SATISH SCIENCE ACADEMY

DHANORI PUNE-411015

CHEMISTRY

MHT - CET - Chemistry

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

1. What will be the mass of one atom of ^{12}C? **[1]**

   a) 1.6603×10^{-22} g
   b) 1.9923×10^{-23} g
   c) 1 a.m.u.
   d) 6 a.m.u.

2. Neutron is a fundamental particle carrying _____. **[1]**

   a) no charge and having a mass of 1.00867 amu
   b) a unit positive charge and having a mass of 1.00867 amu
   c) a unit negative charge and having a mass of 1.00727 amu
   d) no charge and no mass

3. If the atomic number of element X is 7, the best electron dot symbol for the element is _____. **[1]**

   a) •X•
   b) 
   c) X
   d) 

4. Which of the following is CORRECT regarding reductant? **[1]**

   a) It undergoes reduction.
   b) It accepts electron(s)
   c) It undergoes increase in oxidation number.
   d) It causes oxidation of the other chemical species involved in the reaction.

5. Which among the following elements of group 2 exhibits anomalous properties? **[1]**

   a) Ba
   b) Mg
   c) Be
   d) Ca

6. A bubble of air is underwater at a temperature 15 ^{o}C and the pressure 1.5 bar. If the bubble rises to the surface where the temperature is 25 ^{o}C and the pressure is 1.0 bar, what will happen to the volume of the bubble? **[1]**

   a) The volume will become greater by a factor of 2.5.
   b) Volume will become greater by a factor of 1.6.
   c) Volume will become smaller by a factor of 0.70.
   d) Volume will become greater by a factor of 1.1.

7. In case of oil in water emulsion, which of the following is NOT true? **[1]**

   a) When oil is added, a separate layer is formed.
   b) When small amount of an electrolyte is added, the emulsion becomes conducting.
   c) Oil is continuous phase.
   d) When water is added, water is readily

miscible.

8. The CORRECT order decreasing acidity for the following is: **[1]**

a) $CH_2 = CH_2 > CH_3 - CH = CH_2 > CH_3 - C \equiv CH > CH \equiv CH$

b) $CH_2 - CH \equiv C - H > CH \equiv CH > CH_2 = CH_2 > CH_3 - CH_3$

c) $CH \equiv CH > CH_2 = CH_2 > CH_3 - C \equiv CH > CH_3 - CH_3$

d) $CH \equiv CH > CH_3 - C \equiv CH > CH_2 = CH_2 > CH_3 - CH_3$

9. Identify the functional group that has electron-donating inductive effect. **[1]**

a) $- CH_3$

b) - COOH

c) - CN

d) $- NO_2$

10. Which of the following is FALSE about ionic solids? **[1]**

a. In a fused state, ionic solids do not conduct electricity.
b. In an aqueous solution, ionic solids conduct electricity.
c. In solid-state, free electrons are available in ionic solids.
d. In solid state, ionic solids do not conduct electricity.

a) option (b)

b) option (a)

c) option (d)

d) option (c)

11. In a face-centred cubic lattice, atom A occupies the corner positions and atom B occupies the face centre positions. If one atom of B is missing from one of the face centered points, the formula of the compound is: **[1]**

a) AB_2

b) A_2B_5

c) A_2B

d) A_2B_3

12. Which among the following metal crystallize as a simple cube? **[1]**

a) Copper

b) Iron

c) Polonium

d) Gold

13. The vapour pressure of pure liquid A is 70 torr at 27 °C. It forms an ideal solution with another liquid B. The mole fraction of B is 0.2 and the total vapour pressure of the solution is 84 torr at 27 °C. The vapour pressure of pure liquid B at 27 °C is _____ torr. **[1]**

a) 56

b) 14

c) 70

d) 140

14. For sodium chloride dissolved in water, the van't Hoff factor (i) accounts for the extent of _____ of the solute. **[1]**

a) mobility

b) mole fraction

c) solubility

d) dissociation

15. The CORRECT relationship between the boiling points of very dilute solutions of $AICI_3$ (t_1) and $CaCl_2$ (t_2), having the same molar concentration is _____. **[1]**

a) $t_2 \geq t_1$

b) $t_1 = t_2$

c) $t_2 > t_1$ d) $t_1 > t_2$

16. Identify the intensive properties from the following. **[1]**

a) Volume and temperature b) Specific heat and volume

c) Temperature and melting point d) Heat capacity and temperature

17. In an isobaric process, _____. **[1]**

a) $Q_P = \Delta U$ b) $Q_P = \Delta U - P_{ext}\,\Delta V$

c) $Q_P = 0$ d) $Q_P = \Delta U + P_{ext}\Delta V$

18. The enthalpy change for the formation of 3.6 kg of water is _____. **[1]**

$H_{2(g)} + \frac{1}{2}O_{2(g)} \longrightarrow H_2O_{(t)}; \Delta H$ = -284.5 kJ mol^{-1}

a) - 5690 kJ b) - 284.5 kJ

c) 284.5 kJ d) - 56900 kJ

19. The standard Gibbs free energy change, $\Delta G°$, is related to the equilibrium constant K_p as _____. **[1]**

a) $\Delta G° = -RT \text{ In } K_p$ b) $K_p = -\frac{\Delta G°}{RT}$

c) $K_p = \left(\frac{e}{RT}\right)^{\Delta G°}$ d) $K_p = -RT \text{ In } \Delta G°$

20. Consider the reaction $N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$ The equality relationship between $\frac{d[NH_3]}{dt}$ and $-\frac{d[H_2]}{dt}$ is **[1]**

_____.

a) $\frac{d[NH_3]}{dt} = -\frac{3}{2}\frac{d[H_2]}{dt}$ b) $\frac{d[NH_3]}{dt} = -\frac{1}{3}\frac{d[H_2]}{dt}$

c) $\frac{d[NH_3]}{dt} = -\frac{2}{3}\frac{d[H_2]}{dt}$ d) $\frac{d[NH_3]}{dt} = -\frac{d[H_2]}{dt}$

21. The reaction $N_2O_5 \rightarrow 2NO_2 + \frac{1}{2}\,O_{2(g)}$ (in CCl_4 (solution) solution) is of the first order in N_2O_5 with rate **[1]**

constant $6.2 \times 10^{-1}\ s^{-1}$. What is the value of rate of reaction when $[N_2O_5] = 1.25$ mol L^{-1}?

a) 3.85 x 10^{-1} mol L^{-1} s^{-1} b) 6.35 x 10^{-3} mol L^{-1} s^{-1}

c) 7.75 x 10^{-1} mol L^{-1} s^{-1} d) 5.15 x 10^{-5} mol L^{-1} s^{-1}

22. Identify A and B respectively. **[1]**

$$Xe + F_2 \xrightarrow[400°C]{\text{Scaled Ni tube}} A$$

$$Xe + F_2 \xrightarrow[-80°C]{\text{Electric discharge}} B$$

a) XeF_2, XeF_2 b) XeF_6, XeF_2

c) XeF_2, XeF_4 d) XeF_4, XeF_6

23. Oxidation state of **Cl** is +7 in _____. **[1]**

a) chlorous acid b) chloric acid

c) perchloric acid d) hypochlorous acid

24. Na_2O is an example of _____ oxide. **[1]**

a) acidic b) neutral

c) basic

d) amphoteric

25. The following statements are CORRECT, EXCEPT _____. **[1]**

a) all d block elements are electropositive metals

b) most d-block elements are efficient catalyst

c) all d block elements are lustrous

d) all d block elements are soft metals

26. The following reactions take place in the blast furnace in the preparation of impure iron. Identify the reaction pertaining to the formation of slag. **[1]**

a) $CaCO_{3(s)} \longrightarrow CaO_{(s)} + CO_{2(g)}$

b) $2C_{(s)} + O_{2(g)} \longrightarrow 2CO_{(g)}$

c) $CaO_{(s)} + SiO_{2(s)} \longrightarrow CaSiO_{3(s)}$

d) $Fe_2O_{3(s)} + 3CO_{(g)} \longrightarrow 2Fe_{(l)} + 3CO_{2(g)}$

27. Mn^{2+} compounds are more stable than Fe^{2+} compounds towards oxidation to their +3 state, because _____. **[1]**

a) Mn^{2+} is more stable with high 3^{rd} ionization energy

b) Mn^{2+} is bigger in size

c) Mn^{2+} does not exist

d) Mn^{2+} has completely filled d-orbitals

28. The valence shell electronic configuration of Cr^{2+} ion is _____. **[1]**

a) $3d^5$

b) $3d^2$

c) $3d^0$

d) $3d^4$

29. Bidentate ligand is _____. **[1]**

a) ethylenediamine

b) EDTA

c) NO_3^-

d) SCINT

30. A discrete structural unit in which central metal ion and ligands linked to it are enclosed in a square bracket is called _____. **[1]**

a) coordination sphere

b) counter ion

c) coordination number

d) ligand

31. Which of the following complexes is an outer orbital complex? **[1]**
(Atomic numbers: Mn = 25; Fe = 26; Co = 27; Ni = 28)

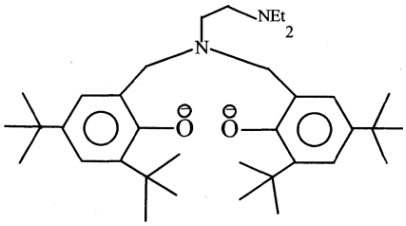
a) $[Mn(CN)_6]^{4-}$

b) $[Ni(NH_3)_6]^{2+}$

c) $[Co(NH_3)_6]^{3+}$

d) $[Fe(CN)_6]^{4-}$

32. The following ligand is _____. **[1]**



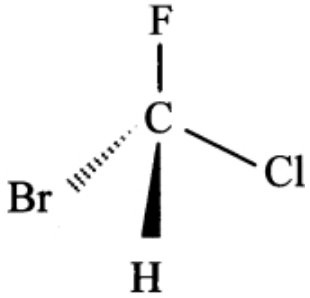
a) hexadentate

b) bidentate

c) tridentate

d) tetradentate

33. Consider the following wedge formula. **[1]**



According to the representation, which bond lies below the plane of the paper?

a) C - Br
b) C - H
c) C - Cl
d) C - F

34. An example of a sigma bonded organometallic compound is _____. **[1]**

a) cobaltocene
b) ruthenocene
c) ferrocene
d) Grignard's reagent

35. Which of the following halide shows the highest reactivity towards S_N1 reaction? **[1]**

a) $CH_3 - CH_2 - CH_2 - CH_2Cl$
b) C_6H_5Cl
c) $CH_3 - CH_2Cl$
d) $C_6H_5CH_2Cl$

36. Conversion of benzene diazonium salt to phenol involves _____. **[1]**

a) hydration
b) hydrolysis
c) decomposition
d) decarboxylation

37. Nitration reaction of phenol is _____. **[1]**

a) aromatic elimination reaction
b) aromatic nucleophilic substitution reaction
c) aromatic addition reaction
d) aromatic electrophilic substitution reaction

38. Which of the following alcohols undergo acid catalysed dehydration to alkenes most readily? **[1]**

a) $(CH_3)_3COH$
b) $CH_3CH_2CH_2OH$
c) $CH_3CHOHCH_3$
d) $(CH_3)_2CHCH_2OH$

39. Ethyl alcohol when treated with cone. H_2SO_4 gives _____ at 443 K and _____ at 413 K. **[1]**

a) ethylene, ethanal
b) ethoxyethane, ethylene
c) ethylene, ethoxyethane
d) ethanal, ethylene

40. Which of the following compound undergoes aldol condensation? **[1]**

a) Trimethyl acetaldehyde
b) Acetaldehyde
c) Trichloro acetaldehyde
d) Formaldehyde

41. A compound 'D' on hydrolysis, formed acetamide which on further hydrolysis gives acetic acid and NH_3. The compound 'D' is _____. **[1]**

a) $CH_3C \equiv N$
b) C_2H_5I
c) C_2H_5OH
d) C_2H_5ONa

42. Identify the INCORRECT statement. **[1]**

A. Azo group can be represented as, - N = N-.

B. Azo coupling reaction is a nucleophilic aromatic substitution reaction.

C. Azo coupling with β-naphthol in NaOH is used as a confirmatory test for primary aromatic amines.

D. The acid-base indicator methyl orange is an azo dye.

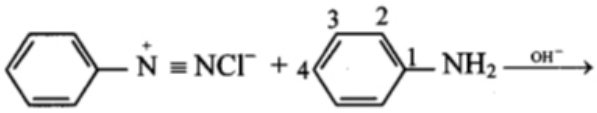
a) Option (C)

b) Option (D)

c) Option (A)

d) Option (B)

43. Azo coupling reaction with respect to aniline takes place at position number _____. **[1]**



a) 2

b) 1

c) 3

d) 4

44. Hexamethylenediamine is an example of _____. **[1]**

a) quaternary ammonium salt

b) 1° amine

c) 2° amine

d) 3° amine

45. Ethanamine on acetylation using ethanoyl chloride gives _____. **[1]**

a) N,N-dimethylethanamide

b) N-ethylethanamide

c) N,N-diethylethanamide

d) N-methylethanamide

46. Which carbon atom of deoxy ribose sugar in DNA does NOT contain $-\overset{|}{\underset{|}{C}}-OH$ bond? **[1]**

a) C_2

b) C_5

c) C_1

d) C_3

47. Oligosaccharides on hydrolysis yield _____ units of monosaccharides. **[1]**

a) ten to twelve

b) two

c) two to ten

d) ten to fifteen

48. A molecule or group of molecules which are repeated to get a polymer is termed as _____. **[1]**

a) tetramer

b) dimer

c) monomer

d) oligomer

49. Orlon is an example of _____. **[1]**

a) condensation polymer

b) copolymer

c) addition polymer

d) natural polymer

50. Aging of the gel means the gel transforms into a _____. **[1]**

a) oily liquid

b) liquid

c) gaseous state

d) solid mass