

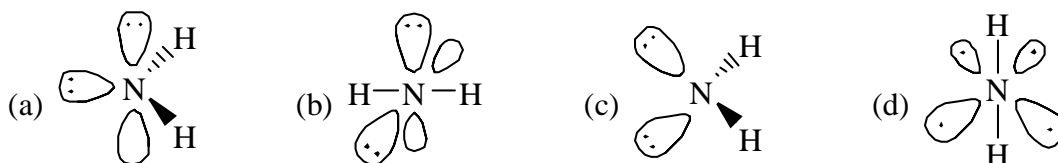
# CHEM ACADEMY

DELHI UNIVERSITY 2014

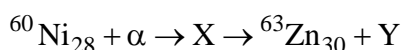
SECTION - A

- The ground state term symbol for  $\text{Eu}^{3+}$  is  
(a)  ${}^7F_0$                       (b)  ${}^7F_6$                       (c)  ${}^3F_0$                       (d)  ${}^3F_6$
- Which of the following compound would be drawn most strongly into a magnetic field?  
(a)  $\text{TiCl}_4$                       (b)  $\text{VCl}_3$                       (c)  $\text{FeCl}_2$                       (d)  $\text{CuCl}_2$
- Which of the following correctly represents the balanced chemical reaction between aluminum and sulfur?  
(a)  $16 \text{Al} + 3\text{S}_8 \rightarrow 8 \text{Al}_2\text{S}_3$                       (b)  $12 \text{Al} + \text{S}_8 \rightarrow 4 \text{Al}_3\text{S}_2$   
(c)  $8 \text{Al} + \text{S}_8 \rightarrow 8 \text{AlS}$                       (d)  $4 \text{Al} + \text{S}_8 \rightarrow 4 \text{AlS}_2$
- When two ionic compounds are dissolved in water, a double replacement reaction can:  
(a) Never occur since all ions in water are "spectator ions"  
(b) Occur if two of the ions form an insoluble ionic compound, which precipitates out of solution.  
(c) Occur if the ions react to form a gas, which bubbles out of the solution  
(d) Occur only if the ions form covalent bonds with each other.
- Which Bronsted acid ( $\text{H}_2\text{O}$  or  $\text{H}_2\text{S}_{(\text{aq})}$ ) is the stronger acid and why is it the stronger acid?  
(a)  $\text{H}_2\text{O}$  is the stronger acid because oxygen has a greater electronegativity than sulfur, which gives the attached hydrogen atom more proton character.  
(b)  $\text{H}_2\text{O}$  is the stronger acid because  $\text{H}_2\text{S}$  is a gas and gases are not acids.  
(c)  $\text{H}_2\text{S}$  is the stronger acid because the hydrogen sulfur bond is much weaker than the hydrogen oxygen bond due to a greater difference in atomic orbital energy levels.  
(d)  $\text{H}_2\text{S}$  is the stronger acid because it is a heavier molecule and therefore has more energetic collisions.
- The common features among the species  $\text{CN}^-$ ,  $\text{CO}$ , and  $\text{NO}^+$  are:  
(a) Bond order three and iso - electronic  
(b) Bond order three and weak - field ligands  
(c) Bond order two and strong - field ligands  
(d) Iso-electronic and weak-field ligands
- The central atom in  $\text{BrF}_5$  has \_\_\_?\_\_\_ bonding pairs of electrons and \_\_\_?\_\_\_ non-bonding pairs of electrons.  
(a) 1 and 5                      (b) 0 and 5                      (c) 5 and 1                      (d) 5 and 0

8. Which of the following best represents the three-dimensional view of  $\text{H}_2\text{N}^-$  ion?

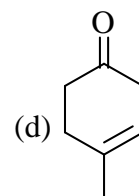
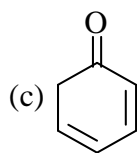
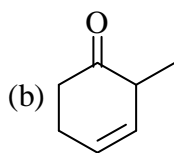
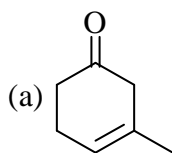


9. What you call an element if it has 18 electrons in penultimate shell and 3 electrons in outer most shell?  
 (a) s block element (b) p block element (c) d block element (d) f block element
10. What is the geometry of  $[\text{AuCl}_4]^-$  complex ion?  
 (a) Square-planar (b) Tetrahedral  
 (c) Trigonal monopyramidal (d) See-Saw
11. The complex ions  $[\text{Cr}(\text{en})_2\text{ClBr}]\text{Br}$  and  $[\text{Cr}(\text{en})_2\text{Br}_2]\text{Cl}$  are called (where “en” stands for ethylene diamine):  
 (a) Optical isomers (b) Linkage isomers (c) Geometrical isomers (d) Ionization isomers
12. The correct formula of the compound whose name is hexaamminechromium (III) nitrate is:  
 (a)  $[\text{Cr}(\text{NH}_2)_6](\text{NO}_3)_3$  (b)  $[\text{Cr}(\text{NH}_3)_6](\text{NO}_2)_6$   
 (c)  $[\text{Cr}(\text{NH}_3)_6](\text{NO}_3)_3$  (d)  $[\text{Cr}(\text{NO}_3)_3](\text{NH}_3)_6$
13. The expected spin-only magnetic moments for  $[\text{Fe}(\text{CN})_6]^{4-}$  and  $[\text{FeF}_6]^{3-}$  are  
 (a) 1.73 and 1.73 B.M. (b) 1.73 and 5.92 B.M.  
 (c) 0.0 and 1.73 B.M. (d) 0.0 and 5.92 B.M.
14. The molecule  $[\text{Pt}(\text{NH}_3)(\text{OH}_2)\text{BrCl}]$  is square-planar. How many geometrical isomers of this molecule can exist?  
 (a) 2 (b) 3 (c) 4 (d) 6
15. Which statement about octahedral complex ions is correct?  
 (a) A  $C_3$  axis makes the  $d_{xy}$ ,  $d_{xz}$  and  $d_{yz}$  orbitals indistinguishable, or degenerate.  
 (b) A  $C_3$  axis destabilizes the  $d_{xy}$ ,  $d_{xz}$  and  $d_{yz}$  orbitals relative to the  $d_{x^2-y^2}$  and  $d_z^2$  orbitals.  
 (c) The donor atoms of the ligands point directly toward the  $d_{xy}$ ,  $d_{xz}$  and  $d_{yz}$  orbitals  
 (d) The  $t_{2g}$  orbitals are destabilized by  $+3/5 \Delta_0$ .
16. Which equation best represents the first ionization energy of magnesium?  
 (a)  $\text{Mg}(\text{s}) \rightarrow \text{Mg}^+(\text{s}) + \text{e}^-$  (b)  $\text{Mg}(\text{g}) \rightarrow \text{Mg}^{2+}(\text{g}) + 2\text{e}^-$   
 (c)  $\text{Mg}(\text{g}) \rightarrow \text{Mg}^+(\text{g}) + \text{e}^-$  (d)  $\text{Mg}(\text{s}) \rightarrow \text{Mg}^+(\text{g}) + \text{e}^-$
17. Which pair of species describes the correct increasing order of the property given?  
 (a) Covalent character :  $\text{HI}$ ,  $\text{HBr}$  (b) Ionic radius :  $\text{Mg}$ ,  $\text{Mg}^{2+}$   
 (c) Melting point :  $\text{I}_2$ ,  $\text{Br}_2$  (d) First ionization potential :  $\text{O}$ ,  $\text{S}$
18. Consider the following nuclear reaction



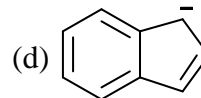
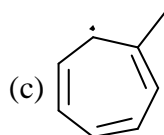
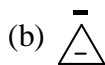
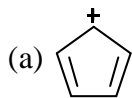
The X and Y are

- (a)  $^{64}\text{Zn}_{30}$  and neutron (b)  $^{64}\text{Zn}_{30}$  and  $\beta$  particle  
 (c)  $^{64}\text{Zn}_{31}$  and proton (d)  $^{64}\text{Zn}_{32}$  and neutron
19. The reaction between hexacyanoferrate (III) and iodide ion in strongly acidic solution produces:  
 (a)  $[\text{Fe}(\text{CN})_6]^{3-}$  and iodine (b)  $[\text{Fe}(\text{CN})_6]^{2-}$  and iodide ion  
 (c)  $[\text{Fe}(\text{CN})_6]^{4-}$  and iodine (d)  $[\text{Fe}(\text{CN})_6]^{3-}$  and iodide ion
20. The perchloric acid molecule contains:  
 (a) 13 lone pairs, 1  $\pi$  bond, and 4  $\sigma$  bonds (b) 9 lone pairs, non  $\pi$  bonds and 6  $\sigma$  bonds  
 (c) 8 lone pairs, 2  $\pi$  bonds, and 7  $\sigma$  bonds (d) 11 lone pairs, no  $\pi$  bonds and 5  $\sigma$  bonds
21. Toluene on oxidation with alkaline  $\text{KMnO}_4$  forms benzoic acid. What is the product formed when n-propyl benzene is oxidized with  $\text{KMnO}_4$ ?  
 (a)  $\text{C}_6\text{H}_5\text{CH}_2\text{COOH}$  (b)  $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2\text{COOH}$   
 (c)  $\text{C}_6\text{H}_5\text{COOH}$  (d)  $\text{C}_6\text{H}_5\text{CHO}$
22. What is the relative area of each peak in a quartet spin-spin splitting pattern?  
 (a) 1 : 4 : 4 : 1 (b) 1 : 2 : 2 : 1 (c) 1 : 2 : 1 (d) 1 : 3 : 3 : 1
23. Which of the following reacts the fastest with  $\text{NaOH}$ ,  $\text{H}_2\text{O}$ ?  
 (a) ethylene oxide (oxirane) (b) cis-2, 3-dimethyloxirane  
 (c) trans-2, 3-dimethyloxirane (d) 2, 2, 3, 3-tetramethyloxirane
24. What is the relationship between keto and enol tautomers?  
 (a) Resonance forms (b) Stereoisomers  
 (c) Constitutional isomers (d) Different conformations of the same compound
25. Lucas reagent is  
 (a) Anhydrous  $\text{CuCl}_2/\text{HCl}$  (b) Anhydrous  $\text{CuCl}_2/\text{H}_2\text{SO}_4$   
 (c) Anhydrous  $\text{ZnCl}_2/\text{HCl}$  (d) Anhydrous  $\text{ZnCl}_2/\text{H}_2\text{SO}_4$
26. Correct order of basicity of the following anion is:  
 (a)  $\text{CH}_3\text{COO}^- < \text{OH}^- < \text{CH}_3\text{O}^-$  (b)  $\text{CH}_3\text{COO}^- > \text{OH}^- > \text{CH}_3\text{O}^-$   
 (c)  $\text{CH}_3\text{COO}^- < \text{CH}_3\text{O}^- < \text{OH}^-$  (d)  $\text{CH}_3\text{COO}^- > \text{CH}_3\text{O}^- > \text{OH}^-$
27. Which of the following compounds will have largest  $\lambda_{\text{max}}$ ?



28. The correct order of reactivity towards electrophilic aromatic substitution is  
 (a) Furan > Thiophene > Pyrrole > Benzene (b) Thiophene > Furan > Pyrrole > Benzene  
 (c) Benzene > Thiophene > Furan > Pyrrole (d) Pyrrole > Furan > Thiophene > Benzene

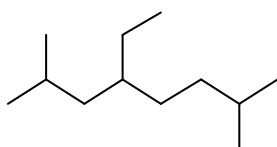
29. Which of the following compound is aromatic?



30. Ethylene molecules may be joined together in large numbers to form polymer which of the following best describes this process?

- (a) Electrophilic addition catalyzed by an acid  
 (b) Nucleophilic addition catalyzed by an acid  
 (c) Addition reaction involves free radicals  
 (d) Substitution reaction catalyzed by oxygen

31. IUPAC name of the following compound is:



- (a) 2-Methyl-5-isobutylheptane  
 (b) 2, 7-Dimethyl-4-ethyloctane  
 (c) 2, 7-Dimethyl-5-ethyloctane  
 (d) 2, 7, 7-trimethyl-4-ethylheptane

32. Amino acids with OH group are:

- (a) Serine and alanine  
 (b) Alanine and valine  
 (c) Serine and threonine  
 (d) Valine and isoleucine

33. In accordance with the sequence rule, correct order of priority of the following group is:

- (a)  $\text{COOH} > \text{CH} = \text{CH}_2 > \text{CH}_2\text{CH} = \text{CH}_2 > \text{CH}_2\text{CH}_2\text{CH}_3$   
 (b)  $\text{COOH} < \text{CH} = \text{CH}_2 < \text{CH}_2\text{CH} = \text{CH}_2 < \text{CH}_2\text{CH}_2\text{CH}_3$   
 (c)  $\text{COOH} > \text{CH}_2\text{CH}_2\text{CH}_3 > \text{CH} = \text{CH}_2 > \text{CH}_2\text{CH} = \text{CH}_2$   
 (d)  $\text{COOH} > \text{CH}_2\text{CH} = \text{CH}_2 > \text{CH} = \text{CH}_2 > \text{CH}_2\text{CH}_2\text{CH}_3$

34. The fingerprint region of an infrared spectrum, which is characteristic for each individual compound, is between:

- (a)  $400 - 1400 \text{ cm}^{-1}$  (b)  $1400 - 900 \text{ cm}^{-1}$  (c)  $900 - 600 \text{ cm}^{-1}$  (d)  $600 - 250 \text{ cm}^{-1}$

35. Which of the following techniques would be most useful to identify and quantify the presence of a known impurity in a drug substance?

- (a) HPLC (b) NMR (c) IR (d) UV

36. Which of the following compounds does not absorb light in the UV / visible spectrum?

- (a) Aspirin (b) Paracetamol (c) Chloral hydrate (d) Phenobarbitone

37. Victor Meyer test is used for the confirmation of

- (a)  $1^\circ, 2^\circ, 3^\circ$  Amines (b)  $1^\circ, 2^\circ, 3^\circ$  Alcohols (d) Carbonyl group (d) Nitro group

38. Correct statement about carbonyl stretching frequency in the IR of cyclopentanone and cyclohexanone is
- (a) Both have same frequency stretching  
(b) Cyclopentanone :  $1745\text{ cm}^{-1}$ ; Cyclohexanone :  $1715\text{ cm}^{-1}$   
(c) Cyclopentanone :  $1715\text{ cm}^{-1}$ ; Cyclohexanone :  $1745\text{ cm}^{-1}$   
(d) Cyclopentanone :  $1690\text{ cm}^{-1}$ ; Cyclohexanone :  $1675\text{ cm}^{-1}$
39. An acid (HA) has  $K_a = 10^{-7}$ , what will be its  $pK_a$ ?
- (a) 7 (b)  $-7$  (c)  $-0.7$  (d)  $1/7$
40. Major product that would be formed when 2-bromo-hexane undergoes E1 elimination reaction:
- (a) Z-2-Hexene (b) 1-Hexene (c) E-2-Hexene (d) Mixture of E/Z-2-hexene
41. Vander Waals' equation for n moles of a gas is
- (a)  $(P + a/V^2)(V - b) = nRT$  (b)  $(P + na/V^2)(V - nb) = nRT$   
(c)  $(P + na/V^2)(V - b) = nRT$  (d)  $(P + n^2a/V^2)(V - nb) = nRT$
42. With increase in temperature, the viscosities of gases and liquids respectively:
- (a) Increase, decrease (b) Decrease, Increase  
(c) Increase, Increase (d) Decrease, Decrease
43. The fraction of molecules of a gas possessing velocities in a given range depends on
- (a) Total number of molecules (b) Temperature  
(c) Volume of the gas (d) Pressure of the gas
44. The triple point of water is  $273.16\text{ K}$ ; what will be the temperature in degree Celsius:
- (a) 0 (b) 0.01 (c)  $-0.01$  (d) 100
45. System A is 1 mole of ice at  $-10^\circ\text{C}$  and system B is 1 mole of super-cooled water at  $-10^\circ\text{C}$ . Choose the correct statement
- (a) A has greater vapour pressure than B (b) A has greater free energy than B  
(c) A has lower free energy than B (d) Both A and B have the same free energy
46. Reverse osmosis is an example of:
- (a) Reversible process (b) Irreversible process  
(c) Equilibrium process (d) Non-spontaneous process
47. A gas (system) at 0.1 atm. pressure is enclosed in a cylinder fitted with a weightless, frictionless piston and the cylinder is placed in the surroundings, where the pressure is 1 atm. In the spontaneous process that occur isothermally:
- (a) entropy of the system increases, that of surrounding decreases  
(b) entropy of the system decreases, that of surrounding increases  
(c) entropy of the system and the surroundings increase  
(d) entropy of the system and the surroundings decrease
48. Mean velocity, most probable velocity and root mean square velocity are approximately in the ratio:
- (a)  $1.13 : 1 : 1.23$  (b)  $1.23 : 1 : 1.13$  (c)  $1.23 : 1.13 : 1$  (d)  $1 : 1.13 : 1.23$

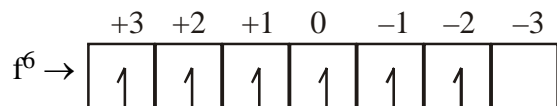
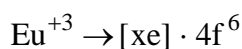
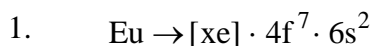
49. Which one of the following is not a perfect differential?  
(a)  $dG$  (b)  $dT$  (c)  $dQ$  (d)  $dH$
50. A condition for equilibrium is  
(a)  $\delta G = 0$  (b)  $\delta G_{T,V} = 0$  (c)  $\delta G_{T,P} = 0$  (d)  $\delta G_{P,V} = 0$
51. The  $E^\circ_{\text{cell}}$  of an Al-air battery is 2.73 V and it involves a 12 electron process. The  $\Delta G^\circ$  in kJ will be  
(a) 3161.340 kJ (b) -32.76 kJ (c) 32.76 kJ (d) -3161.340 kJ
52. For the first order reaction, if the time taken for 50% of the reaction is  $t$  secs; the time required for completion of 99.99% reaction is  
(a)  $5t$  (b)  $10t$  (c)  $2t$  (d)  $100t$
53. If  $e^{\alpha x}$  is an eigen function and  $d^n/dx^n$  is an operator thne the eigen value will be  
(a)  $\alpha^n$  (b)  $a$  (c)  $n$  (d)  $n^\alpha$
54. A projectile of mass 1.0 g is known to be within  $1 \mu\text{m s}^{-1}$ . Calculate the minimum uncertainty in its position.  
(a)  $5 \times 10^{26} \text{ m s}^{-1}$  (b)  $5 \times 10^{26} \text{ m}$  (c)  $5 \times 10^{-26} \text{ m s}^{-1}$  (d)  $5 \times 10^{-26} \text{ m}$
55. In NMR spectroscopy, by what mechanism the saturation effect is removed, to maintain the population difference:  
(a) spin-spin relaxation (b) spin-lattice relaxation  
(c) Magic angle spinning (d) Nuclear Overhauser effect
56. In the hydrogen molecule, when hydrogen is replaced by deuterium. What will happen to the rotational constant  $B$ ?  
(a) Increases (b) Becomes zero (c) Decreases (d) Remains same
57. Choose the correct statement  
(a) For a real gas  $C_p$ , changes with temperature, but does not change with pressure  
(b) For an ideal gas  $C_p$  changes neither with temperature nor with pressure  
(c) For an ideal gas  $C_p$  changes with temperature, but not with pressure  
(d) For an ideal gas  $C_p$  changes with both temperature and pressure
58. Bragg's law can be stated as  
(a)  $n\lambda = 2d\sin\theta$  (b)  $n\lambda = 2a\sin\theta$  (c)  $n\lambda = \sqrt{2}d\sin\theta$  (d)  $d = 2\lambda\sin\theta$
59. To be classified as "nanoscale" an object must have one dimension in the order of:  
(a)  $10^{-10} \text{ m}$  (b)  $10^{-15} \text{ m}$  (c)  $10^{-8} \text{ m}$  (d)  $10^{-9} \text{ m}$
60. How many phases are present in the equilibria,  $\text{CaCO}_3(\text{s}) \leftrightarrow \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$ ?  
(a) 1 (b) 2 (c) 3 (d) 4

## ANSWER KEY

1. a	2. c	3. a	4. b	5. c	6. a	7. c
8. c	9. b	10. a	11. d	12. c	13. d	14. b
15. a	16. c	17. a	18. a	19. c	20. d	21. c
22. d	23. a	24. c	25. c	26. a	27. c	28. d
29. d	30. c	31. b	32. c	33. a	34. b	35. a
36. c	37. b	38. b	39. a	40. c	41. d	42. a
43. b	44. b	45. c	46. d	47. b	48. a	49. c
50. c	51. d	52. b	53. a	54. d	55. b	56. c
57. c	58. a	59. d	60. c			

CHEM ACADEMY

## SOLUTION



$L = +3 + 2 + 1 + 0 - 1 - 2 = 3 \Rightarrow F$

$S = 6 \times \frac{1}{2} = \frac{6}{2} = 3$

$\Rightarrow \text{S.M.} = 2S + 1 = 7$

$J = (L - S) \text{ to } (L + S)$   
 $= (3 + 3) \text{ to } (3 + 3)$   
 $= 0 \text{ to } 6$

G.S. Term symbol  $\Rightarrow 2s + 1 \left| \begin{array}{l} \\ \hline J \end{array} \right.$

Since, subshell is less than half field then J will be '0' (minimum)

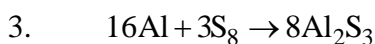
Ans. :  ${}^7F_0$

Correct option is (a)



Number of unpaired electron = 4

Correct option is (c)



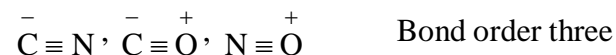
Because Al is most stable in its +3 oxidation state and S is most stable in its -2 oxidation state.

Correct option is (a)

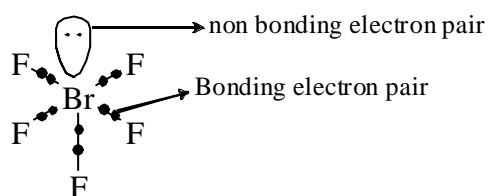
4. Correct option is (b)

5. Correct option is (c)

6.  $\text{CN}^-$ ,  $\text{CO}$ ,  $\text{NO}^+$  Strong Field ligands and Isoelectronic



Correct answer is (a)



$= \frac{1}{2} [7 + 5(1)]$

$= \frac{12}{2} = 6 \rightarrow sp^3d^2$



for central atom (Br) :

Bonding electron pairs = 5

(5 Br – F bond)

Non bonding electron pairs = 1

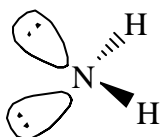
(1 lone pair)

Correct option is (c)

8.  $\text{H}_2\text{N}^- \rightarrow \text{sp}^3 \rightarrow$  tetrahedral geometry

$$= \frac{1}{2}[5 + 2(1) + 1]$$

$$= 4 \rightarrow \text{sp}^3$$



Correct option is (c)

9. Penultimate shell  $\rightarrow n - 1$

Outer most shell  $\rightarrow n$

if a shell has 18 electron then it must have s, p, d

$$\begin{array}{ccc} \downarrow & \downarrow & \downarrow \\ 2 & 6 & 10 \rightarrow 18e^- \end{array}$$

and the lowest shell has all these three sub shell is  $n = 3$

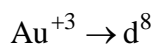
$$\Rightarrow 3s^2 3p^6 3d^{10} \rightarrow 18 e^-$$

When we fill the electrons the remaining three electrons goes to  $4s^2$  (which comes before 3d) and 4p.

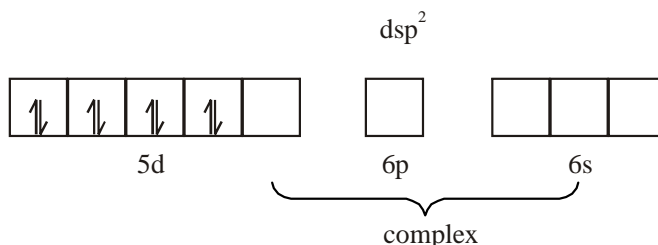
i.e. it will be a p block element

Correct option is (b)

10.  $[\text{AuCl}_4]^-$



↳ [Always make square planer]



4d and 5d metals in +3 state, always show pairing even with weak field ligands.

Correct option is (a)

11.  $[\text{Cr}(\text{en})_2\text{ClBr}]\text{Br}$  and  $[\text{Cr}(\text{en})_2\text{Br}_2]\text{Cl}$   
 coordination sphere      ionisation sphere

Since, atoms are replaced between ionization sphere and coordination sphere,

Hence, It is an example of ionisation isomer

Correct option is (d)

12. Hexa amine chromium (III) nitrate  
 $6 \text{ NH}_3 \quad \text{Cr} \quad +3 \quad \text{NO}_3$

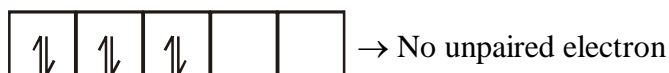


Correct option is (c)

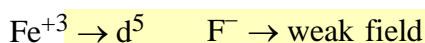
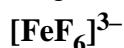
13.  $[\text{Fe}(\text{CN})_6]^{-4}$



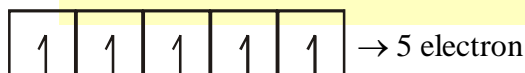
↓  
pairing



Magnetic moment = 0



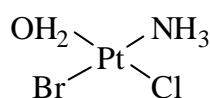
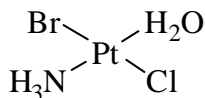
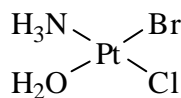
↓  
No pairing



$$\mu_s = \sqrt{5(5+2)} = \sqrt{35} = 5.92 \text{ B.M.}$$

Correct option is (d)

14.  $[\text{Pt}(\text{NH}_3)(\text{OH}_2)\text{BrCl}]$



Correct option is (b)

15. Correct option is (a)

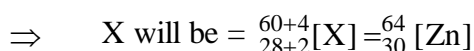
16. Ionisation energy is removal of electron from its gaseous atom.

Correct option is (c)

17. Correct option is (a)

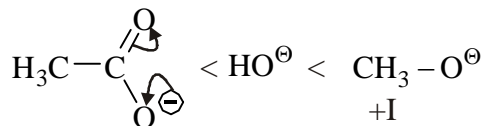
18.  ${}^{60}\text{Ni}_{28} + \alpha \rightarrow X \rightarrow {}^{63}\text{Zn}_{30} + Y$

$$\alpha = {}^4_2[\text{He}]$$






24. Correct option is (c)  
 25. Anhydrous  $\text{ZnCl}_2 / \text{HCl}$   
 Correct option is (c)



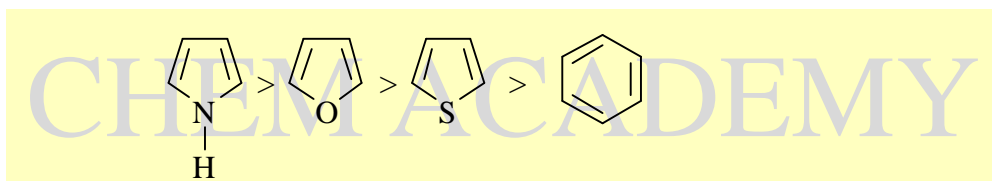
26. Due to resonance negative charge is stabilized hence less basic  
 Correct option is (a)  
 Due to +I effect electron density increases on oxygen

27.  due to conjugation this molecule has least energy hence

$$E = \frac{hc}{\lambda_{\text{max}}} \quad \lambda \text{ is maximum}$$



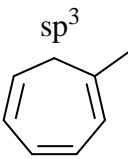
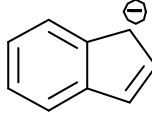
Correct option is (c)

28.



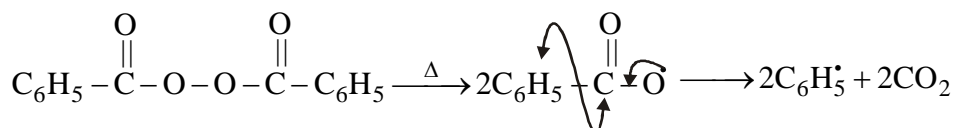
Nitrogen is less electronegative than oxygen hence pyrrole ring is most electron rich hence give fastest electrophilic substitution. | Down the group size increases hence electron density in thiophene is less than furan hence it is less reactive

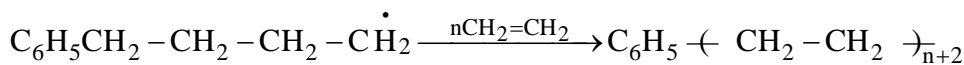
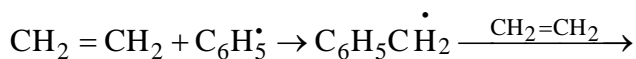
Correct option is (d)

29. (a)   $4\pi$  electron antiaromatic  
 (b)   $4\pi$  electron antiaromatic  
 (c)  nonaromatic  
 (d)  aromatic  $10\pi$  electron

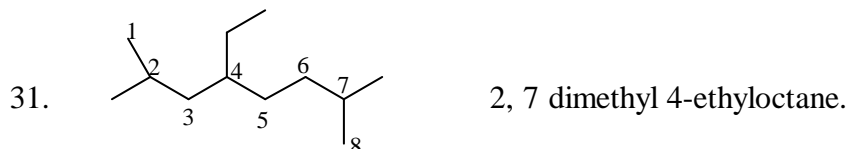
Correct option is (d)

30.  $n\text{CH}_2 = \text{CH}_2 \xrightarrow{\text{Benzoyl peroxide}} -(\text{CH}_2 - \text{CH}_2)_n$

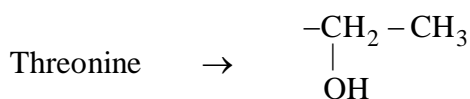




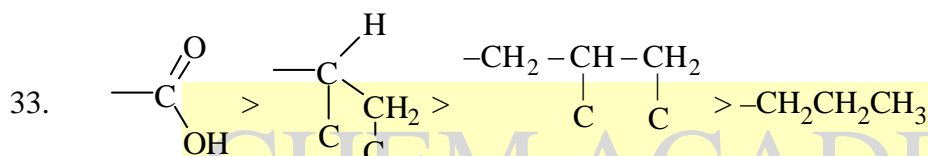
Correct option is (c)



Correct option is (b)



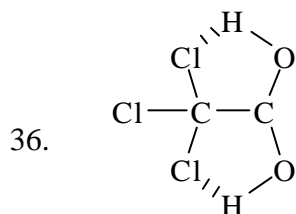
Correct option is (c)



Correct option is (a)

34. Correct option is (b)

35. Correct option is (a)

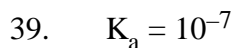


It doesn't contain  $\pi$ -bond hence no UV visible spectrum is observed.

Correct option is (c)

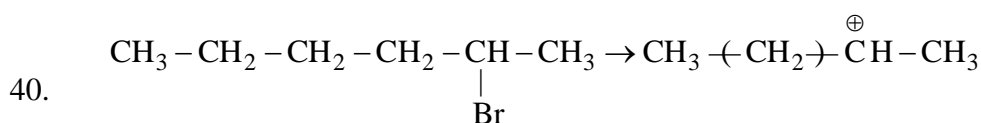
37. Correct option is (b)

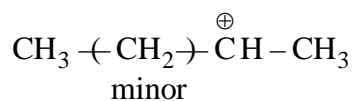
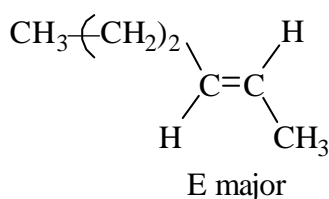
38. Correct option is (b)



$$\text{p}K_a = -\log K_a = -\log 10^{-7} = -(-7) = 7$$

Correct option is (a)





Correct option is (c)

$$41. \left( P + \frac{an^2}{V^2} \right) (V - nb) = nRT$$

Correct option is (d)

42. viscosity means resistance to flow

As temperature increases in gas. Kinetic energy of molecules increases i.e. more collisions hence more resistance so viscosity increases.

In liquids they are intrection present between the molecules of liquid which create a resistance to flow, as temperature increases these interactions decreases hence resistance decreases so viscosity decreases.

Correct option is (a)

$$43. \frac{dN}{N} = 4\pi \left( \frac{M}{2\pi RT} \right)^{3/2} e^{-MU^2/2RT} U^2 dU$$

Correct option is (b)

44.  $0^\circ \text{C} = 273.15 \text{K}$

hence Correct option is (b)

45. because system B is a meta stable state i.e. unstable incomparison to system A

and we know the system which is unstable has more energy and it always try to decrease its energy

Correct option is (c)

46. Correct option is (d)

47. Correct option is (b)

$$48. V_{\text{mean}} = \sqrt{\frac{8RT}{\pi M}}; V_{\text{MP}} = \sqrt{\frac{2RT}{M}}; V_{\text{rms}} = \sqrt{\frac{3RT}{M}}$$

$$1.13 : 1 : 1.23$$

Correct option is (a)

49.  $dQ \rightarrow$  Not a perfect differential because  $dQ \rightarrow$  is not a state function.

Correct option is (c)

50.  $dG = Vdp - SdT$

at constant P & T

$$dG = 0 \quad \text{Equilibrium condition.}$$

Correct option is (c)

51.  $E_{\text{cell}}^{\circ} = 2.73\text{V}$        $n = 12$

$$\Delta G^{\circ} = -nE_{\text{cell}}^{\circ}F$$

$$= -12 \times 2.73 \times 96500$$

$$= -3.16134 \times 10^{-6} \text{ J}$$

$$\Delta G^{\circ} = -3161.34\text{kJ}$$

Correct option is (d)

52.  $t_{50} = t_{\text{sec.}}$

$$\Rightarrow K = \frac{0.693}{t_{50}} \quad \Rightarrow \quad K = \frac{0.693}{t}$$

$$t_{99.99} = \frac{2.303}{K} \log \frac{[A_0]}{[A]} = \frac{2.303}{0.693} \times t \times \log \frac{[100]}{[0.01]}$$

$$= \frac{2.303}{0.693} \times t \times 4 = 13.29t \approx 10t$$

Correct option is (b)

53.  $\frac{d^n e^{ax}}{dx^n} = e^{ax} \cdot a^n$

e.g.  $\frac{d^2 e^{ax}}{dx^2} = \frac{d}{dx} [a \cdot e^{ax}]$

$$= a \cdot a \cdot e^{ax} = a^2 e^{ax}$$

$\Rightarrow$  Eigen value will be:  $a^n$

Correct option is (a)

54.  $\Delta p \cdot \Delta x \geq \frac{h}{4\pi}$

↓  
Uncertainty in position

$$\Delta x \geq \frac{h}{4\pi \times \Delta p}$$

$$\geq \frac{6.62 \times 10^{-34} \text{ Js}}{4 \times 3.14 \times 1 \times 1 \times 10^{-6} \text{ ms}^{-1} \times 10^{-3} \text{ kg}}$$

$$\Delta x \geq 5.27 \times 10^{-26} \text{ m}$$

Correct option is (d)

55. Correct option is (b)

56. We know,

$$B = \frac{\hbar}{2I} \quad I = \mu r^2$$

as  $M_D > M_H$

$\Rightarrow$  I increases, as a result B decreases

Correct option is (c)

57.  $C_p = \left( \frac{dQ}{dT} \right)_p$

i.e.  $C_p$  change with temperature but not with pressure (as p is constant)

Correct option is (c)

58. Correct option is (a)

59. Correct option is (d)

60. Correct option is (c)

CHEM ACADEMY