

(RQ) BLUE CHEMISTRY

1. The correct set of four quantum number for the outermost electron of sodium (Z=11) is

- a) 3,1,0,  $\frac{1}{2}$                       b) 3,1,1,  $\frac{1}{2}$                       c) 3,2,1,  $\frac{1}{2}$                       d) 3,0,0,  $\frac{1}{2}$

2. The pH of the solution obtained by mixing 100ml of a solution of pH =3 with 400 ml of a solution of pH = 4 is,

- a) 3 – log 2.8                      b) 7 – log 2.8                      c) 4 – log 2.8                      d) 5 – log 2.8

3. 20 ml of methane is completely burnt using 50ml of oxygen. The volume of the gas left after cooling to room temperature is,

- a) 80 ml                              b) 40 ml                              c) 60 ml                              d) 30 ml

4. The equilibrium constant of the reaction



$E^{\circ}_{\text{cell}} = 0.0295 \text{ V}$  is

[ $2.303RT / F = 0.059$ ]

- a) 10                                  b)  $2 \times 10^2$                                   c)  $3 \times 10^2$                                   d)  $2 \times 10^5$

5. Intermolecular hydrogen bonding is formed in

- a) H<sub>2</sub>O                                  b) salicylaldehyde                                  c) NH<sub>3</sub>                                  d) benzophenone

6. The rate of reaction increases with rise in temperature because of

- a) increase in number of activated molecules      b) increase in energy of activation  
c) decrease in energy of activation                      d) increase in the number of effective collisions

7. Temperature co-efficient of a reaction is '2' when temperature is increased from 30°C to 90°C , the rate of the reaction increased by

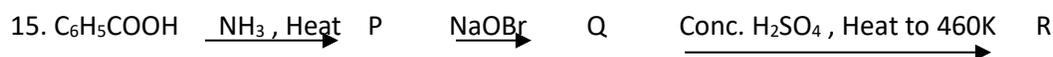
- a) 60 times                                  b) 64 times                                  c) 150 times                                  d) 400 times

8. The emf of a galvanic cell constituted with the electrodes Zn<sup>2+</sup> / Zn (0.76V) and Fe<sup>2+</sup> / Fe (-0.41V) is

- a) -0.35 V                                  b) +1.17 V                                  c) +0.35 V                                  d) -1.17 V

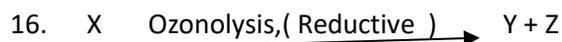
9. A group of atoms can function as a ligand only when



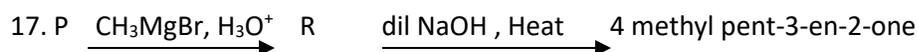
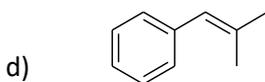
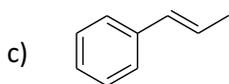
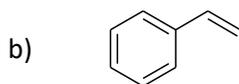
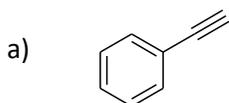


R is,

- a) o-bromosulphanilic acid      b) Sulphanilamide      c) Sulphanilic acid  
d) p-bromosulphanilamide



Y can be obtained by Etard's reaction. Z undergoes disproportionation reaction with concentrated alkali. X could be



P is

- a) Propanone      b) ethanamine      c) ethanenitrile      d) ethanol

18. 0.44 g of a monohydric alcohol when added to methyl magnesium iodide in ether liberates at STP,  $112 \text{ cm}^3$  of methane. With PCC the same alcohol forms a carbonyl compound that answers silver mirror test. The monohydric alcohol is

- a)  $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$       b)  $(\text{CH}_3)_3\text{C}-\text{CH}_2\text{OH}$       c)  $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}_2\text{CH}_3$   
d)  $(\text{CH}_3)_2\text{CHCH}_2\text{OH}$

19. The formation of cyanohydrins from a ketone is an example of

- a) nucleophilic addition      b) electrophilic substitution      c) nucleophilic substitution  
d) electrophilic addition

20. Arrange the following compounds in the increasing order of their acidic strength

- i) *m*-Nitrophenol      ii) *m*-Cresol      iii) Phenol      iv) *m*-Chlorophenol  
a) ii < iv < iii < i      b) ii < iii < i < iv      c) iii < ii < i < iv      d) ii < iii < iv < i

21. Acetic acid is treated with  $\text{Ca}(\text{OH})_2$  and the product so obtained is subjected to dry distillation. The final product is ,

- a) Propanal                      b) ethanol                      c) ethanal                      d) propanone

22. One of the following conversion results in the change of hybridization and geometry

- a)  $\text{NH}_3$  to  $\text{NH}_4^+$                       b)  $\text{H}_2\text{O}$  to  $\text{H}_3\text{O}^+$                       c)  $\text{CH}_4$  to  $\text{C}_2\text{H}_6$                       d)  $\text{BF}_3$  to  $\text{BF}_4^-$

23. Adenosine is an example of

- a) Purine base                      b) nucleoside                      c) nucleotide                      d) pyrimidine base

24. Glycogen is

- a) a structural polysaccharide                      b) structurally similar to amylopectin but extensively branched  
c) a polymer of  $\beta$ -D-glucose units                      d) structurally very much similar to amylopectin

25. Which of the following aqueous solution has the highest freezing point

- a) 0.01M NaCl                      b) 0.01m  $\text{Na}_2\text{SO}_4$                       c) 0.1 M sucrose                      d) 0.1 M NaCl

26. The emf of the three galvanic cells are represented by  $E_1$ ,  $E_2$  and  $E_3$

- I)  $\text{Zn} / \text{Zn}^{2+} (1\text{M}) // \text{Cu}^{2+} (1\text{M}) / \text{Cu}$                       II)  $\text{Zn} / \text{Zn}^{2+} (0.1\text{M}) // \text{Cu}^{2+} (1\text{M}) / \text{Cu}$   
III)  $\text{Zn} / \text{Zn}^{2+} (1\text{M}) // \text{Cu}^{2+} (0.1\text{M}) / \text{Cu}$

Which of the following is true?

- a)  $E_1 > E_2 > E_3$                       b)  $E_3 > E_2 > E_1$                       c)  $E_3 > E_1 > E_2$                       d)  $E_2 > E_1 > E_3$

27. The hybridization of atomic orbitals of the transition metals in the following complexes are respectively

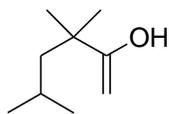
$[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$  ,  $[\text{Co}(\text{NH}_3)_6]^{3+}$  ,  $[\text{Ni}(\text{CN})_4]^{2-}$  ,  $[\text{Ni}(\text{CO})_4]$

- a)  $d^2sp^3$  ,  $sp^3d^2$  ,  $dsp^2$  ,  $sp^3$                       b)  $sp^3d^2$  ,  $d^2sp^3$  ,  $sp^3$  ,  $dsp^2$                       c)  $sp^3d^2$  ,  $d^2sp^3$  ,  $dsp^2$  ,  $sp^3$   
d)  $d^2sp^3$  ,  $sp^3d^2$  ,  $sp^3$  ,  $dsp^2$

28. The increasing order of boiling points of the following compound is,

- I) 1,2-dihydroxybenzene                      II) 1,3-dihydroxybenzene                      III) 1,4-dihydroxybenzene  
a) II < I < III                      b) I < III < II                      c) I < II < III                      d) III < II < I

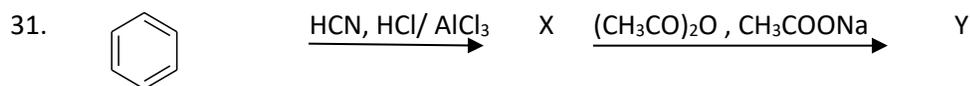
29. The IUPAC name of the given compound is



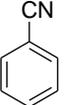
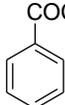
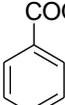
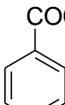
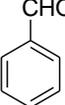
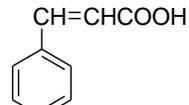
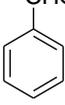
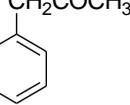
- a) 2,4,4 - trimethyl-hex-5-ene-5-ol      b) 3,3,4,4-tetramethylbut-1-en-2-ol  
 c) 3,3,5-trimethylhex-1-en-2-ol      d) none of the above

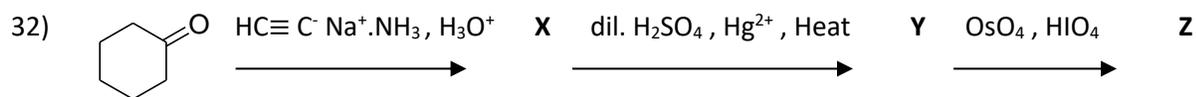
30. Which of the following statement is not true

- a) Ampicillin is a natural antibiotic      b) Aspirin is both analgesic and antipyretic  
 c) Sulphadiazine is a synthetic antibacterial drug      d) Soma disinfectant can be used as antiseptics

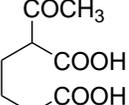
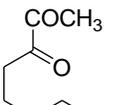
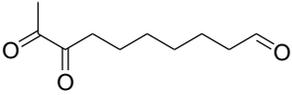
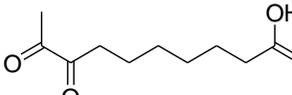


X and Y are respectively

- a)        b)    
 c)        d)  



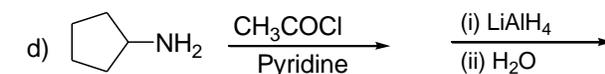
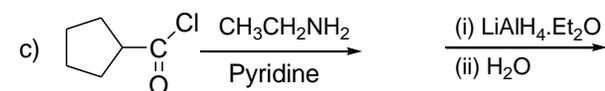
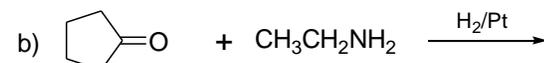
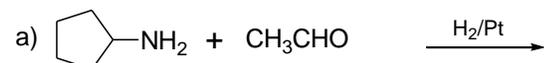
Here, Z is....

- a)       b)   
 c)       d) 

33. Which of the following equation depicts reducing nature of H<sub>2</sub>O



34. Which of the following does not give n-ethyl cyclopentyl amine as major product



35. Which class of drugs is used in sleeping pills

a) Analgesic

b) Tranquilizer

c) Antibiotic

d) antihistamine

36. Which of the following statement is correct when a mixture of NaCl and K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> is gently warmed with conc. H<sub>2</sub>SO<sub>4</sub>

a) A deep red vapour is evolved

b) The vapour when placed into NaOH solution gives a yellow solution of Na<sub>2</sub>CrO<sub>4</sub>

c) Chlorine gas evolved

d) Chromyl chloride is formed

37. Which of the following will undergo aldol condensation:

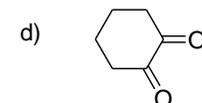
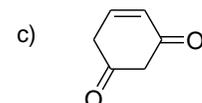
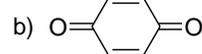
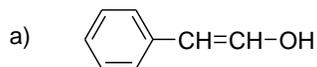
a) Acetaldehyde

b) Propanaldehyde

c) Benzaldehyde

d) Trideuteroacetaldehyde

38. Tautomerism is exhibited by



39. Which of the following statement is correct

- a) The pH is  $1.0 \times 10^{-8}$  M solution of HCl is 8
- b) The conjugate base of  $\text{H}_2\text{PO}_4^-$  is  $\text{HPO}_4^{2-}$
- c) Autoprotolysis constant of water increase with temperature
- d) When a solution of a weak monoprotic acid is titrated against a strong base at half neutralization point,  $\text{pH} = (1/2) \text{pKa}$

40. The correct order of increasing C-O bond length of  $\text{CO}$ ,  $\text{CO}_3^{2-}$  and  $\text{CO}_2$  is

- a)  $\text{CO}_3^{2-} < \text{CO}_2 < \text{CO}$
- b)  $\text{CO}_2 < \text{CO}_3^{2-} < \text{CO}$
- c)  $\text{CO} < \text{CO}_3^{2-} < \text{CO}_2$
- d)  $\text{CO} < \text{CO}_2 < \text{CO}_3^{2-}$

41. The oxidation number of sulphur in  $\text{S}_8$ ,  $\text{S}_2\text{F}_2$ ,  $\text{H}_2\text{S}$  respectively are

- a) 0, +1 and -2
- b) +2, +1 and -2
- c) 0, +1 and +2
- d) -2, +1 and -2

42. The geometry of  $\text{Ni}(\text{CO})_4$  and  $\text{Ni}(\text{PPh}_3)_2\text{Cl}_2$  are

- a) Both square planar
- b) Tetrahedral and square planar respectively
- c) both tetrahedral
- d) square planar and tetrahedral respectively

43. A solution of (+) 2-chloro-2-phenyl ethane in toluene racemises slowly in the presence of small amount of  $\text{SbCl}_5$ , due to the formation of

- a) Carbanion
- b) carbene
- c) free-radical
- d) carbocation

44. The following statement is (are) correct

- a) A plot of  $\log K_p$  v/s  $1/T$  is linear
- b) A plot of  $\log [X]$  v/s time is linear for a first order reaction,  $X \longrightarrow P$
- c) A plot of  $\log P$  v/s  $1/T$  is linear at constant volume
- d) A plot of  $P$  v/s  $1/V$  is linear at constant temperature

45. The correct order of acidic strength is

- a)  $\text{Cl}_2\text{O}_7 > \text{SO}_2 > \text{P}_4\text{O}_{10}$
- b)  $\text{CO}_2 > \text{N}_2\text{O}_5 > \text{SO}_3$
- c)  $\text{Na}_2\text{O} > \text{MgO} > \text{Al}_2\text{O}_3$
- d)  $\text{K}_2\text{O} > \text{CaO} > \text{MgO}$

46. Electrolytic reduction of alumina to aluminium by Hall-Heroult process is carried out

- a) in the presence of NaCl      b) in the presence of fluoride
- c) in the presence of cryolite which forms a melt with lower melting temperature
- d) in the presence of cryolite which forms a melt with higher melting temperature

47. For the reversible reaction  $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$  at  $500^\circ\text{C}$ , the value of  $K_p$  is  $1.44 \times 10^{-5}$  when partial pressure is measured in atmosphere. The corresponding value of  $K_c$  with concentration in  $\text{mol L}^{-1}$  is

- a)  $1.44 \times 10^{-5} / (0.082 \times 500)^{-2}$       b)  $1.44 \times 10^{-5} / (8.314 \times 773)^{-2}$
- c)  $1.44 \times 10^{-5} / (0.082 \times 773)^2$       d)  $1.44 \times 10^{-5} / (0.082 \times 773)^{-2}$

48. Which one of the following statement is false?

- a) Work is a state function
- b) Temperature is a state function
- c) Change in the state is completely defined when the initial and final states are specified
- d) Work appears at the boundary of the system

49. Saturated solution of  $\text{KNO}_3$  is used to make salt-bridge because

- a) Velocity of  $\text{K}^+$  is greater than that of  $\text{NO}_3^-$       b) Velocity of  $\text{NO}_3^-$  is greater than that of  $\text{K}^+$
- c) Velocity of  $\text{K}^+$  and  $\text{NO}_3^-$  are nearly the same      d)  $\text{KNO}_3$  is highly soluble in water

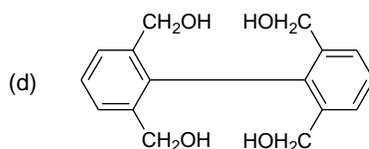
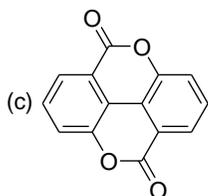
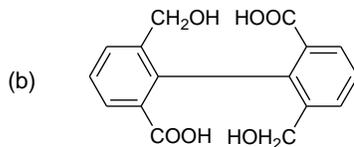
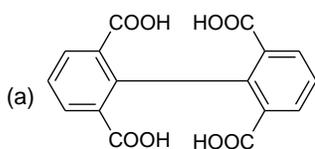
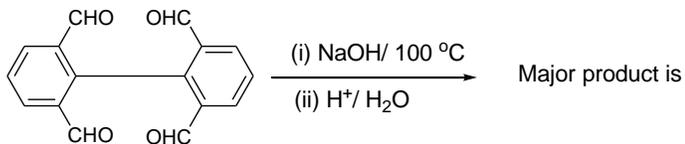
50. The common features among the species  $\text{CN}^-$ ,  $\text{CO}$  and  $\text{NO}^+$  are

- a) bond order three and isoelectric      b) bond order three and weak field ligands
- c) bond order two and  $\pi$  acceptors      d) isoelectric and weak field ligand

51. For  $\text{H}_3\text{PO}_3$  and  $\text{H}_3\text{PO}_4$  the correct choice is

- a)  $\text{H}_3\text{PO}_3$  is dibasic and reducing      b)  $\text{H}_3\text{PO}_3$  is dibasic and non reducing
- c)  $\text{H}_3\text{PO}_4$  is dibasic and reducing      d)  $\text{H}_3\text{PO}_3$  is tribasic and non reducing

52.



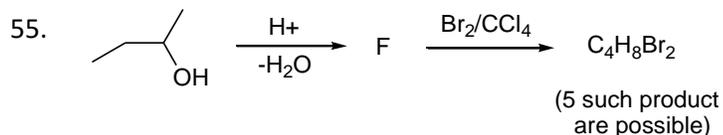
53.  $\text{H}_3\text{BO}_3$  is

a) monobasic and weak lewis acid      b) monobasic and weak Bronsted acid

c) monobasic and strong lewis acid      d) tribasic and weak Bronsted acid

54.  $^{23}\text{Na}$  is the more stable isotope of Na. Find out the process by which  $^{24}\text{Na}_{11}$  can undergo radioactive decay

a)  $\beta^-$  emission      b)  $\alpha$  emission      c)  $\beta^+$  emission      d) k electron capture



How many structures of F is possible?

(a) 2      (b) 5      (c) 6      (d) 3

56. 2-phenyl propene on acidic hydration gives

a) 2-phenyl-2-propanol      b) 2-phenyl-1-propanol

c) 3-phenyl-1-propanol      d) 1-phenyl-2-propanol

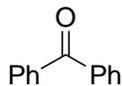
57. The order of reactivity of phenyl magnesium bromide with the following



(i)



(ii)



(iii)

- a)  $II > III > I$       b)  $I > III > I$       c)  $II > I > III$       d) All react with same rate

58. Spontaneous adsorption of a gas on solid surface is an exothermic process because

- a)  $\Delta H$  increases for system      b)  $\Delta S$  increases for gas      c)  $\Delta S$  decreases for gas  
d)  $\Delta G$  increases for gas

59. The compound having tetrahedral geometry is

- a)  $[\text{Ni}(\text{CN})_4]^{2-}$       b)  $[\text{Pd}(\text{CN})_4]^{2-}$       c)  $[\text{Pd}(\text{Cl})_4]^{2-}$       d)  $[\text{Ni}(\text{Cl})_4]^{2-}$

60. 0.004M  $\text{Na}_2\text{SO}_4$  is isotonic with 0.01M glucose. Degree of dissociation of  $\text{Na}_2\text{SO}_4$  is

- a) 75 %      b) 50%      c) 25 %      D) 85 %

Answer Blue

1. d
2. c
3. d
4. a
5. b
6. a and d
7. b
8. c
9. b
10. a
11. a
12. a
13. c
14. d
15. c
16. b
17. c
18. b
19. a
20. d
21. d
22. d
23. b
24. b
25. a
26. d
27. c
28. c
29. c
30. a
31. c
32. c
33. b
34. c
35. b
36. b,c,d
37. a,b,d

- 38. a,c,d
- 39. c
- 40. d
- 41. a
- 42. c
- 43. d
- 44. a,b,d
- 45. a
- 46. c
- 47. d
- 48. a
- 49. c
- 50. a
- 51. a
- 52. c
- 53. a
- 54. a
- 55. d
- 56. a
- 57. c
- 58. c
- 59. d
- 60. a