

GGSIU chemistry 2014

1. The molecular ion XF_2 has three pairs of non-bonding electrons around the central atom. The bond angle F-X-F will be closest to

- a 180° b 120°
c 109° d 90°

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

	Tetrahedral	Triagonal 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 $\text{CH}_3\text{CH}_2\text{OH}$. Which species is formed when ethanol acts as a Bronstead base?

- a $\text{CH}_3\text{CH}_2\text{O}^-$
b CH_3CH_2^+
c $\text{CH}_3\text{CH}_2\text{OH}_2^+$
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

- a 6 b 10 c 11 d 16

6. Which of the following pairs contains isoelectronic species?

- a Be and Li^+ b P^+ and S^-
c N^{2-} and Ne d O^{2-} and Na^+

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

- a $\text{Ne} < \text{F}^- < \text{O}^{2-}$
- b $\text{Br}^- < \text{Cl}^- < \text{F}^-$
- c $\text{Na}^+ < \text{Mg}^{2+} < \text{Al}^{3+}$
- d $\text{P} < \text{S} < \text{Cl}$

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

- a $\text{C (g)} + \text{H}_2\text{(g)} + \frac{1}{2}\text{O}_2\text{(g)} \rightarrow \text{CH}_2\text{OI}$
- b $\text{Cs} + \text{H}_2\text{(g)} + \frac{1}{2}\text{O}_2\text{(g)} \rightarrow \text{CH}_2\text{OI}$
- c $\text{C(g)} + 2\text{H}_2\text{(g)} + \text{O(g)} \rightarrow \text{CH}_2\text{OI}$
- d $\text{CO(g)} + 2\text{H}_2\text{(g)} \rightarrow \text{CH}_2\text{OI}$

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 Waals, equation given below, $[p + \frac{an}{V^2}]V - nb = nRT$, the $\frac{an}{V^2}$ 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 is $2.53^\circ C/m$; the normal boiling point of benzene = $80^\circ C$.

- a $81^\circ C$
- b $85^\circ C$
- c $79.99^\circ C$
- d $79^\circ C$

15. Magnesium fluoride is a slightly soluble salt whose solubility product constant is $K_{sp} = 3.7 \times 10^{-8}$. What is the approximate solubility of magnesium fluoride?

- a $9.2 \times 10^{-9} M$
- b $1.2 \times 10^{-8} M$
- c $1.4 \times 10^{-4} M$
- d $2.1 \times 10^{-3} M$

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 excellent oxidizing 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
- c 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 $0.020 \text{ mol L}^{-1} \text{ s}^{-1}$ when $[C] = 1.0 M$, what is the rate when $[C] = 0.60 M$?

- a $0.0093 \text{ mol L}^{-1} \text{ s}^{-1}$
- b $0.012 \text{ mol L}^{-1} \text{ s}^{-1}$
- c $0.033 \text{ mol L}^{-1} \text{ s}^{-1}$
- d $0.040 \text{ mol L}^{-1} \text{ s}^{-1}$

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

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



20. What is the volume, in liters, of 576 g of SO₂ 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 CaCl₂ b CH₂COOH
c C₂H₅OH d NaCl

22. Cellulose, protein and starch are classified as

- a natural 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 CH₂ = CH(CH₃)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. $K_{sp} = [\text{A}^{3+}]^2[\text{B}^{2-}]^3$

a $\text{A}_2\text{B}_3\text{S} \rightleftharpoons 3\text{A}^{3+}\text{aq} + 2\text{B}^{2-}\text{aq}$

b $\text{A}_2\text{B}_3\text{S} \rightleftharpoons 3\text{A}^{3+}\text{aq} + 3\text{B}^{2-}\text{aq}$

c $\text{A}_3\text{B}_2\text{S} \rightleftharpoons 3\text{A}^{3+}\text{aq} + 2\text{B}^{2-}\text{aq}$

d $\text{A}_3\text{B}_2\text{S} \rightleftharpoons 2\text{A}^{3+}\text{aq} + 3\text{B}^{2-}\text{aq}$

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 $\text{K}[\text{PtNH}_3\text{Cl}_5]$?

a 0 b +1

c +2 d +4

31. Which substance has the lowest boiling point?

a $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OCH}_3$

b $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$

c $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$

d $\text{CH}_3\text{CH}_2\text{C}=\text{OCH}_3$

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 $\text{C}_4\text{H}_6\text{O}$ b $\text{C}_{18}\text{H}_{22}\text{O}_3$

c $\text{C}_{20}\text{H}_{25}\text{O}_4$ d $\text{C}_{12}\text{H}_{28}\text{O}_5$

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

- a C_2H_5OH and CH_3OCH_3
- b $HOCH_2CH_2OH$ and H_2O
- c $HOCH_2CH_2OH$ and CH_3OH
- d CH_3OCH_3 and H_2O

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

- a Trichloroacetic acid b Acetic acid
- c Chloroacetic acid d Dichloroacetic 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 $Pt(NH_3)_2Cl_2$. 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, $Al(OH)_3$, 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? $CdCO_3$, $Mn(OH)_2$, PbS , $PbCl_2$

- a 1 b 2 c 3 d 4

39. Which of the 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 BO_3
- c N_2O_5 d Li_2O_2

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

- a $[\text{Ar}]4s^1 3d^5$ b $[\text{Ar}]4s^2 3d^3$
c $[\text{Ar}]3d^5$ d $[\text{Ar}]3d^4$

42. In spontaneous beta particle 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 water 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

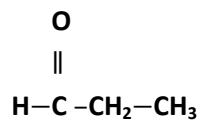
46. Which atom is the smallest?

- a Rb b Ag
c Sb d I

47. Which of the anhydride of nitric acid?

- a NO b NO₂
c N₂O₃ d N₂O₅

48. What type of compound is shown in below?



- 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 C₆H₅CH₂Cl can be prepared from toluene by chlorination with

- a CL₂ b SO₂CL₂
c SOCL₂ d NaOCL