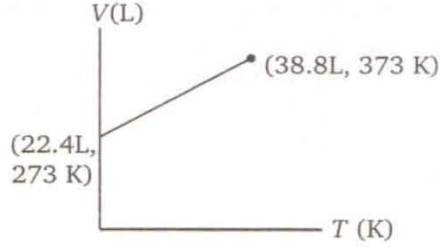
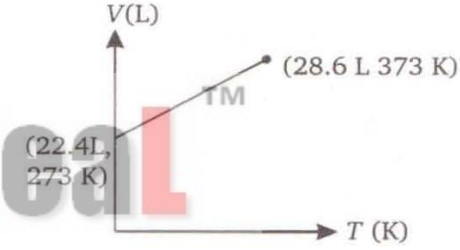
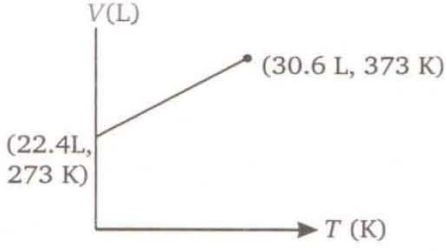
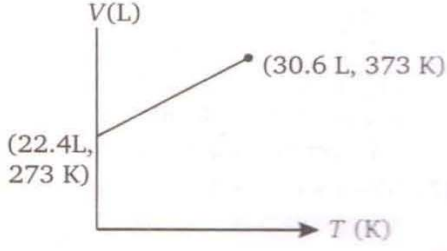
1. The optically active tartaric acid is named as D – (+) – tartaric acid because it has a positive
   (a) optical rotation and derived from D-glucose
   (b) pH in organic solvent
   (c) optical rotation and is derived from D – (+) – glyceraldehyde
   (d) optical rotation when substituted by deuterium
2. Which one of the following pairs is not correctly matched ?
   (a) $>C=O \rightarrow CH_2$ Clemmnensen reduction
   (b) $>C=O \rightarrow >CHOH$ Wolff-Kishner reduction
   (c) $-COCl \rightarrow -CHO$ Rosenmund reduction
   (d) $-C\equiv N \rightarrow -CHO$ Stephen reduction
3. Which of the following radical is precipitated as sulphide when treated with hydrogen sulphide in ammoniacal solution ?
   (a) Ba^{2+} (b) Ni^{2+}
   (c) Mg^{2+} (d) Ca^{2+}
4. Isomerism which arises due to the presence of two different atoms in the same ligand is called
   (a) linkage (b) hydrate
   (c) salt (d) Both (a) and (c)
5. The black compound formed during the reaction between sodium thiosulphate and silver nitrate is
   (a) silver thiosulphate
   (b) silver sulphide
   (c) silver sulphate
   (d) silver sulphite
6. Electrode potential data are given below
   $Fe^{3+}(aq) + e^- \longrightarrow Fe^{2+}(aq)\ E^\circ = +0.77\ V$
   $Al^{3+}(aq) + 3e^- \longrightarrow Al(s)\quad E^\circ = -1.66\ V$
   $Br_2(aq) + 2e^- \longrightarrow 2Br^-(aq)\ E^\circ = +1.08\ V$
   Based on the data given above, reducing power of Fe^{2+}, Al and Br^-, will increase in the order
   (a) $Br^- < Fe^{2+} < Al$ (b) $Fe^{2+} < Al < Br^-$
   (c) $Al < Br^- < Fe^{2+}$ (d) $Al < Fe^{2+} < Br^-$
7. Which of the following volume (V) -temperature (T) plots represent the behaviour of one mole of an ideal gas at one atmospheric pressure ?

(a)


(b)


(c)


(d)


8. Amongst the following, identify the species with an atom in +6 oxidation state
(a) MnO_4^- (b) $Cr(CN)_6^{3-}$
(c) NiF_6^{2-} (d) CrO_2Cl_2

9. What is the concentration of nitrate ions if equal volumes of 0.1 M $AgNO_3$ and 0.1 M NaCl are mixed together ?
(a) 0.1 N (b) 0.2 M
(c) 0.05 M (d) 0.25 M

10. Consider the following statements
(I) A sigma (σ) bond is formed when two *s*-orbitals overlap
(II) A pi (π) bond is formed when two *p*-orbitals axially overlap
(III) A σ bond is weaker than π –bond
Which of the above statements is/are correct ?
(a) II and III (b) I and II
(c) I alone (d) II alone

11. Speed of decomposition of H_2O_2 is reduced by
(a) Na_2CO_3 (b) NaOH
(c) alcohol (d) Pt

12. The correct order of radii is
(a) N < Be < B (b) $F^- < O^{2-} < N^{3-}$
(c) Na < Li < K (d) $Fe^{3+} < Fe^{2+} < Fe^{4+}$

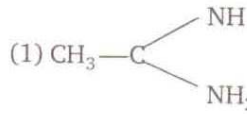
13. Amalgamation method is used for the extraction of
(a) noble metals
(b) alkali metals
(c) alkaline earth metals
(d) transition elements

14. The alkali metal that reacts with nitrogen directly to form nitride is
(a) Li (b) Na
(c) K (d) Rb

15. Fluid magnesia is
(a) a solution of magnesium
(b) a solution of magnesium carbonate
(c) a solution of magnesium bicarbonate
(d) a solution of magnesium sulphate

16. A compound with the molecular formula C_3H_8O on vigorous oxidation produces an acid $C_3H_6O_2$. It is
(a) a tertiary alcohol
(b) a secondary alcohol
(c) a primary alcohol
(d) not necessarily an alcohol

17. The correct order of basicities of the following compounds is

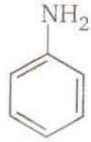
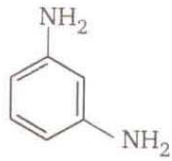
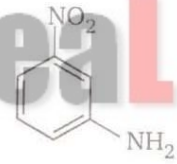


(1) (2) $CH_3—CH_2—NH_2$

(3) $(CH_3)_2NH$ (4)
(a) 2 > 1 > 3 > 4 (b) 1 > 3 > 2 > 4
(c) 3 > 1 > 2 > 4 (d) 1 > 2 > 3 > 4

18. 
Here *X* is
(a) isonitrile (b) nitrile
(c) nitrite (d) oxime

19. Identify "*X*" $C_6H_6 \xrightarrow[\text{reflux}]{HNO_3/H_2SO_4}$ Intermediate $\xrightarrow[\text{heat}]{Sn/HCl} X$

(a) 
(b) 
(c) 
(d) 

20. Rutherford's α-particle dispersion experiment concludes
(a) all positive ions are deposited at small part
(b) all negative ions are deposited at small part
(c) proton moves around the electron
(d) neutrons are charged particles

21. Identify the correct statement when following compounds are given
HF, HBr, H_2Se, H_2Te, H_3P
(a) HF is strong acid
(b) H_2Te is strong alkali
(c) HBr is strong acid
(d) H_3P is strong alkali

22. Calcium is obtained by
(a) electrolysis of molten $CaCl_2$
(b) electrolysis of aq solution of $CaCl_2$
(c) reduction of $CaCl_2$ with carbon
(d) roasting of lime stone

23. Heat of dissociation of benzene to elements in 5535 kJ mol^{-1}. The bond enthalpies of C—C, C=C, and C—H are 347.3, 615.0 and 416.2 kJ respectively resonance energy of benzene is
(a) 1.51 kJ (b) 15.1 kJ
(c) 151 kJ (d) 1511 kJ

24. The rate constant for the reaction,
$$2N_2O_5 \longrightarrow 4NO_2 + O_2$$
3.0×10^{-5} s^{-1}. If the rate is 2.40×10^{-5} mol $L^{-1}s^{-1}$, Then the concentration of N_2O_5 (in mol L^{-1}) is
(a) 1.4 (b) 1.2
(c) 0.04 (d) 0.8

25. Which one of the following has highest pH ?
(a) Distilled water
(b) 1 M NH_3
(c) 1 M NaOH
(d) Water saturated with chlorine

26. Which of the following element of IIIA group form alum with aluminum like alkali metals ?
(a) B (b) Ca
(c) In (d) Te

27. Which of the following is used as a test for detecting the presence of carbon monoxide ?
(a) Reduction of metallic oxides to metals
(b) Reduction of water to hydrogen
(c) Reduction of $PdCl_2$ to Pd (Black)
(d) All of the above

28. Nitrogen can exists in two forms which are correct about them ?
(i) α-nitrogen with cubic crystalline structure
(ii) β- nitrogen with cubic crystalline structure
(iii) β-nitrogen with hexagonal crystalline structure
(a) Both (i) and (iii) (b) Both (i) and (ii)
(c) Both (ii) and (iii) (d) None of these

29. Which of the following mixture is called black ash ?
(a) $K_2CO_3 + CuS$ (b) $Na_2CO_3 + CaS$
(c) $K_2CO_3 + Na_2S$ (d) $Na_2CO_3 + Na_2S$

30. In phosphorus pentoxide each P atoms is linked to
(a) 4 oxygen atom (b) 2 oxygen atom
(c) 3 oxygen atom (d) 10 oxygen atom

31. When glucose is warmed with dilute alkali solution converted into a mixture of
(a) glucose and manose
(b) glucose and fructose
(c) manose and fructose
(d) glucose and manose and fructose

32. Methyl amine reacts with nitrous acid to form
(a) methyl nitrile (b) dimethyle ether
(c) Both (a) and (b) (d) None of these

33. Which order is correct about acidity ?
(a) $C_6H_5OH > C_6H_5COOH > CH_3COOH$
(b) $C_6H_5COOH > CH_3COOH > C_6H_5OH$
(c) $CH_3COOH > C_6H_5COOH > C_6H_5OH$
(d) $C_6H_5OH > CH_3COOH > C_6H_5COOH$

34. Which of the following is most reactive towards nucleophilic addition reaction ?
(a) HCHO (b) CH_3CHO
(c) C_2H_5CHO (d) $CH_3 \cdot CO \cdot CH_3$

35. Metaformaldehyde is a
(a) polymer (b) tetramer
(c) trimer (d) dimer

36. An aqueous solution of urea freezes at 272.8 K. An equimolar solution of acetic acid in water will freeze at
(a) 272.8 K (b) 272.79 K
(c) 272.81 K (d) 272.6 K

37. A mixture of 0.3 mol of H_2 and 0. 3 mole of I_2 is allowed to react in a 10 L evacuated flask at 500°C. The reaction is $H_2 + I_2 \rightleftharpoons 2HI$. The K is found to be 64. The amount of unreacted I_2 at equilibrium is
(a) 0.15 mol (b) 0.06 mol
(c) 0.03 mol (d) 0.2 mol

38. $IFN_2 + 3H_2 \rightleftharpoons 2NH_3 - K$ and $2N_2 + 6H_2 \rightleftharpoons 4NH_3 - k^1$ then k^1 will be
(a) k^2 (b) $\sqrt{k}$
(c) $\frac{1}{\sqrt{k}}$ (d) $\frac{1}{k^2}$

39. With the rise in temperature, the surface tension of a liquid
(a) increases
(b) decreases
(c) remain constant
(d) first increase then decrease

40. At STP a container has 1 mole of Ar, 2 mol of CO_2, 3 mol of O_2 and 4 mol of N_2 with out changing the total pressure if one mole of O_2 is removed, the partical pressure of O_2
(a) is change by about 16%
(b) is halved
(c) is changed by 26%
(d) is unchanged

41. Due to Frenkel defect, the density of ionic solid
(a) decreases (b) increases
(c) does not change (d) charge

42. A semiconductor of Ge can be made *p*-type by adding
(a) trivalent impurity
(b) tetravalent impurity
(c) pentavalent impurity
(d) divalent impurity

43. 0.45 g of acid of molecular weight 90 was neutralised by 20 mL of 0.5 N caustic potash. The basicity of the acid is
(a) 1 (b) 2
(c) 3 (d) 4

44. Which of the following cannot give iodometric titrations ?
(a) Fe^{3+} (b) Cu^{2+}
(c) Pb^{2+} (d) Ag^{+}

45. Oxidation state of Fe in Fe_3O_4 is
(a) 2/3 (b) 4/5
(c) 5/4 (d) 8/3

46. A compound contains atoms of three elements *AB* and *C*. If the oxidation number of *A* is +2, *B* is +5 and that of *C* is −2, the possible formula of the compound is
(a) $A_3(BC_4)_2$ (b) $A_3(B_4C)_2$
(c) ABC_2 (d) $A_2(BC_3)_2$

47. For the redox reaction,
$MnO_4^- + C_2O_4^{2-} + H^+ \longrightarrow Mn^{2+} + CO_2 + H_2O$
the correct coefficient of the reactants for the balanced reaction are

	MnO_4^-	$C_2O_4^{2-}$	H^+
(a)	2	5	16
(b)	16	5	2
(c)	5	16	2
(d)	2	16	5

48. An example of Lewis acid is
(a) NaCl (b) $MgCl_2$
(c) CCl_4 (d) $AlCl_3$

49. The conjugate acid of NH_2^- is
(a) NH_3 (b) NH_2OH
(c) NH_4^+ (d) N_2H_4

50. Which of the following is not paramagnetic ?
(a) NO (b) N_2^+
(c) CO (d) O_2^-

51. The values of electeronegativites of atom *A* and *B* are 1.20 and 4.0 respectively. The percentage of ionic character of *A*—*B* bond is
(a) 50% (b) 72.24%
(c) 55.3% (d) 43%

52. A sample of wood decayed to 1/16 of its original value. What is the number of $t_{1/2}$?
(a) 3 (b) 4
(c) 8 (d) 16

53. The phenomenon of radioactivity arises from the
(a) binary fission
(b) nuclear fission
(c) stable nuclei
(d) decay of unstable nuclei

54. The kinetic energy of an electron accelerated from rest through a potential difference of 5 V will be
(a) 5eV (b) 5 J
(c) 5 erg (d) 80 eV

55. A 2.5 mol sample of hydrazine, N_2H_4 loses 25 mole of electrons in being converted to a new compound *X*. Assuming that all of the nitrogen appears in the new compound, what is the oxidation state of nitrogen in compound *X* ?
(a) −1 (b) −2
(c) +3 (d) +4

Answer – Key

1. a	2. c	3. d	4. d	5. b	6. a	7. c	8. d	9. c	10. c
11. c	12. d	13. a	14. a	15. c	16. c	17. b	18. b	19. a	20. a
21. c	22. a	23. c	24. d	25. c	26. d	27. c	28. a	29. b	30. a
31. a	32. c	33. b	34. a	35. c	36. b	37. b	38. a	39. b	40. c
41. c	42. a	43. b	44. c	45. d	46. a	47. a	48. d	49. a	50. c
51. b	52. b	53. d	54. a	55. c					