Competition File

Multiple Choice Questions (NCERT Exemplar Problems)

1. What happens when a solution of an acid is mixed with a solution of a base in a test tube?
   (*i*) The temperature of the solution increases
   (*ii*) The temperature of the solution decreases
   (*iii*) The temperature of the solution remains the same
   (*iv*) Salt formation takes place
   (*a*) (*i*) only (*b*) (*i*) and (*iii*)
   (*c*) (*ii*) and (iii) (*d*) (*i*) and (*iv*)
2. An aqueous solution turns red litmus solution blue. Excess addition of which of the following solution would reverse the change?
   (*a*) Baking powder
   (*b*) Lime
   (*c*) Ammonium hydroxide solution
   (*d*) Hydrochloric acid
3. During the preparation of hydrogen chloride gas on a humid day, the gas is usually passed through the guard tube containing calcium chloride. The role of calcium chloride taken in the guard tube is to
   (*a*) absorb the evolved gas
   (*b*) moisten the gas
   (*c*) absorb moisture from the gas
   (*d*) absorb Cl^- ions from the evolved gas
4. Which of the following salts does not contain water of crystallisation?
   (*a*) Blue vitriol
   (*b*) Baking soda
   (*c*) Washing soda
   (*d*) Gypsum
5. Sodium carbonate is a basic salt because it is a salt of
   (*a*) strong acid and strong base
   (*b*) weak acid and weak base
   (*c*) strong acid and weak base
   (*d*) weak acid and strong base
   (C.B.S.E. Sample Paper 2010)
6. Calcium phosphate is present in tooth enamel. Its nature is
   (*a*) basic (*b*) acidic
   (*c*) neutral (*d*) amphoteric
7. A sample of soil is mixed with water and allowed to settle. The clear supernatant solution turns the pH paper yellowish-orange. Which of the following would change the colour of this pH paper to greenish-blue?
   (*a*) Lemon juice (*b*) Vinegar
   (*c*) Common salt (*d*) An antacid
8. Which of the following gives the correct increasing order of acidic strength?
   (*a*) Water <Acetic acid <Hydrochloric acid
   (*b*) Water <Hydrochloric acid <Acetic acid
   (*c*) Acetic acid <Water <Hydrochloric acid
   (*d*) Hydrochloric acid <Water <Acetic acid
9. If a few drops of a concentrated acid accidentally spills over the hand of a student, what should be done?
   (*a*) Wash the hand with saline solution
   (*b*) Wash the hand immediately with plenty of water and apply a paste of sodium hydrogen carbonate
   (*c*) After washing with plenty of water apply solution of sodium hydroxide on the hand
   (*d*) Neutralise the acid with a strong alkali
10. Sodium hydrogen carbonate when added to acetic acid evolves a gas.
    Which of the following statements are true about the gas evolved?
    (*i*) It turns lime water milky
    (*ii*) It extinguishes a burning splinter
    (*iii*) It dissolves in a solution of sodium hydroxide
    (*iv*) It has a pungent odour
    (*a*) (*i*) and (*ii*) (*b*) (*i*), (*ii*) and (*iii*)
    (*c*) (*ii*), (*iii*) and (*iv*) (*d*) (*i*) and (*iv*)
11. Common salt besides being used in kitchen can also be used as the raw material for making
    (*i*) washing soda
    (*ii*) bleaching powder
    (*iii*) baking soda
    (*iv*) slaked lime
    (*a*) (*i*) and (*ii*) (*b*) (*i*), (*ii*) and (*iv*)
    (*c*) (*i*) and (*iii*) (*d*) (i), (*iii*) and (*iv*)
12. One of the constituents of baking powder is sodium hydrogen carbonate, the other constituent is
    (*a*) hydrochloric acid
    (*b*) tartaric acid
    (*c*) acetic acid
    (*d*) sulphuric acid
13. To protect tooth decay we are advised to brush our teeth regularly.
    The nature of the tooth paste commonly used is
    (*a*) acidic (*b*) neutral
    (*c*) basic (*d*) corrosive
14. Which of the following statements is correct about an aqueous solution of an acid and of a base?
    (*i*) Higher the pH, stronger the acid
    (*ii*) Higher the pH, weaker the acid
    (*iii*) Lower the pH, stronger the base
    (*iv*) Lower the pH, weaker the base
    (*a*) (*i*) and (*iii*) (*b*) (*ii*) and (*iii*)
    (*c*) (*i*) and (*iv*) (*d*) (*ii*) and (*iv*)

15. The pH of the gastric juices released during digestion is
(a) less than 7 (b) more than 7
(c) equal to 7 (d) equal to 0

16. Which of the following phenomena occur, when a small amount of acid is added to water?
(i) Ionisation (ii) Neutralisation
(iii) Dilution (iv) Salt formation
(a) (i) and (ii) (b) (i) and (iii)
(c) (ii) and (iii) (d) (ii) and (iv)

17. Which one of the following can be used as an acid–base indicator by a visually impared student?
(a) Litmus (b) Turmeric
(c) Vanilla essence (d) Petunia leaves

18. Which of the following substance will not give carbon dioxide on treatment with dilute acid?
(a) Marble (b) Limestone
(c) Baking soda (d) Lime

19. Which of the following is acidic in nature?
(a) Lime juice (b) Human blood
(c) Lime water (d) Antacid

20. In an attempt to demonstrate electrical conductivity through an electrolyte, the following apparatus (Figure 13) was set up.
Which among the following statement(s) is(are) correct?

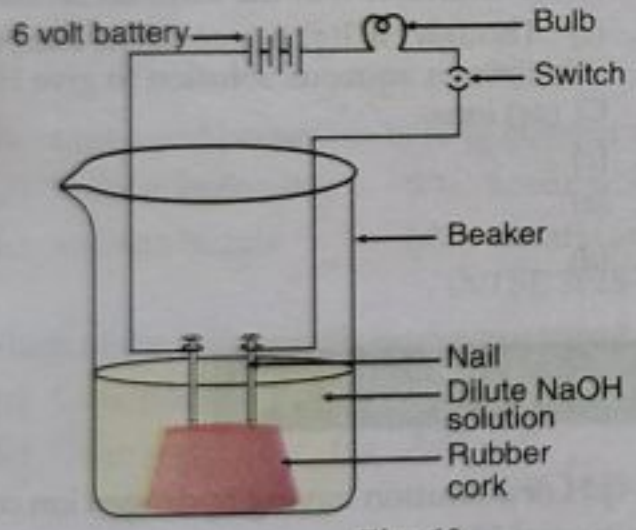

Fig. 13

(i) Bulb will not glow because electrolyte is not acidic
(ii) Bulb will glow because NaOH is a strong base and furnishes ions for conduction.
(iii) Bulb will not glow because circuit is incomplete
(iv) Bulb will not glow because it depends upon the type of electrolytic solution
(a) (i) and (iii) (b) (ii) and (iv)
(b) (ii) only (c) (iv) only

21. Which of the following is used for dissolution of gold?
(a) Hydrochloric acid
(b) Sulphuric acid
(c) Nitric acid
(d) Aqua regia

22. Which of the following is not a mineral acid?
(a) Hydrochloric acid
(b) Citric acid
(c) Sulphuric acid
(d) Nitric acid

23. Which among the following is not a base?
(a) NaOH (b) KOH
(c) NH_4OH (d) C_2H_5OH

24. Which of the following statements is not correct?
(a) All metal carbonates react with acid to give a salt, water and carbon dioxide
(b) All metal oxides react with water to give salt and acid
(c) Some metals react with acids to give salt and hydrogen
(d) Some non metal oxides react with water to form an acid

25. Match the chemical substances given in Column (A) with their appropriate application given in Column (B)

Column (A)	Column (B)
(A) Bleaching powder	(i) Preparation of glass
(B) Baking soda	(ii) Production of H_2 and Cl_2
(C) Washing soda	(iii) Decolourisation
(D) Sodium chloride	(iv) Antacid

(a) A—(ii), B—(i), C—(iv), D—(iii)
(b) A—(iii), B—(ii), C—(iv), D—(i)
(c) A—(iii), B—(iv), C—(i), D—(ii)
(d) A—(ii), B—(iv), C—(i), D—(iii)

26. Equal volumes of hydrochloric acid and sodium hydroxide solutions of same concentration are mixed and the pH of the resulting solution is checked with a pH paper. What would be the colour obtained? (You may use colour guide given in Figure 7.

Fig. 7

(a) Red (b) Yellow
(c) Yellowish green (d) Blue

27. Which of the following is(are) true when HCl (g) is passed through water?
(i) It does not ionise in the solution as it is a covalent compound.
(ii) It ionises in the solution
(iii) It gives both hydrogen and hydroxyl ion in the solution
(iv) It forms hydronium ion in the solution due to the combination of hydrogen ion with water molecule
(a) (i) only (b) (iii) only
(c) (ii) and (iv) (d) (iii) and (iv)

28. Which of the following statements is true for acids?
(a) Bitter and change red litmus to blue

(b) Sour and change red litmus to blue
(c) Sour and change blue litmus to red
(d) Bitter and change blue litmus to red

29. Which of the following are present in a dilute aqueous solution of hydrochloric acid?
(a) $H_3O^+ + Cl^-$ (b) $H_3O^+ + OH^-$
(c) $Cl^- + OH^-$ (d) unionised HCl

30. Identify the correct representation of reaction occurring during chloralkali process
(a) $2NaCl(l) + 2H_2O(l) \longrightarrow 2NaOH(l) + Cl_2(g) + H_2(g)$
(b) $2NaCl(aq) + 2H_2O(aq) \longrightarrow 2NaOH(aq) + Cl_2(g) + H_2(g)$
(c) $2NaCl(aq) + 2H_2O(l) \longrightarrow 2NaOH(aq) + Cl_2(aq) + H_2(aq)$
(d) $2NaCl(aq) + 2H_2O(l) \longrightarrow 2NaOH(aq) + Cl_2(g) + H_2(g)$

ANSWERS AND HINTS

1. (d) : Heat is evolved and therefore temperature increases. The combination of an acid and a base gives salt and water.
2. (d) : The aqueous solution is basic in nature because it turns red litmus solution blue. The reaction can be reversed by adding HCl.
3. (c) : Anhydrous calcium chloride absorbs moisture to keep the gas in dry state.
4. (b) : Baking soda, $NaHCO_3$ does not contain water of crystallisation.
5. (d)
6. (a) : $Ca_3(PO_4)_2$ is a salt of strong base $Ca(OH)_2$ and weak acid H_3PO_4.
7. (d) : The colour of pH paper signifies that the solution is some what acidic. It can be changed to greenish blue by an antacid.
8. (a)
9. (b) : The paste of sodium hydrogen carbonate will completely neutralise the effect of acid.
10. (b) : The gas evolved is CO_2.
11. (c)
12. (b)
13. (c) : The basic ingredient of the tooth paste helps in neutralising acid released by sugary items we eat.
14. (d)
15. (a) : Gastric juices generally release hydrochloric acid during digestion. Therefore, pH is less than 7.
16. (b) : Water helps in ionisation of acid and also results in its dilution.
17. (c) : Vanilla essence is an olfactory indicator.
18. (d) : Lime does not contain carbon.
19. (a) : Lime juice is acidic in nature.
20. (c)
21. (d)
22. (b)
23. (d)
24. (b)
25. (c)
26. (c) : The pH paper will have yellowish green colour which indicates that the solution is neutral.
27. (c) : Though $HCl(g)$ is a covalent compound but it ionizes in aqueous solution to give $H^+(aq)$ and $Cl^-(aq)$ ions.
28. (c)
29. (a)
30. (d)

NTSE – Target: Scholastic Aptitude Test-SAT

1. Which of the following statement is not correct?
(a) Acids turn blue litmus solution red.
(b) Raw onion can be used as olfactory indicator to check acid or base.
(c) Bases are sour in taste.
(d) Vanilla essence does not give odour in strongly basic solutions.

2. When black copper oxide placed in a beaker is treated with dilute HCl, its colour changes to
(a) white (b) dark red
(c) bluish green (d) no change

3. Metal hydrogen carbonates react with acids to give
(a) salt, water, chlorine
(b) salt, water and carbon dioxide
(c) salt and carbon dioxide
(d) salt, hydrogen and carbon dioxide

4. pH of a solution having hydrogen ion concentration of 1M is
(a) 0 (b) 1
(c) 10 (d) 14

5. Which of the following acidic solutions having given pH values is most acidic ?
(a) Coffee (pH =4.8)
(b) Beer (pH = 4.2)
(c) Tomato juice (pH = 4.4)
(d) Lemon juice (pH = 2.3)

6. Which of the following aqueous solutions has highest pH value ?
(a) Sodium chloride
(b) Potassium carbonate
(c) Copper sulphate
(d) Ammonium

7. Which of the following is not a strong acid?
   (a) H_2SO_4 (b) CH_3COOH
   (c) HNO_3 (d) HCl

8. The pH of a solution is 3. When its pH changes to 5, then H^+ ion concentration
   (a) increases two times
   (b) decreases two times
   (c) increases 100 times
   (d) decreases 100 times

9. Bleaching powder is :
   (a) CaO_2Cl_2 (b) $CaOCl_2$
   (c) $CaClO_2$ (d) $CaCl_2 + O_2$.

10. Plaster of Paris is :
   (a) $CaSO_4$ (b) $CaSO_4.H_2O$
   (c) $CaSO_4.2H_2O$ (d) $CaSO_4.\frac{1}{2}H_2O$.

11. Sodium carbonate is also called
   (a) baking soda
   (b) washing soda
   (c) bleaching powder
   (d) bread soda **(NTSE 2011-2012)**

12. The pH of 0.1 M NaOH is :
   (a) 13 (b) 12
   (c) 11 (d) 10
   (NTSE 2013-2014)

13. The constituent present in baking powder is :
   (a) sodium benzoate (b) acetic acid
   (c) sodium lactate (d) tartaric acid
   (NTSE 2013-2014)

14. Which of the following is acidic in nature?
   (a) Lime juice (b) Human blood
   (c) Lime water (d) Antacid
   (NTSE 2013-2014)

15. If a few drops of a concentrated acid accidently spill over the hand of a student, what should be done?
   (a) Wash the hand with saline water
   (b) Wash the hand immediately with plenty of water and apply a paste of sodium hydrogen carbonate
   (c) After washing with plenty of water apply solution of sodium hydroxide on the hand
   (d) Neutralise the acid with a strong alkali
   (NTSE 2013-2014)

16. Slaked lime reacts with Cl_2 to give
   (a) Baking soda
   (b) Sodium hydroxide
   (c) Bleaching powder
   (d) Cement

17. Baking powder contains sodium hydrogen carbonate and
   (a) Tartaric acid (b) Sodium hydroxide
   (c) Calcium chloride (d) Acetic acid

18. Plaster of Paris is obtained by heating:
   (a) Gypsum
   (b) Limestone
   (c) Sodium chloride
   (d) Acetic acid.

19. Lime reacts with water to give:
   (a) $Ca(OH)_2$ (b) $CaCl_2$
   (c) $CaOCl_2$ (d) CaO.

20. The common salt is
   (a) NaOH (b) KCl
   (c) Na_2CO_3 (d) NaCl

21. pH of a solution is zero. The nature of this solution is
   (a) acidic (b) basic
   (c) neutral (d) amphoteric
   (NTSE 2014-15)

22. The nature of solution when sodium carbonate is dissolved in water will be
   (a) acidic (b) basic
   (c) neutral (d) amphoteric.
   (NTSE 2014-15)

23. pH of 10^{-6}N KOH solution is
   (a) 6 (b) 0.6
   (c) 8 (d) 0.8
   (NTSE 2014-15)

24. Baking soda is :
   (i) Sodium hydrogen carbonate
   (ii) on heating gives sodium carbonate
   (iii) an ingredient of baking powder
   (iv) used for manufacture of soap
   Which of the following is true :
   (a) (i) and (iv)
   (b) (i), (ii) and (iii)
   (c) (i), (iii) and (iv)
   (d) (i), (iii) and (iv)

25. The substances having pH more than 7 are
(i) common salt
(ii) washing soda
(iii) vinegar
(iv) sodium hydroxide
(a) (i), (ii) and (iv) (b) (ii) and (iv)
(c) (i), (iii) and (iv) (d) (iv) only

26. A milk man added a small pinch of baking soda to fresh milk which had pH close to 6. As a result, pH of the medium
(a) became close to 2
(b) became close to 4
(c) did not undergo any change
(d) became close to 8
(NTSE 2015-16)

27. Which of the chemical formulae of the compounds are wrong?
(i) Brine solution : NaCl
(ii) Baking powder : $NaHCO_3$
(iii) Bleaching powder : $CaOCl_2$
(iv) Gypsum : $CaSO_4.H_2O$
(a) (i) and (iv) (b) (i), (ii) and (iv)
(c) (ii) and (iv) (d) (ii) and (iv)

28. Which of the following salts have pH less than 7?
(i) Copper sulphate
(ii) Sodium carbonate
(iii) Aluminium chloride
(iv) Sodium acetate
(a) (i) and (iii) (b) (ii) and (iv)
(c) (ii), (iii) and (iv) (d) (i) and (iv)

29. The acid obtained from curd is
(a) Oxalic acid (b) Tartaric acid
(c) Acetic acid (d) Lactic acid

30. By dissolving metal oxide in water, we get
(a) acid (b) base
(c) salt (d) none of these

31. Which of the following acid is present in sour milk?
(a) Citric acid (b) Acetic acid
(c) Lactic acid (d) Tartaric acid

32. Which of the following is a diabasic acid ?
(a) Nitric acid (b) Phosphoric acid
(c) Sulphuric acid (d) Acetic acid

33. The acid used in batteries of trucks and cars is
(a) HNO_3 (b) HCl
(c) H_2SO_4 (d) CH_3COOH

34. Which of the following salt is used as an antacid?
(a) Copper sulphate
(b) Potash alum
(c) Potassium nitrate
(d) Sodium biocarbonate

35. The basicity of CH_3COOH (acetic acid) is
(a) 1 (b) 4
(c) 2 (d) 0

36. The main component of baking powder responsible for fluffy nature of cakes is
(a) Tartaric acid
(b) Sodium carbonate
(c) Sodium bicarbonate
(d) Citric acid

37. Which of the following salts does not contain any water of crystallisation?
(a) blue vitriol (b) washing soda
(c) baking soda (d) gypsum
(NTSE 2015-16)

38. Aqueous solution of sodium chloride turns
(a) red litmus blue
(b) blue litmus red
(c) red litmus orange
(d) not change the colour of either red or blue litmus.
(NTSE 2015-16)

39. On passing CO_2 gas through a brine solution, saturated with ammonia, the substance obtained is :
(a) NaOH (b) $NaHCO_3$
(c) $Na_2CO_3.10H_2O$ (d) $Na_2CO_3.H_2O$
(NTSE 2015-16)

40. The difference in number of crystalline molecules in a molecule of gypsum and a molecule of plaster of paris is
(a) $\frac{5}{2}$ (b) 2
(c) $\frac{1}{2}$ (d) $\frac{3}{2}$
(NTSE 2014-15)

41. Chemical formula of gypsum is
(a) $CaSO_4$ (b) $ZnSO_4$
(c) $CaSO_4.2H_2O$ (d) $CaSO_4.H_2O$
(NTSE 2015-16)

ANSWERS AND HINTS (NTSE) : SAT

1. (a) : Bases are bitter in taste.
2. (c) : $CuO + 2HCl \longrightarrow CuCl_2 + 2H_2O$
(bluish green)
3. (b)
4. (a) : $[H^+] = 1\ M$ or $= 10^0\ M$
$\therefore$ pH = 0
5. (d) : Lower the pH value, more acidic the solution is.
6. (b) Potassium carbonate is basic salt because it is salt of strong base (KOH) and weak acid (H_2CO_3).
7. (b)
8. (d)
9. (b)

10. (*d*)
11. (*b*)
12. (*a*) : $[OH^-] = 0.1 = 10^{-1}$

$$[H^+] = \frac{10^{-14}}{10^{-1}} = 10^{-13}$$

$\therefore$ pH = 13

13. (*d*)
14. (*a*)
15. (*b*)
16. (*c*) : $Ca(OH)_2 + Cl_2 \longrightarrow CaOCl_2 + H_2O$

Slaked lime — Bleaching powder

17. (*a*)
18. (*a*) : $CaSO_4.2H_2O \xrightarrow{Heat} CaSO_4\frac{1}{2}H_2O + \frac{3}{2}H_2O$

Gypsum — Plaster of Paris

19. (*a*)
20. (*d*)
21. (*a*)
22. (*b*) It forms strong base (NaOH) and weak acid (H_2CO_3) and therefore, the solution is basic.
23. (*c*) : $[OH^-] = 10^{-6}$

$$[H^+] = \frac{10^{-14}}{10^{-6}} = 10^{-8}$$

$\therefore$ pH = 8

24. (*b*) : Baking soda is not used for the manufacture of soap.
25. (*b*) : Washing soda (*ii*) and sodium hydroxide (*iv*) are basic and have pH more than 7.
26. (*d*) : The milkman adds baking soda to milk so that milk becomes slightly alkaline (pH > 7). The milk will not be converted to acidic curd readily.
27. (*c*)
28. (*a*)
29. (*d*)
30. (*b*)
31. (*c*)
32. (*c*)
33. (*c*) Sulphuric acid is used in batteries of trucks and cars.
34. (*d*)
35. (*a*) CH_3COOH has only one ionisable H^+ ions.
36. (*c*)
37. (*c*)
38. (*a*) Aqueous solution of NaCl is neutral and therefore, does not change the colour of either red or blue litmus.
39. (*b*)
40. (*d*) Gypsum : $CaSO_4.2H_2O$;

Plaster of Paris : $CaSO_4.\frac{1}{2}H_2O$

Difference in number of water molecules : $2 - \frac{1}{2} = \frac{3}{2}$

41. (*c*)