation for one such solution.

55. To the three solutions listed below, a few drops of phenolphthalein and blue litmus were added separately. [3]  
Specify the colour change in each case, if any:

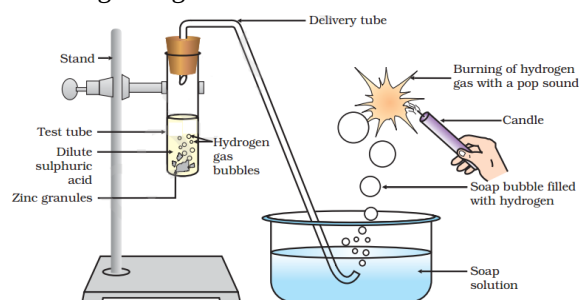
	Name of the solution	Colour change with phenolphthalein	Colour change with blue litmus
(a)	Sodium carbonate		
(b)	Hydrochloric acid		
(c)	Sodium chloride		

56. During the reaction of some metals with dilute hydrochloric acid, the following observations were made by a student: [3]

- Silver does not show any change.
- Some bubbles of a gas are seen when lead is reacted with the acid.
- The reaction of sodium is found to be highly explosive.
- The temperature of the reaction mixture rises when aluminium is added to the acid.

Explain these observations giving appropriate reason.

57. In the following schematic diagram for the preparation of hydrogen gas as shown in fig, what would happen if following changes are made? [3]



Instead of dilute sulphuric acid, dilute hydrochloric acid is taken.

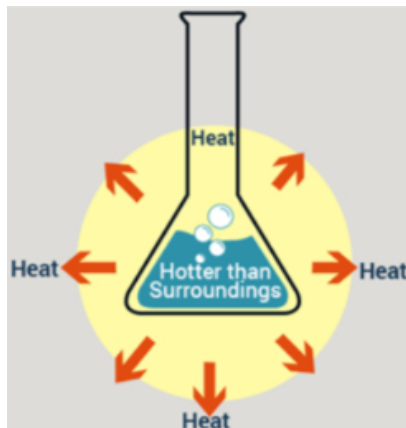
58. When zinc metal is treated with a dilute solution of a strong acid, a gas is evolved, which is utilised in the hydrogenation of oil. Name the gas evolved. Write the chemical equation of the reaction and also write a test to detect the gas formed. [3]
59. With the help of a chemical equation, explain how a soda-acid fire extinguisher helps in putting out a fire. [3]

### Section C

**Question No. 60 to 63 are based on the given text. Read the text carefully and answer the questions:** [4]

The dissolving of an acid or a base in water is a highly exothermic reaction. Care must be taken while mixing concentrated nitric acid or sulphuric acid with water. The acid must always be added slowly to water with constant stirring. If water is added to a concentrated acid, the heat generated may cause the mixture to splash out and cause burns. The glass container may also break due to excessive local heating. Look out for the warning sign on the can of

concentrated sulphuric acid and on the bottle of sodium hydroxide pellets.



60. What is the exothermic reaction?

61. Write an example of an exothermic reaction.

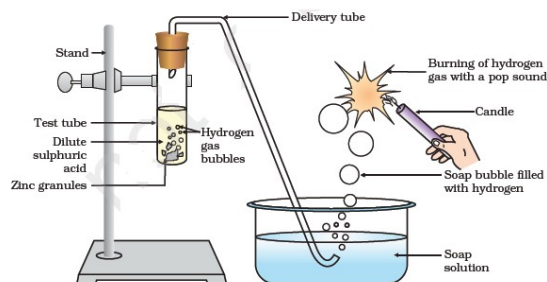
62. How will you obtain sulphuric acid from an acidic oxide?

63. While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid ?

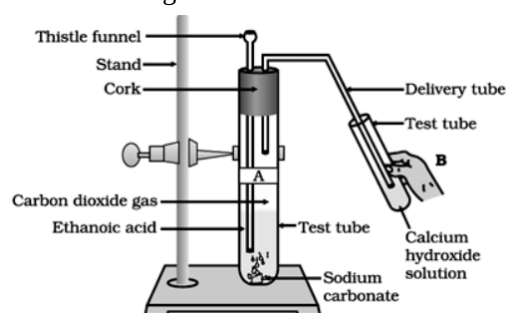
64. **Read the following and answer any four questions:**

[4]

**Experiment-1** to show the reaction of dilute sulphuric acid with zinc a few pieces of zinc granules in the boiling tube is taken and 5ml of dil.  $\text{H}_2\text{SO}_4$  added to it and the gas bubble is formed.



**Experiment-2** of passing  $\text{CO}_2$  gas through calcium hydroxide solution. On passing the carbon dioxide gas evolved through lime water.



i. In **experiment 1** which gas evolved which produce the pop sound:

- Oxygen
- Hydrogen
- Nitrogen
- $\text{CO}_2$

ii. The reaction that takes place in experiment 2 is:

- $2\text{NaOH} + \text{Zn} \rightarrow \text{Na}_2\text{ZnO}_2 + \text{H}_2$
- $2\text{NaOH} + \text{Fe} \rightarrow \text{Na}_2\text{FeO}_2 + \text{H}_2$
- $2\text{KOH} + \text{Zn} \rightarrow \text{K}_2\text{ZnO}_2 + \text{H}_2$
- $2\text{NaOH} + \text{Sn} \rightarrow \text{Na}_2\text{SnO}_2 + \text{H}_2$

iii. In experiment-2 neutralization reaction can be written as:

- a. Base + Acid  $\rightarrow$  salt + water
- b. Base + Base  $\rightarrow$  Strong base
- c. Acid + Acid  $\rightarrow$  Strong acid
- d. None of the above

iv. The chemical formula of sodium zincate:

- a.  $\text{Na}_2\text{ZnO}_2$
- b.  $\text{Na}_3\text{ZnO}_3$
- c.  $\text{Na}_6\text{ZnO}_3$
- d.  $\text{Na}_4\text{ZnO}_3$

v. In experiment - 2 the product which is formed on passing excess of  $\text{CO}_2$  in  $\text{CaCO}_3$ :

- a.  $\text{Ca}(\text{CO}_3)$
- b.  $\text{Ca}_2(\text{HCO}_3)$
- c.  $\text{Ca}_2\text{CO}_3$
- d.  $\text{Ca}(\text{HCO}_3)_2$

### Section D

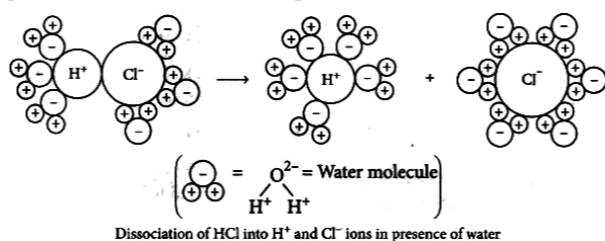
**Question No. 65 to 69 are based on the given text. Read the text carefully and answer the questions:**

**[5]**

The acidic behaviour of acids is due to the presence of hydrogen ( $\text{H}^+$ ) ions in them. They produce hydrogen ions in the presence of water. Water is a polar solvent and this property of water helps in weakening the bond between the ions and makes them soluble.

Hence, acids and bases produce ions in aqueous solutions. It may be noted that a dry  $\text{HCl}$  gas or a solution of hydrogen chloride in organic, non-polar solvents like toluene or benzene do not show acidic properties. This is because hydrogen chloride does not undergo ionization in toluene.

The reason why  $\text{HCl}$  splits into  $\text{H}^+$  and  $\text{Cl}^-$  ions in presence of water lies in the fact that water molecules, being polar, pull the  $\text{H}^+$  and  $\text{Cl}^-$  ions apart and thus, the bond in  $\text{HCl}$  is broken.



65. Which acids are present in bee sting?

66. If the pH of a solution is 8, then find its  $[\text{H}^+]$  ion.

67. If you are given water, Hydrochloric acid, and Acetic acid, then mention increasing the order of acid strength.

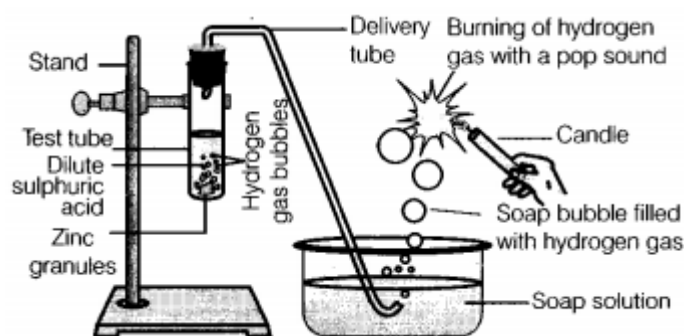
68. If you are provided  $\text{H}_3\text{PO}_4$ ,  $\text{C}_2\text{H}_5\text{OH}$ ,  $\text{H}_2\text{CO}_3$ , and  $\text{CH}_3\text{COOH}$ , then which compound does not give  $\text{H}^+$  ions in an aqueous solution?

69. If four solutions labeled as P, Q, R, and S have pH values 1, 9, 3 and 13 respectively, then which solution turns red litmus solution blue?

70. Solution A turns the universal indicator blue to purple whereas solution B turns the universal indicator orange to red.

- What will be the action of solution A on litmus?
- What will be the action of solution B on litmus?
- Name any two substances which can give solutions like A.
- Name any two substances which can give solutions like B.
- What sort of reaction takes place when solution A reacts with solution B?

71.
  - Write three physical properties each of acids and bases, [5]
  - How will you show with an example that metal oxides are basic in nature? Give chemical equation also.
72. A metal carbonate X on reacting with an acid gives a gas which when passed through a solution Y gives the carbonate back. On the other hand, a gas G that is obtained at anode during electrolysis of brine is passed on dry Y, it gives a compound Z, used for disinfecting drinking water. Identify X, Y, G, and Z. [5]
73. In the following schematic diagram for the preparation of hydrogen gas as shown in the figure, what would happen if the following changes are made? [5]



- In place of zinc granules, same amount of zinc dust is taken in the test tube.
  - Instead of dilute sulphuric acid, dilute hydrochloric acid is taken.
  - In place of zinc, copper turnings are taken.
  - Sodium hydroxide is taken in place of dilute sulphuric acid and the test tube is heated.
74.
  - Why does an aqueous solution of acid conduct electricity? [5]
  - How does the concentration of hydrogen ions  $[H_3O]^+$  change when the solution of an acid is diluted with water?
  - Which has higher pH. A concentrated or dilute solution of HCL?
  - What would you observe on adding dil HCL acid to
    - Sodium bicarbonate placed in a test tube.
    - Zinc metal in a test tube.
75. Identify the compound X on the basis of the reactions given below. Also, write the name and chemical formulae of A, B and C. [5]

