CHEMISTRY

Hydrogen

No. of Questions	Maximum Marks	Time
45	180	1 Hour

Speed TEST 37
Chapter-wise

GENERAL INSTRUCTIONS

- This test contains 45 MCQ's. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.
- You have to evaluate your Response Grids yourself with the help of solutions provided at the end of this book.
- Each correct answer will get you 4 marks and 1 mark shall be deduced for each incorrect answer. No mark will be given/ deducted if no bubble is filled. Keep a timer in front of you and stop immediately at the end of 60 min.
- The sheet follows a particular syllabus. Do not attempt the sheet before you have completed your preparation for that syllabus.
- After completing the sheet check your answers with the solution booklet and complete the Result Grid. Finally spend time to analyse your performance and revise the areas which emerge out as weak in your evaluation.

1. Which of the following will not displace hydrogen
(a) Ba (b) Pb (c) Hg (d) Sn

2. Which of the following statements is correct ?
(a) Hydrogen has same IP as alkali metals
(b) Hydrogen has same electronegativity as halogens
(c) It has oxidation number of –1 and +1
(d) It will not be liberated at anode.

3. Which one of the following pairs of substances on reaction will not evolve H_2 gas ?
(a) Iron and H_2SO_4 (aq) (b) Iron and steam
(c) Copper and HCl (aq) (d) Sodium and ethanol

4. Following are some properties of hydrogen. Which of the following properties resemble with alkali metals and which with halogens
(i) Hydrogen lose one electron to form unipositive ions
(ii) Hydrogen gain one electron to form uninegative ions
(iii) Hydrogen forms oxides, halides and sulphides
(iv) Hydrogen has a very high ionization enthalpy
(v) Hydrogen forms a diatomic molecule, combines with elements to form hydrides and covalent compounds.
(a) Alkali metals resemble (i), (iii) and (iv)
Halogens resemble (ii) and (v)
(b) Alkali metals resemble (i) and (iii)
Halogens resemble (ii), (iii) and (v)
(c) Alkali metals resemble (i) and (iii)
Halogens resemble (ii), (iv) and (v)
(d) Alkali metals resemble (i) only
Halogens resemble (iv) and (v)

5. Match the columns

Column - I (Chemical property of water)	Column - II (Chemical equation)
A. Basic nature	I. $2H_2O(l) + 2Na(s) \longrightarrow 2NaOH(aq) + H_2(g)$
B. Auto-protolysis	II. $H_2O(l) + H_2O(l) \rightleftharpoons H_3O^+(aq) + OH^-(aq)$
C. Oxidising nature	III. $2F_2(g) + 2H_2O(l) \longrightarrow 4H^+(aq) + 4F^-(aq) + O_2(g)$
D. Reducing nature	IV. $H_2O(l) + H_2S(aq) \rightleftharpoons H_3O^+(aq) + HS^-(aq)$

(a) A – IV; B – II; C – III; D – I
(b) A – IV; B – II; C – I; D – III
(c) A – III; B – II; C – IV; D – I
(d) A – I; B – II; C – IV; D – III

RESPONSE GRID 1. ⓐⓑⓒⓓ 2. ⓐⓑⓒⓓ 3. ⓐⓑⓒⓓ 4. ⓐⓑⓒⓓ 5. ⓐⓑⓒⓓ

Space for Rough Work

6. The unusual properties of water in the condensed phase (liquid and solid states) are due to the
   (a) presence of hydrogen and covalent bonding between the water molecules
   (b) presence of covalent bonding between the water molecules
   (c) presence of extensive hydrogen bonding between water molecules
   (d) presence of ionic bonding
7. Hydrogen bond energy is equal to :
   (a) 3-7 cals (b) 30-70 cals
   (c) 3-10 k cals (d) 30-70 k cals
8. D_2O is preferred to H_2O, as a moderator, in nuclear reactors because
   (a) D_2O slows down fast neutrons better
   (b) D_2O has high specific heat
   (c) D_2O is cheaper
   (d) The neutron absorbing ability of D_2O is higher
9. Consider the following statements :
   1. Atomic hydrogen is obtained by passing hydrogen through an electric arc.
   2. Hydrogen gas will not reduce heated aluminium oxide.
   3. Finely divided palladium adsorbs large volume of hydrogen gas
   4. Pure nascent hydrogen is best obtained by reacting Na with C_2H_5OH

   Which of the above statements is/are correct ?
   (a) only 1 (b) only 2
   (c) 1, 2 and 3 (d) 2, 3 and 4
10. The low density of ice compared to water is due to
    (a) hydrogen bonding interactions
    (b) dipole – dipole interactions
    (c) dipole – induced dipole interactions
    (d) induced dipole – induced dipole interactions
11. What is formed when calcium carbide reacts with heavy water?
    (a) C_2D_2 (b) CaD_2 (c) Ca_2D_2O (d) CD_2
12. Which of the following is formed on reaction of carbon monoxide gas with dihydrogen in presence of cobalt as a catalyst?
    (a) Methanal (b) Methanol
    (c) Methane (d) Formic acid
13. Water possesses a high dielectric constant, therefore
    (a) it always contains ions
    (b) it is a universal solvent
    (c) can dissolve covalent compounds
    (d) can conduct electricity
14. The m.p. of most of the solid substances increase with an increase of pressure . However ice melts at a temperature lower than its usual melting point when pressure is increased. This is because
    (a) ice is less denser than H_2O
    (b) pressure generates heat
    (c) the chemical bonds break under pressure
    (d) ice is not a true solid
15. In context with the industrial preparation of hydrogen from water gas ($CO + H_2$), which of the following is the correct statement?
    (a) CO and H_2, are fractionally separated using differences in their densities
    (b) CO is removed by absorption in aqueous Cu_2Cl_2 solution
    (c) H_2 is removed through occlusion with Pd
    (d) CO is oxidised to CO_2 with steam in the presence of a catalyst followed by absorption of of CO_2 in alkali
16. Calculate the normality of 10 volume H_2O_2 ?
    (a) 1.7 N (b) 12 N (c) 30.3 N (d) 0.0303 N
17. The hydride ion H^- is stronger base than its hydroxide ion OH^-. Which of the following reactions will occur if sodium hydride (NaH) is dissolved in water ?
    (a) $H^-(aq) + H_2O \rightarrow H_3O^-$
    (b) $H^-(aq) + H_2O(l) \rightarrow OH^- + H_2$
    (c) $H^- + H_2O \rightarrow$ No reaction
    (d) None of these

RESPONSE GRID

6. (a)(b)(c)(d)	7. (a)(b)(c)(d)	8. (a)(b)(c)(d)	9. (a)(b)(c)(d)	10. (a)(b)(c)(d)
11. (a)(b)(c)(d)	12. (a)(b)(c)(d)	13. (a)(b)(c)(d)	14. (a)(b)(c)(d)	15. (a)(b)(c)(d)
16. (a)(b)(c)(d)	17. (a)(b)(c)(d)			

Space for Rough Work

18. Match list I with list II and select the correct answer using the codes given below the lists :

List I	List II
A. Heavy water	I. Bicarbonates of Mg and Ca in water
B. Temporary hard water	II. No foreign ions in water
C. Soft water	III. D_2O
D. Permanent hard water	IV. Sulphates & chlorides of Mg & Ca in water

(a) A–III; B–IV; C–II; D–I (b) A–II; B–I; C–III; D–IV
(c) A–II; B–IV; C–III; D–I (d) A–III; B–I; C–II; D–IV

19. When a substance A reacts with water it produces a combustible gas B and a solution of substance C in water. When another substance D reacts with this solution of C, it also produces the same gas B on warming but D can produce gas B on reaction with dilute sulphuric acid at room temperature. A imparts a deep golden yellow colour to a smokeless flame of Bunsen burner. A, B, C and D respectively are
(a) Na , H_2, NaOH, Zn (b) K, H_2, KOH, Al
(c) Ca, H_2, $Ca(OH)_2$, Sn (d) CaC_2, C_2H_2, $Ca(OH)_2$, Fe

20. At its melting point ice is lighter than water because
(a) H_2O molecules are more closely packed in solid state
(b) ice crystals have hollow hexagonal arrangement of H_2O molecules.
(c) on melting of ice the H_2O molecule shrinks in size
(d) ice froms mostly heavy water on first melting

21. H_2O_2 is commonly prepared in lab. by the reaction of
(a) $PbO_2 + H_2SO_4$ (b) $MnO_2 + H_2SO_4$
(c) $BaO_2 + H_2O + CO_2$ (d) $Na_2O_2 + H_2O$

22. Which of the following is formed by the action of water on sodium peroxide
(a) H_2 (b) N_2 (c) O_2 (d) CO_2

23. The reaction, $2H_2O_2 \rightarrow 2H_2O + O_2$
shows that H_2O_2 :
(a) acts as reducing agent (b) acts as oxidising agent
(c) is decomposed (d) None of these

24. True peroxide is
(a) BaO_2 (b) MnO_2 (c) PbO_2 (d) NO_2

25. The component present in greater proportion in water gas is
(a) CH_4 (b) CO_2 (c) CO (d) H_2

26. Which physical property of dihydrogen is wrong ?
(a) Odourless gas (b) Tasteless gas
(c) Colourless gas (d) Non–inflammable gas

27. In which of the following reactions, H_2O_2 acts as a reducing agent?
(a) $PbO_2(s) + H_2O_2(aq) \rightarrow PbO(s) + H_2O(l) + O_2(g)$
(b) $Na_2SO_3(aq) + H_2O_2(aq) \rightarrow Na_2SO_4(aq) + H_2O(l)$
(c) $2KI(aq) + H_2O_2(aq) \rightarrow 2KOH(aq) + I_2(s)$
(d) $KNO_2(aq) + H_2O_2(aq) \rightarrow KNO_3(aq) + H_2O(l)$

28. In which of the following reactions, H_2O_2 is acting as a reducing agent
(a) $H_2O_2 + SO_2 \rightarrow H_2SO_4$
(b) $2KI + H_2O_2 \rightarrow 2KOH + I_2$
(c) $PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$
(d) $Ag_2O + H_2O_2 \rightarrow 2Ag + H_2O + O_2$

29. Commercial 10 volume H_2O_2 is a solution with a strength of approximately
(a) 15% (b) 3%
(c) 1% (d) 10%

30. Which of the following is not true?
(a) D_2O freezes at lower temperature than H_2O
(b) Reaction between H_2 and Cl_2 is much faster than D_2 and Cl_2
(c) Ordinary water gets electrolysed more rapidly than D_2O
(d) Bond dissociation energy of D_2 is greater than H_2

31. When zeolite (hydrated sodium aluminium silicate) is treated with hard water the sodium ions are exchanged with
(a) H^+ ions (b) Ca^{2+} ions
(c) SO_4^{2-} ions (d) OH^- ions

32. The oxide that gives H_2O_2 on treatment with a dil. acid is
(a) Na_2O_2 (b) PbO_2 (c) TiO_2 (d) MnO_2

RESPONSE GRID					
	18. (a)(b)(c)(d)	**19.** (a)(b)(c)(d)	**20.** (a)(b)(c)(d)	**21.** (a)(b)(c)(d)	**22.** (a)(b)(c)(d)
	23. (a)(b)(c)(d)	**24.** (a)(b)(c)(d)	**25.** (a)(b)(c)(d)	**26.** (a)(b)(c)(d)	**27.** (a)(b)(c)(d)
	28. (a)(b)(c)(d)	**29.** (a)(b)(c)(d)	**30.** (a)(b)(c)(d)	**31.** (a)(b)(c)(d)	**32.** (a)(b)(c)(d)

Space for Rough Work

33. Which statement is wrong?
(a) Ordinary hydrogen is an equilibrium mixture of ortho and para hydrogen
(b) In ortho hydrogen spin of two nuclei is in same direction
(c) Ortho and para forms do not resemble in their chemical properties
(d) In para hydrogen spin of two nuclei is in opposite direction.

34. Water contracts on heating
(a) to 100°C (b) from 0°C to 4°C
(c) to 273 K (d) from 10°C to 20°C

35. Water is :
(a) more polar than H_2S
(b) more or less identical in polarity with H_2S
(c) less polar than H_2S
(d) None of these

36. $LiAlH_4$ is used as :
(a) An oxidizing agent (b) A reducing agent
(c) A mordant (d) A water softener

37. Hydrogen is not obtained when Zn reacts with
(a) cold water (b) dil H_2SO_4
(c) dil. HCl (d) 20% NaOH

38. An inorganic compound gives off O_2 when heated, turns an acidic solution of KI violet and reduces acidified $KMnO_4$. The compound is
(a) SO_3 (b) KNO_3
(c) H_2O_2 (d) All of these

39. The species that does not contain peroxide ions
(a) PbO_2 (b) H_2O_2 (c) SrO_2 (d) BaO_2

40. Metal hydrides are ionic, covalent or molecular in nature. Among LiH, NaH, KH, RbH, CsH, the correct order of increasing ionic character is
(a) LiH > NaH > CsH > KH > RbH
(b) LiH < NaH < KH < RbH < CsH
(c) RbH > CsH > NaH > KH > LiH
(d) NaH > CsH > RbH > LiH > KH

41. Which of the following in incorrect statement?
(a) s-block elements, except Be and Mg, form ionic hydride
(b) BeH_4, MgH_2, CuH_2, ZnH_2, CaH_2 and HgH_2 are intermediate hydride
(c) p-block elements form covalent hydride
(d) d-and f-block elements form ionic hydride

42. The decomposition of H_2O_2 is accelerated by –
(a) glycerine (b) alcohol
(c) phosphoric acid (d) Pt powder

43. The molarity of a 100 ml solution containing 5.1 g of hydrogen peroxide is
(a) 0.15 M (b) 1.5 M (c) 3.0 M (d) 50.0 M

44. Permanent hardness of water can be removed by adding Calgon ($NaPO_3)_n$. This is an example of
(a) adsorption (b) exchange of ion
(c) precipitation (d) None of these.

45. The oxidation states of most electronegative element in the products of reaction BaO_2 with dil. H_2SO_4 are
(a) 0 and – 1 (b) –1 and – 2
(c) – 2 and 0 (d) – 2 and + 1

RESPONSE GRID

33. ⓐⓑⓒⓓ	**34.** ⓐⓑⓒⓓ	**35.** ⓐⓑⓒⓓ	**36.** ⓐⓑⓒⓓ	**37.** ⓐⓑⓒⓓ
38. ⓐⓑⓒⓓ	**39.** ⓐⓑⓒⓓ	**40.** ⓐⓑⓒⓓ	**41.** ⓐⓑⓒⓓ	**42.** ⓐⓑⓒⓓ
43. ⓐⓑⓒⓓ	**44.** ⓐⓑⓒⓓ	**45.** ⓐⓑⓒⓓ		

CHEMISTRY CHAPTERWISE SPEED TEST-37			
Total Questions	45	Total Marks	180
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	42	Qualifying Score	66
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

Space for Rough Work