SATISH SCIENCE ACADEMY

DHANORI PUNE-411015

CHEMISTRY

MHT - CET - Chemistry

Time Allowed: 1 hour **Maximum Marks: 50**

1. If Avogadro number N_A, is changed from 6.022×10^{23} mol^{-1} to 6.022×10^{20} mol^{-1}, this would change _____. **[1]**

   a) the ratio of chemical species to each other in a balanced equation

   b) the definition of mass in units of grams

   c) the mass of one mole of carbon

   d) the ratio of elements to each other in a compound

2. The number of electrons, protons and neutrons in P^{3-} ion is respectively _____. **[1]**

   a) 15, 16, 18

   b) 15, 15, 16

   c) 15, 16, 15

   d) 18, 15, 16

3. LiI is more covalent than LiCl because _____. **[1]**

   a) I^- is larger anion than Cl^-

   b) I is less electronegative than Cl

   c) I is more electronegative than Cl

   d) I^- is smaller anion than Cl^-

4. Identify the INCORRECT statement regarding the following reaction. **[1]**

   $SeO_{3(aq)}^{2-} + Cl_2(g) \longrightarrow SeO_{4(aq)}^{2-} + Cl_{aq}^-$ (basic)

   a) The oxidation number of oxygen remains unchanged.

   b) Se gets reduced while Cl gets oxidised.

   c) Se acts as a reductant while Cl acts as an oxidant.

   d) Oxidation number of Se changes from +4 to +6.

5. The alkaline earth metals Ba, Sr, Ca and Mg may be arranged in the order of their decreasing first ionization enthalpy as _____. **[1]**

   a) Ca, Sr, Ba, Mg

   b) Sr, Ba, Mg, Ca

   c) Mg, Ca, Sr, Ba

   d) Ba, Mg, Ca, Sr

6. Hot air balloons float in air because of the low density of the air inside the balloon. This can be explained with the help of _____. **[1]**

   a) Gay Lussac's law

   b) Avogadro's law

   c) Charles' law

   d) Boyle's law

7. _____ is the process in which adsorbate molecules are held on the surface of the adsorbent by weak van der Waals forces. **[1]**

a) Biosorption

b) Absorption

c) Physisorption

d) Chemisorption

8. When but-1-yne is treated with aqueous H_2SO_4 in presence of $HgSO_4$, the major product is _____. **[1]**

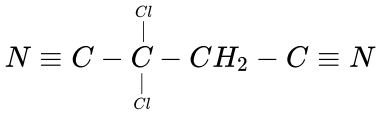
a) $CH_3 - CH_2 - CH = CH_2$

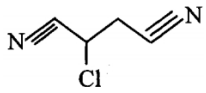
b) $CH_3 - CH_2 - CH_2 - CH_2 - OH$

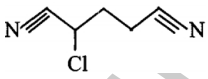
c) $CH_3 - CH_2 - CO - CH_3$

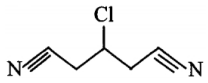
d) $CH_3 - CH_2 - CH_2 - CHO$

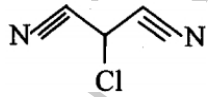
9. The bond line or zig-zag formula for the adjacent compound is _____. **[1]**



a) 

b) 

c) 

d) 

10. A corner particle contributes its _____ part to the given unit cell. **[1]**

a) $\frac{1}{12}$ th

b) $\frac{1}{4}$ th

c) $\frac{1}{8}$ th

d) $\frac{1}{6}$ th

11. The atoms of element 'Y' form hexagonal close packing and the atoms of element X occupies $\frac{2}{3}$rd portion of the number of tetrahedral voids. Write the formula of the compound formed by X and Y. **[1]**

a) X_3Y_4

b) X_4Y_3

c) X_2Y

d) X_2Y_2

12. $Ni_{0.97}O_{1.0}$ is an example of _____. **[1]**

a) interstitial impurity defect

b) metal deficiency defect

c) metal excess defect

d) Frenkel defect

13. The boiling point of water (100 °C) becomes 100.52 °C, if 3 grams of a non-volatile solute is dissolved in 200 g of water. The molecular weight of the solute is _____. (K_b for water is 0.52 K kg mol^{-1}) **[1]**

a) 15.0 g/mol

b) 20.4 g/mol

c) 12.2 g/mol

d) 17.3 g/mol

14. Vapour pressure of CCl_4 at 25 °C is 143 mm of Hg. 0.5 g of a non-volatile solute (molecular mass = 65) is dissolved in 100 mL CCI_4. Find the vapour pressure of the solution (Density of CCl_4 = 1.58 g/cm^3). **[1]**

a) 94.39 mm

b) 199.34 mm

c) 141.93 mm

d) 143.99 mm

15. Relative lowering of vapour pressure of a dilute solution of glucose dissolved in 1 kg of water is 0.002. The molality of the solution is _____. **[1]**

a) 0.004

b) 0.222

c) 0.111

d) 0.021

16. For which among the following reactions, change in entropy is less than zero? **[1]**

a) Thermal decomposition of calcium carbonate

b) Dissociation of hydrogen

c) Formation of water

d) Sublimation of iodine

17. A minus sign of the free energy change denotes that _____. **[1]**

a) the reaction tends to proceed spontaneously

b) the system is in equilibrium

c) the reaction is slow

d) the reaction is nonspontaneous

18. Values of standard enthalpies of formation for SiO_2 and MgO are - 48.4 and - 34.7 kJ mol^{-1} respectively. The standard enthalpy of the reaction **[1]**

$2Mg_{(s)} + SiO_{2(s)} \rightarrow 2MgO_{(s)} + Si_{(s)}$ is _____ .

a) 13.7 kJ

b) -21.0 kJ

c) -13.7 kJ

d) 21.0 kJ

19. The heat of formations of $CO_{(g)}$ and $CO_{2(g)}$ are -26.4 kcal/mol and -94.0 kcal/mol respectively. The heat of combustion of carbon monoxide will be _____. **[1]**

a) - 20.6 kcal/mol

b) - 67.6 kcal/mol

c) + 52.8 kcal/mol

d) + 26.4 kcal/mol

20. Half life period of a first order reaction is 1386 seconds. The rate constant of the reaction is _____. **[1]**

a) $0.5 \times 10^{-3}\ s^{-1}$

b) $5.0 \times 10^{-2}\ s^{-1}$

c) $0.5 \times 10^{-4}\ s^{-1}$

d) $5.0 \times 10^{-3}\ s^{-1}$

21. According to the collision theory of chemical reactions, _____. **[1]**

a) rate is directly proportional to the number of effective collisions

b) rate of reaction does not depend on the number of collisions

c) every molecular collision leads to a chemical reaction

d) the colliding molecules need to possess certain energy which is lower than the activation energy

22. Which one of the following orders is CORRECT for the bond dissociation enthalpy of halogen molecules? **[1]**

a) $F_2 > Cl_2 > Br_2 > I_2$

b) $Br_2 > I_2 > F_2 > Cl_2$

c) $I_2 > Br_2 > Cl_2 > F_2$

d) $Cl_2 > Br_2 > F_2 > I_2$

23. The molecular formula of thiosulfuric acid is _____. **[1]**

a) $H_2S_2O_3$

b) $H_2S_2O_7$

c) $H_2S_2O_8$

d) H_2SO_3

24. Ozone is present as a chief constituent in which region of the atmosphere? **[1]**

a) Thermosphere

b) Troposphere

c) Stratosphere

d) Mesosphere

[1]

25. The atomic number of cerium (Ce) is 58. The CORRECT electronic configuration of Ce^{3+} ion is _____.

a) $[Xe]\ 4f^{13}$ b) $[Xe]\ 4f^{1}$

c) $[Kr]\ 4d^{1}$ d) $[Kr]\ 4f^{1}$

26. The purest form of commercial iron is _____. **[1]**

a) cast iron b) pig iron

c) wrought iron d) scrap iron arid pig iron

27. _____ is used to make ultra-high speed flight, fire proof bulkheads and exhaust shrouds. **[1]**

a) Bronze b) Titanium alloy

c) Nichrome d) Cupra-nickel alloy

28. Identify the CORRECT decreasing order of ionic radii of lanthanoids. **[1]**

a) Ce > Pm > Sm > Gd b) Sm > Gd > Ce > Pm

c) Pm > Sm > Ce > Gd d) Gd > Pm > Ce > Sm

29. Hexafluorocobaltate(III) ion is found to be high spin complex, the probable hybrid state of cobalt in it is _____. **[1]**

a) sp^3 b) sp^3d^2

c) sp^3d d) d^2sp^3

30. Which of the following complex will not exhibit cis-trans isomerism? **[1]**

a) $[Co(NH_3)_4Cl_2]^{2+}$ b) $[Co(en)_3]Cl_3$

c) $[Co(en)_2(NH_3)Cl]$ d) $[Pt(NH_3)(H_2O)Cl_2]$

31. The complex salt having the molecular composition $[Co(NO_2)(SCN)(en)_2]Br$ exhibits _____. **[1]**

a) linkage isomerism b) ionization isomerism

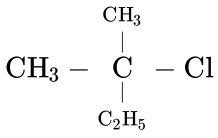
c) all the these d) cis-trans isomerism

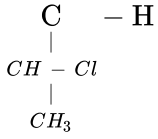
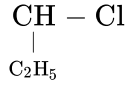
32. In which of the following, the central atom does NOT exhibit an oxidation state of +2? **[1]**

a) $[Cu(NH_3)_4]^{2+}$ b) $K_4[Fe(CN)_6]$

c) $[Fe(C_2O_4)_3]^{3-}$ d) $K_2[Ni(CN)_4]$

33. Which one of the following compounds most readily undergoes substitution by S_N2 mechanism? **[1]**

a) $CH_3 - CH_2 - Cl$ b) 

c)  d) 

34. Butanenitrile may be prepared by heating _____. **[1]**

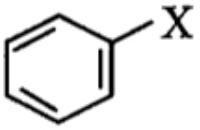
a) $CH_3CH_2CH_2Cl$ and KCN b) $CH_3CH_2CH_2CH_2Cl$ and KNO_3

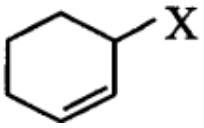
c) $CH_3CH_2CH_2OH$ and KNO_3

d) $CH_3CH_2CH_2CH_2Cl$ and KCN

35. Which of the following structures represent allylic halides? **[1]**

I. $CH_2 = CH - CH_2 - X$

II. 

III. 

IV. $CH_2 = CH - X$

a) II, III

b) I, IV

c) I, III

d) III, IV

36. $CH_3CH_2CH_2OH \xrightarrow{PCl_5} X \xrightarrow{ak.KOH} Y$, where Y is _____. **[1]**

a) propyne

b) propanol

c) propene

d) propane

37. The most suitable reagent for the conversion of $R - CH_2 - OH \longrightarrow R - CHO$ is _____. **[1]**

a) $K_2Cr_2O_7$

b) PCC (Pyridinium chlorochromate)

c) $KMnO_4$

d) CrO_3

38. In the Williamson's synthesis for ethyl isopropyl ether, which species works as a nucleophile? **[1]**

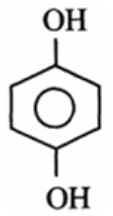
a) Sodium ethoxide

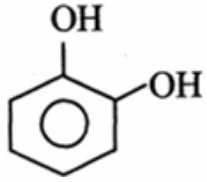
b) Ethyl chloride

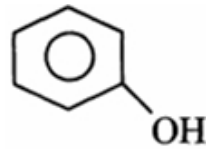
c) Sodium isopropoxide

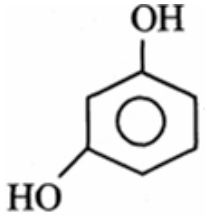
d) Isopropyl chloride

39. Which of the following is Resorcinol? **[1]**

a) 

b) 

c) 

d) 

40. The reaction between a carboxylic acid and alcohol in presence of cone. H_2SO_4 will give a/an _____. **[1]**

a) alkane

b) acid anhydride

c) ester

d) secondary alcohol

41. Iodoform can be prepared from all, EXCEPT _____. **[1]**

a) butan-2-one

b) acetophenone

c) propan-1-ol

d) propan-2-ol

42. $X \xrightarrow[ii.Na/C_2H_5OH]{i.\ Alc.AgCN,\triangle}$ N-Methylethanamine X is _____. **[1]**

a) n-propyl chloride
b) chloroethane
c) isopropylchloride
d) chloromethane

43. Match the following. **[1]**

	Column I		**Column II**
i.	β-Methylpropylamine	a.	Mixed 2° amine
ii.	Di-isopropylamine	b.	1° Amine
iii.	Dimethyl-sec-butylamie	c.	Simple 2° amine
iv.	Ethylisopropylamine	d.	Mixed 3° amine

a) i - c, ii - d, iii - b, iv - a
b) i - b, ii - c, iii - d, iv - a
c) i - b, ii - d, iii - a, iv - c
d) i - d, ii - a, iii - b, iv - c

44. Ethyl bromide when heated with alcoholic NH_3 in a sealed tube gives _____. **[1]**

I. ethylamine
II. diethylamine
III. triethylamine
IV. tetraethylammonium bromide

a) I, II and III
b) only I
c) I, II, III and IV
d) only III

45. Acetic acid on heating with NH_3 forms A. When A reacts with $LiAlH_4$ followed by hydrolysis gives B. When B is heated with chloroform in KOH medium gives C. What are B and C respectively? **[1]**

a) $CH_3CH_2CH_2NH_2$, CH_3CH_2NC
b) $CH_3CH_2NH_2$, CH_3COOH
c) CH_3CONH_2, CH_3CH_2NC
d) $CH_3CH_2NH_2$, CH_3CH_2NC

46. Which of the following does NOT yield two monosaccharide units on hydrolysis? **[1]**

a) Ribose
b) Sucrose
c) Maltose
d) Lactose

47. Which of the following set of bases is present both in DNA and RNA? **[1]**

a) Adenine, guanine, cytosine
b) Adenine, uracil, thymine
c) Adenine, guanine, uracil
d) Adenine, guanine, thymine

48. Which of the following pair of monomers are used in the preparation of PHBV? **[1]**

a) β-Hyrdoxyvaleric acid, Aminocaproic acid
b) Lactic acid, Adipic acid
c) β-Hydroxybutyric acid, β-hydroxyvaleric acid
d) β-Hydroxybutyric acid, Adipic acid

49. Which of the following chemical species is used to vulcanize natural rubber? **[1]**

a) Magnesium oxide
b) Sodium

c) Sulfur

d) Carbon disulphide

50. Which of the following is INCORRECT? **[1]**

a. Polyethylene terephthalate is recycled to make furniture.

b. High-density polyethylene is recycled to make detergent bottles.

c. Polystyrene is used in making microwavable food trays.

d. Polypropylene is used in making ketchup bottles.

a) Option (a)

b) Option (d)

c) Option (c)

d) Option (b)