GGSIPU chamistry 2014

1. The molecular ion X F$_2^-$ has three pairs of non-bonding electrons around the central atom. The bond angle F-X-F will be closest to

<div align="center">

a 180 ^{0} b 120 ^{0}

c 109 ^{0} d 90 ^{0}

</div>

2. Which of the following sets have correctly matched each molecule or ion and its geometry?

	Tetrahedral	Triogonal Pyramidal	T-shaped	Square planar
a	CH_4	BCl_3	NO_3^-	SO_4^{2-}
b	SO_4^{2-}	NF_3	ICl_3	XeF_4
c	CH_4	NO_3^-	GaL_3	$SnCL_4$
d	CCL_4	PF_3	ICl_3	SF_4

3. Ethanol is CH_3CH_2OH. Which species is formed when ethanol acts as a Bronstead base?

a $CH_3CH_2O^-$

b $CH_3CH_2^+$

c $CH_3CH_2OH_2^+$

d H_3O^+

4. Which of the following salts has the greatest molar solubility in pure water?

a $CaCO_3$ $K_{sp} = 8.7 \times 10^{-9}$

b CuS $K_{sp} = 8.5 \times 10^{-45}$

c Ag_2CO_3 $K_{sp} = 6.2 \times 10^{-12}$

d Pb_9IO_3 $K_{sp} = 2.6 \times 10^{-13}$

5. The number of valence-shell bonding electron-dot model for HNNN is

<div align="center">

a 6   b 10   c 11   d 16

</div>

6. Which of the following pairs contains isoelectronic species?

<div align="center">

a Be and Li$^+$ b P$^+$ and S$^-$

c N^{2-} and Ne   d O^{2-} and Na$^+$

</div>

7. Which of the following sets has the atoms and/or ions in correct order of increasing size?

a $Ne < F^- < O^{2-}$

b $Br^- < Cl^- < F^-$

c $Na^+ < Mg^{2+} < Al^{3+}$

d $P < S < Cl$

8. For which of the following equations is the change in enthalpy at 25^0C and 1 atm equal to ΔH°_f of CH_2OI

a $C_g + H_{2g} + 1/2O_{2g} \rightarrow CH_2OI$

b $Cs + H_{2g} + 1/2O_{2g} \rightarrow CH_2OI$

c $Cg + 2H_{2g} + Og \rightarrow CH_2OI$

d $COg + 2H_{2g} \rightarrow CH_2OI$

9. Cl_2O is a yellowish-red gas at room temperature. The strongest intermolecular forces present in Cl_2O are

a dipole -dipole forces

b London forces

c hydrogen bonds

d covalent bonds

10. An ammonia solution has a density of 0.910 g cm^{-3} and is 25.0% NH_3 by mass. What is the molarity of the solution?

a 12.1 M   b   13.4 M   c   14.5 M   d   15.5 M

11. A compound X_2O_3 contains 31.58% oxygen by weight. The atomic weight of X is

a 34.66 g/mol   b 45.01 g/mol

c 52. 00 g/mol   d 104.0 g/mol

12. What is the concentration of a solution prepared by dissolving 4.20 of NaF in 500 g of water?

a 0.200 -molal   b   0.200-molar

c 0.00840 -molal   d 0.00840 -molar

13. In the van der Walls, equation given below, $[p + an/V^2]V - nb = nRT$, the an/V^2 and $-nb$ terms represent, respectively, corrections for

a derivations in the pressure   and the temperature

b intermolecular attractive forces and molecular volumes

c   intermolecular attractive forces and inelastic collisions

d intermolecular repulsive forces and high temperature

14. Find the boiling point of a solution of 5.00 g of naphthalene$C_{10}H_8$ in 100 g of benzene. K_b of benzene if 2.53^0 C/m; the normal boiling point of benzene = 80^0C.

a 81 ^{0}C   b 85 ^{0}C

c 0.99 ^{0}C   d 79 ^{0}C

15. Magnessium fluoride is a slightly soluble salt whose solubility product constant is K_{sp} = $3.7x10^{-8}$. What is the approximate solubility of magnesium fluoride?

a $9.2x10^{-9}$ M   b $1.2x10^{-8}$ M

c $1.4x10^{-4}$ M   d $2.1x10^{-3}$ M

16. The distribution coefficient, K_D for an organic compound between water and methylene chloride is 3.40. An aqueous solution of the organic compound contains 0.500 g per 100 mL and is extracted with 50.0 mL of methylene chloride. What percentage of the organic compound originally in water is extracted?

a 31.5%   b 63.0%

c 72.0%   d 92.6%

17. The permanganate ion is an excellence oxidisting agent in aqueous solutions. When the half reaction, $MnO_4^- + H^+ + e^- \rightarrow MnO_2 + H_2O$ is balanced, the correct coefficients for the species involved are

a 1,4,4,1,2   b 1,4,2,1,2

b 1,4,3,1,2   d 1,4,1,1,2

18. For a certain reaction the rate law is rate = $k[C]^{3/2}$. If the rate of the reaction is 0.020 mol $L^{-1}s^{-1}$ when [C] = 1.0 M, what is the rate when [C] = 0.60 M?

a 0.0093 mol $L^{-1}s^{-1}$ b 0.012 mol $L^{-1}s^{-1}$

b 0.033 mol $L^{-1}s^{-1}$ d 0.040 mol $L^{-1}s^{-1}$

19. Which atom has the correct ground state electron configuration?

a Cl : $[Ne]3s^1 3p^6$ b Mo : $[Kr]5s^1 4d^5$

c Cu : [Ar]4s ^{2}3d^6 d   As : [Ar]4s^{2}4d^{10}4p^3

20. What is the volume,in liters,of 576 g of SO_2 gas at STP?

     a 101   b 202

     c 216   d 788

21. A 2.0 molal sugar solution has approximately the same freezing point as a, 1.0 molal solution of

     a CaCL $_2$ b CH $_2$COOH

     c C $_2$H$_5$OH   d NaCL

22. Cellulose,protein and starch are classified as

     a na tural polymers   b aldehydes

     c esters   d   synthetic polymers

23. An example of a secondary alcohol is

     a 1 -propanol   b 2 -propanol

     c 1,2 -propanol   d 1,2,3 propanol

24. The IUPAC name of compound $CH_2 = CH(CH_3$ $_2$ is

     a 1,1 -dimethyl-2-propane

     b 2 -vinyl propane

     c 3 -methyl-1-butene

     d   2-vinyl propane

25. The number of sigma and pi-bonds in 1-butene 3-yne are

     a 6 sigma   and 4 pi   b   7 sigma and 3 pi

     c 5 sigma and 5 pi   d None of these

26. Geometrically isomerism is reflected by which of the compound ?

     a 3 -phenyl-1-butene

     b 2 -phenyl-1-butene

     c 1,1 -diphenyl-1-propane

d   1-phenyl-2-butene

27. Which of the compound does not dissolve in concentrated H_2SO_4?

    a Hexane   b Benzene

    c Ethylene   d Aniline

28. Given the K_{sp} expression. $K_{sp} = [A^{3+}]^2[B^{2-}]^3$

    a $A_2B_3s \Leftrightarrow 3A^{3+}aq + 2B^{2-}aq$

    b $A_2B_3s \Leftrightarrow 3A^{3+}aq + 3B^{2-}aq$

    c $A_3B_2s \Leftrightarrow 3A^{3+}aq + 2B^{2-}aq$

    d $A_3B_2s \Leftrightarrow 2A^{3+}aq + 3B^{2-}aq$

29. Black precipitate from in many metal ion solutions when which anion is used as a precipitating agent?

    a Cl^- b S^{2-}

    c PO_4^{3-} d CO_3^{2-}

30. What is the oxidation number of Pt in $K[PtNH_3Cl_5]$?

    a 0   b +1

    c +2   d +4

31. Which substance has the lowest boiling point?

    a $CH_3CH_2CH_2CH_2OCH_3$

    b $CH_3CH_2OCH_2CH_3$

    c $CH_3CH_2CH_2CH_3$

    d $CH_3CH_2C = OCH_3$

32. Elemental analysis results obtained for cortisone, an anti-inflammatory agent, are 69.98% C, 7.83% H and 22.19% O. What is the empirical formula of cortisone?

    a C_4H_6O b $C_{18}H_{22}O_3$

    c $C_{20}H_{25}O_4$ d $C_{12}H_{28}O_5$

33. Which pairs of compounds will form the strongest hydrogen bonds with each other?

a C $_2$H$_5$OH and CH$_3$OCH$_3$

b HOCH $_2$CH$_2$OH and H$_2$O

c HOCH $_2$CH$_2$OH and CH$_3$OH

d CH $_3$OCH$_3$ and H$_2$O

34. Which of the following acids dissociates to the greatest extent in a aqueous solution?

a Tricloroacetic acid   b Acetic acid

c Chloroa cetic acid   d Dichloracetic acid

35. What is one of the products of the addition of HBr to 2 butene?

a 1 -bromobutene   b 2 -bromobutene

c 1,2 -dibromobutene   d 2,3 -dibromobutene

36. The anti-cancer drug cis-platin has the formula PtNH $_3$ $_2$CL$_2$. There is another isomer, trans-platin, that is not medically active. What is the shape of cis-platin?

a Tetrahedral   b Octahedral

c square planar   d Trigonal bipyramidal

37. Aluminium hydroxide, AlOH) $_3$, is insoluble in water, but dissolves readily in both acidic and basic solutions. Such behavior is characteristic of

a polyprotic behavior   b hydrophilic behavior

c a buffer   d amphoteric behavior

38. How many of the following salts will be more soluble in acid solution than in pure water? CdCO$_3$, MnOH) $_2$, PbS,PbCl$_2$

a 1 b 2 c 3   d 4

39. Which of t6he following substances has the highest melting point?

a CaO   b BiCl $_3$ c KCL d CLO $_2$

40. Which of the following oxides, at the same concentration when dissolved in water,results in the most acidic solutions?

a CO $_2$ b B $_2$O$_3$

c N $_2$O$_5$ d Li $_2$O$_2$

41. What is the ground state electron configuration of the Mn^{2+} ion?

    a $[Ar]4s^1 3d^5$ b $[Ar]4s^2 3d^3$

    c $[Ar]3d^5$ d $[Ar]3d^4$

42. In spontaneous beta paticle β^- emission, what is the source of the emitted electron?

    a The nucleus

    b The 1s orbital

    c The outermost occupied orbital

    d A random orbital

43. Very strong acids, such as HNO_3 and HCL, appear to be equally strong in water. This "leaving effect" of bwater because

    a OH^- is a stronger base than the conjugate bases of HNO_3 and HCL

    b H_3O^+ is a stronger acid than HNO_3 and HCL

    c H_2O is a stronger base than the conjugate bases of HNO_3 and HCL

    d H_2O is a weaker base than the conjugate bases of HNO_3 and HCL

44. Which factors do not effect the vapour pressure of a liquid at equilibrium ?

    I. Intermolecular forces of attraction

    II. The volume of liquid present

    III. The temperature of the liquid.

    a Only I   b Only II

    c I and II   d II and III

45. The half-life of ^{14}C is 5570 yr. How many years will it take for 90% of a sample to decompose?

    a 5.570 yr   b 17,700 yr

    c 18,600 yr   d 50,100 yr

46. Which atom is the smallest?

    a Rb   b Ag

    c Sb   d I

47. Which of the anhydride of nitric acid?

        a NO   b NO_2

        c N_2O_3 d N_2O_5

48. What type of compound is shown in below?

$$\overset{\displaystyle O}{\underset{\displaystyle H-C-CH_2-CH_3}{\|}}$$
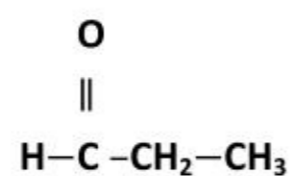
    a   An alcohol   b An aldehyde

    c   A ketone   d None of these

49. Hydrogen bonding is maximum in

        a diethyl ether   b triethyl amine

        c ethanol   d None of these

50. Benzyl chloride C $_6H_5CH_2CL$ can be prepared from toluene by chlorination with

        a CL_2 b SO_2CL_2

        c $SOCL_2$ d NaOCL