JKPSC
Asst Prof.

Previous Year Paper
(Clinical Bio-Chemistry)
27 Aug, 2023

1. Gel permeation chromatography separates the components according to their
   A) Colour
   B) Ionic charge
   C) Potential
   D) Physical size

2. Carbonyl stretching frequency is around 1760 cm^{-1} in case of monomeric saturated aliphatic carboxylic acid while it is 1720 cm^{-1} in saturated aliphatic ketones because
   A) Mesomeric effect is dominant in acids as compared to inductive effect
   B) Inductive effect is dominant in acids as compared to mesomeric effect
   C) Mesomeric effect is dominant in ketones as compared to inductive effect
   D) Inductive effect is dominant in ketones as compared to mesomeric effect

3. The pH sensing and its reference electrode must have an iso-potential point at
   A) 0V
   B) 1V
   C) 2V
   D) 3V

4. The absorption of X-rays in a material is governed by
   A) Bragg's law
   B) Beer lambert's law
   C) Stephan's law
   D) Photoelectric effect

5. Which of the statement is true for Photoacoustic spectroscopy
   A) It is a combination of optical methods and acoustical detection
   B) It detects the sound absorbed by the sample
   C) It is the measurement of the change of direction of plane-polarized light
   D) All the statements are correct

6. A Raman line was observed at 4447 A°, using 4358 A° lines of mercury as the source of radiation. The Raman shift is
   A) 410 cm-1
   B) 460 cm-1
   C) 560 cm-1
   D) 500cm-1

7. ESR spectrum of deuterium and hydrogen will have how many peaks of equal intensity
   A) Two and three peaks, respectively
   B) Two and one peaks, respectively
   C) Three and two peaks, respectively
   D) Four and two peaks, respectively

8. Movement of nuclei is negligible during the time taken by an electronic transition. It is called
   A) Born-oppenheimer approximation
   B) Franck-condon principle
   C) Lambert-beer law
   D) Laporte rule

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In a spectrometer operating at 1T, the NMR frequency of F19 is 50.06 MHz. The magnetogyric ratio of F19 is

A) 2.143×10^8 T-1 s-1
B) 1.143×10^8 T-1 s-1
C) 3.143×10^8 T-1 s-1
D) 4.143×10^8 T-1 s-1

10. When catalyst increases the rate of the reaction, the rate constant,

A) Depend on the order of the reaction
B) Increases
C) Decreases
D) Remain constant

11. Calculate the wavelength of a particle having mass 6.6×10^{-27} kg moving with a speed of 10^3 ms^{-1}

A) 1×10^{-10} m
B) 1×10^{-8} m
C) 2×10^{-10} m
D) 2×10^{-8} m

12. In the following question a statement of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct option out of the choices given below each question.

Assertion (A): Cyclobutane is less stable than cyclopentane

Reason (R): The presence of bent bond causes loss of orbital overlap

A) A and R are true and R is the correct explanation of A
B) A and R are true and R is not the correct explanation of A
C) A is true R is false
D) A is false R is true

13. The indicator electrodes used in precipitation, redox and acid-base titrations are

A) Silver electrode, platinum electrode, glass electrode, respectively
B) Platinum electrode, silver electrode, glass electrode, respectively
C) Glass electrode, silver electrode, platinum electrode, respectively
D) Combination electrodes

14. The trans effect gives the relationship between the reaction rate and the nature of the ligand trans to the leaving group. the order of trans -effect ligands:

A) $CN^- > NO_2^- > Cl^- > NH_3$
B) $NO_2^- > CN^- > Cl^- > NH_3$
C) $Cl^- > CN^- > NO_2^- > NH_3$
D) $NH_3 > CN^- > NO_2^- > Cl^-$

15. Organometallic compounds are sources of
A) Free radicals
B) Carbanion
C) Carbocation
D) Electrophiles

16. The following radioisotope is used in cancer therapy
A) C-14
B) Co-60
C) U-235
D) Na-24

17. In the following question a statement of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct option out of the choices given below each question.
Assertion (A): Xenon fluorides can be used as fluorinating agents in organic synthesis.
Reason (R): The by-product of reactions using XeF_2, XeF_4, and XeF_6 is noble gas itself.
A) Both A and R are correct and R is the correct explanation of A.
B) Both A and R are correct but R is not the correct explanation of A.
C) Both A and R are not correct
D) A is not correct but R is correct

18. For a chemical reaction involving reactants A, B and C, the rate of the reaction become double when the concentration of B is doubled. When the concentration of both A and B is doubled, the rate again becomes doubled. However, when the concentration of both B and C is doubled, rate become quadrupled. What is the total order of the reaction?
A) 2
B) 4
C) 6
D) 0

19. Which gas law states that the pressure of a given mass of gas varies directly with the absolute temperature of the gas, when the volume is kept constant.
A) Boyle's law
B) Avogadro's law
C) Gay lussac's law
D) Combined gas law

20. The sample of oxygen is collected by downward displacement of water from an inverted bottle. Water levels inside and outside the bottle were equalized. Barometric pressure was found to be 112367 Pa, and temperature of water is 296 K. Vapour pressure of water is 2700 Pa. What is the partial pressure of oxygen?
A) 115067 Pa
B) 115363 Pa
C) 109963 Pa
D) 109667 Pa

21. $0.0003\ m^3$ of gas A effuses through a pinhole in 140 seconds. The same volume of carbon dioxide under identical conditions effuses in 112 seconds. Calculate the molecular weight of A.
A) 69
B) 72
C) 75
D) 65

22. In the following question a statement of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct option out of the choices given below each question.
Assertion (A): The rate law of a reaction cannot be predicted from its balanced chemical equation, but must be determined experimentally only.
Reason (R): The order of a reaction is always an integer and not in fractions.
A) Both A and R are correct and R is the correct explanation of A.
B) Both A and R are correct but R is not the correct explanation of A.
C) Both A and R are not correct
D) A is correct but R is incorrect

23. The mean free path is directly proportional to the
A) pressure of the gas
B) temperature of the gas
C) absolute temperature of the gas
D) root mean square velocity of the gas

24. In CaF_2 fluorite like structure the coordination number of Ca^{+2} and F^- is
A) 2 and 1, respectively
B) 8 and 4, respectively
C) 1 and 2, respectively
D) 4 and 8, respectively

25. Efficiency of a heat engine is the ratio of
A) Work obtained in a cyclic process to the heat taken from the high temperature reservoir
B) Heat taken from the high temperature reservoir to the work obtained in a cyclic process
C) Work obtained in a cyclic process to the heat taken from the low temperature sink
D) Heat taken from the low temperature sink to the work obtained in a cyclic process

26. Balmer series in the spectrum of hydrogen atom lies in the
A) Visible region
B) IR region
C) UV region
D) All of the above

27. If r is the radius of first orbit, ...
A) n^2r
B) n/r
C) r/n
D) r^n

28. Principle quantum number is related to
A) Shape of the orbital
B) Average size of the orbital
C) Orbital angular momentum
D) Orientation of the orbital

29. After filling the 4p orbitals the electron will enter
A) 5s
B) 4d
C) 4f
D) 5d

30. Demulsification can be achieved by using
A) Centrifugation
B) Heating
C) Electrolytes
D) All of the above

31. Which of the following compound will not undergo Cannizaro reaction
A) Benzaldehyde
B) Formaldehyde
C) Acetaldehyde
D) Trimethylacetaldehyde

32. Which of the following is not permissible arrangement of electron in an atom?
A) n=5, l=3, m=0, s=+1/2
B) n=3, l=2, m=-3, s=-1/2
C) n=3, l=2, m=-2, s=-1/2
D) n=4, l=0, m=0, s=-1/2

33. Sum of first three ionisation energies of aluminium is 56 eV $atom^{-1}$ and sum of first two ionisation energies of sodium is 49 eV $atom^{-1}$. Which of the statement is correct
A) Na(II) is more stable than Al(III)
B) Al(III) is more stable than Na(II)
C) Both are equally stable
D) Both are equally unstable

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(B)

34. The correct order of viscosity between glycerol, ethylene glycol, ethanol and diethyl ether
A) glycerol > ethylene glycol > ethanol > diethyl ether
B) glycerol > diethyl ether > ethanol > ethylene glycol
C) glycerol > ethanol > diethyl ether> ethylene glycol
D) glycerol > ethylene glycol > diethyl ether > ethanol

35. Calculate the work done during the combustion of 0.090 kg of ethane at 300 K (R= 8.314 $JK^{-1}mol^{-1}$, molar mass=30)
A) 18.7 KJ
B) -18.7KJ
C) 6.236 KJ
D) -6.236 KJ

36. Factors governing the formation of ionic bond are
A) low ionization energy of metal and low electron affinity of non-metal
B) high ionization energy of metal and high electron affinity of non-metal
C) high ionization energy of metal and low electron affinity of non-metal
D) low ionization energy of metal and high electron affinity of non-metal

37. Amorphous solids are
A) Supercooled liquids
B) Anisotropic
C) Have long range order
D) Melt sharply

38. Which is an example of sigmatropic rearrangement?
A) Claisen rearrangement
B) Diels-Alder reaction
C) Hofmann bromamide reaction
D) Benzidine rearrangement

39. What is the increasing reactivity of CH_3OH, CH_3CH_2OH, $CH_3CH_2CH_2OH$ and $(CH_3)_2CHOH$ towards sodium metal?
A) $CH_3OH < CH_3CH_2OH < CH_3CH_2CH_2OH < (CH_3)_2CHOH$
B) $(CH_3)_2CHOH < CH_3CH_2OH < CH_3CH_2CH_2OH < CH_3OH$
C) $CH_3CH_2CH_2OH < (CH_3)_2CHOH < CH_3CH_2OH < CH_3OH$
D) $(CH_3)_2CHOH < CH_3CH_2CH_2OH < CH_3CH_2OH < CH_3OH$

40. Lunar caustic is
A) Sodium hydroxide
B) Ammonium acetate
C) Caustic soda
D) Silver nitrate

41. In aqueous medium, _____ is the order of amine strength.
A) $(CH_3)_2NH > CH_3NH_2 > NH_3 > (CH_3)_3N$
B) $NH_3 > CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N$
C) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N > NH_3$
D) $CH_3NH_2 > (CH_3)_2NH > NH_3 > (CH_3)_3N$

42. Silver of a carboxylic upon refluxing with bromine in CCl_4 gives the corresponding alkyl halide. The reaction is known as
A) Wittig reaction
B) Kolbe reaction
C) Hunsdiecker reaction
D) Fittig reaction

43. The reason why phenylamine is a much weaker base than ammonia when each is in aqueous solution is that
A) The benzene ring has a tendency to increase the acidity of its substituent
B) The phenylamine molecule is too large to capture hydrogen ion easily
C) Phenylamine is much less soluble in water than is ammonia
D) The lone pair of electrons on two nitrogen atom of phenylamine is delocalised over the benzene ring

44. The condensation between formaldehyde and acetaldehyde in the presence of conc. NaOH and heat gives
A) Mixture of CH_3CH_2OH and $HCOO^-Na^+$
B) Mixture of CH_3OH and $CH_3COO^-Na^+$
C) Acrolein
D) None of these

45. Which statement is not true with respect to applications of Hammett equations?
A) It develops a quantitative relationship between structure and reactivity
B) This equation can be used to calculate the value of pK
C) This equation does not help to calculate the rate of some reactions
D) This equation has mechanistic implications

46. Mechanism of reaction may be studied with the help of
A) Stereo chemical evidence
B) Isotopic labeling
C) Intermediate trapping
D) All of the above

47. Which statement is true regarding Arrhenius concept?

A) This concept is applicable only for aqueous systems

B) Neutralization takes place in aqueous medium only

C) H ion cannot remain as such in water

D) This concept is applicable for non-aqueous systems only

48. A reaction intermediate having only six electrons in the outer orbit of carbon but charge on it, is called _____.

A) Carbocation

B) Carbene

C) Carbanion

D) Free radical

49. In the thermal conversion of cyclobutene to butadiene, the reaction is symmetry allowed if there is

A) Conrotatory opening of the ring

B) No correlation of symmetry

C) Disrotatory opening of ring

D) Reaction does not occur

50. Glycerol on dehydration produces

A) Acrolein

B) Allyl alcohol

C) CHOH=C=CHOH

D) $CHO\text{-}CHOH\text{-}CH_2OH$

51. Which of the statements are correct are incorrect about the phase diagram of water

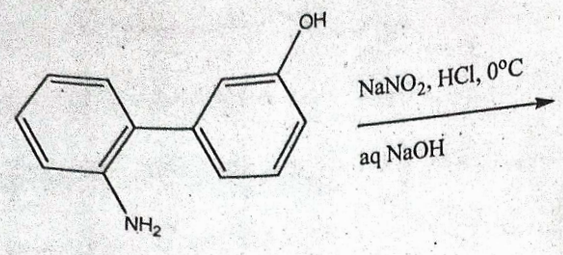
A) The fusion curve of ice has a negative slope

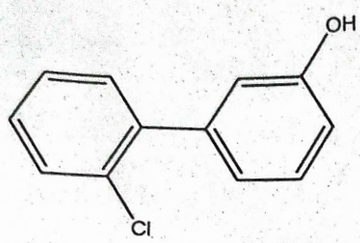
B) The sublimation curve of ice has a negative slope

C) The freezing point of water is depressed by the increase of pressure

D) The vapour pressure of water increases with the rise of temperature

52. The major product of the following reaction is



A)


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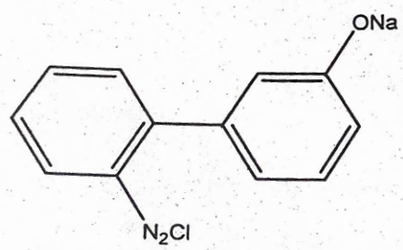

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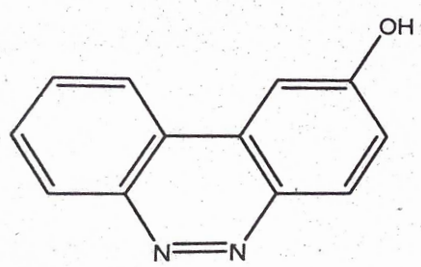

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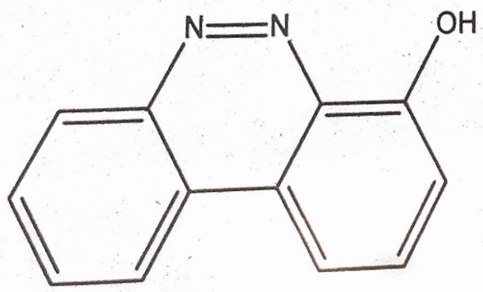

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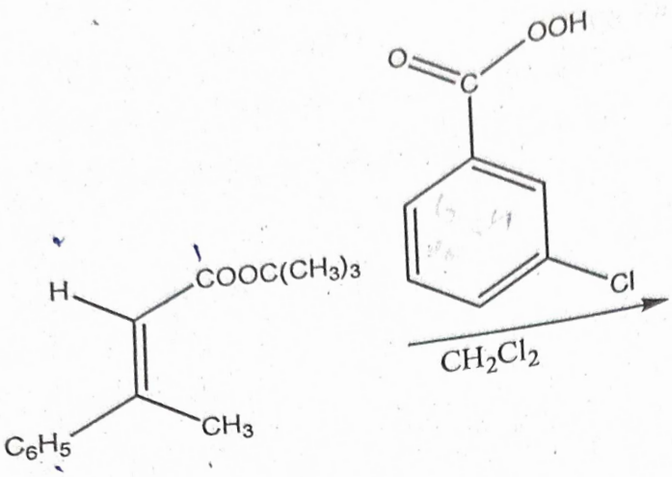
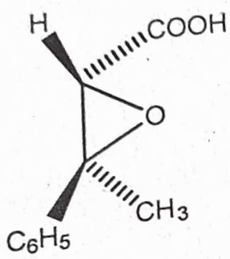
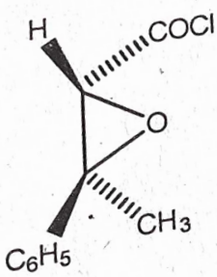
53. The only single product of the following reaction is



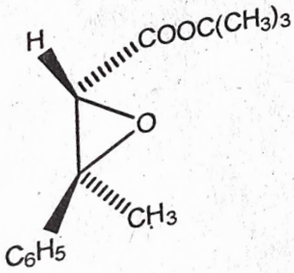
A)



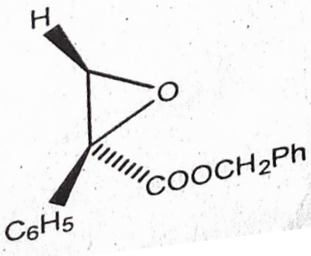
B)



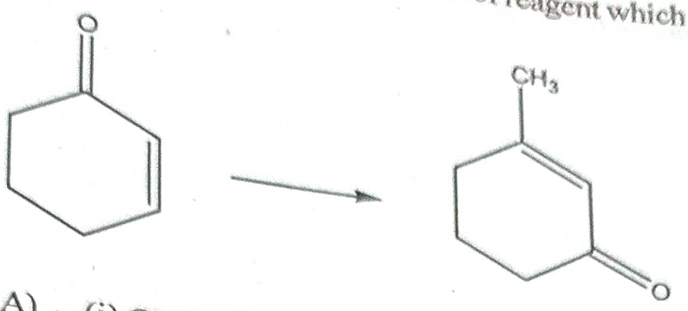
C)



D)



54. Which is the correct combination of reagent which can carry out following conversion?



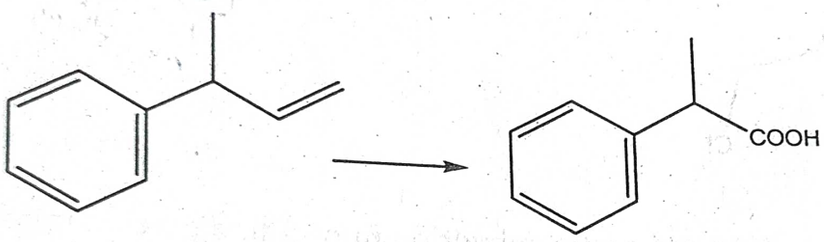
A) (i) CH_3MgBr then H^+ (ii) H_2SO_4 / Δ (iii) NH_2-NH_2 / KOH

B) (i) $(CH_3)_2$ CuLi then H^+ (ii) $NaBH_4$ EtOH (iii) H_2SO_4 / Δ

C) (i) CH_3Li, then H^+ (ii) PCC / Δ

D) (i) $NaBH_4$, $CeCl_3$ then H^+ (ii) MnO_2 (iii) CH_3Li

55. What is used to carry out the following conversion?



A) Hydroboration oxidation followed by Jones oxidation

B) Wacker oxidation followed by haloform reaction

C) Oxymercuration-determination followed by Jones oxidation

D) Ozonolysis followed by haloform reaction

56. Hydrolysis of cyclopropylcarbinyl chloride results in the formation of

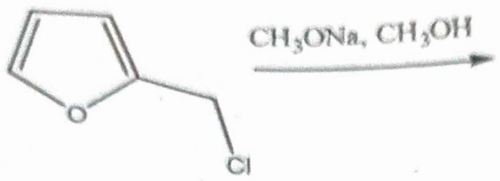
A) Cyclopropylcarbinol

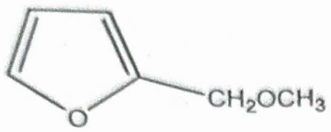
B) Cyclobutyl alcohol

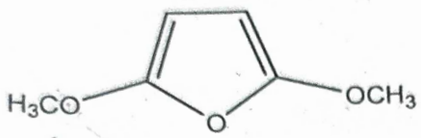
C) Allyl carbinol

D) All of the above

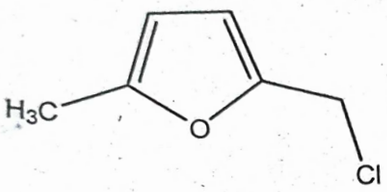
57. The product(s) of the following reaction is/are



A) 

B) 

C) Both A and B

D) 

58. Reaction of para-chloroaniline and acetic anhydride in pyridine gives a mixture of para-chloroacetanilide, contaminated with some unreacted amine.

What is the best method to purify the amide?

A) Wash an ether solution of the crude product with concentrated nitric acid

B) Wash an ether solution of the crude product with concentrated brine (aq. NaCl).

C) Wash an ether solution of the crude product with 5% aqueous sulfuric acid.

D) Wash an ether solution of the crude product with 5% aqueous sodium carbonate.

59. The specific rotation of pure (R)-2-butanol is -13.5°. What % of a mixture of the two enantiomeric forms is (S)-2-butanol if the specific rotation of this mixture is -5.4°

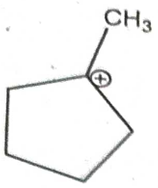
A) 40%

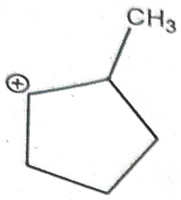
B) 30%

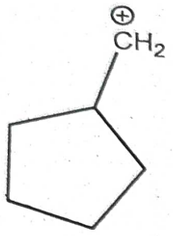
C) 60%

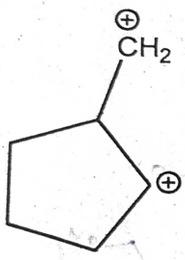
D) 70%

60. Predict which of the following carbocations has the highest energy:

A) 

B) 

C) 

D) 

61. What is the sequence of reagents that will accomplish the synthesis of the following aromatic amine from benzene?

A) $CH_3Cl, AlCl_3; HNO_3, H_2SO_4; H_2$

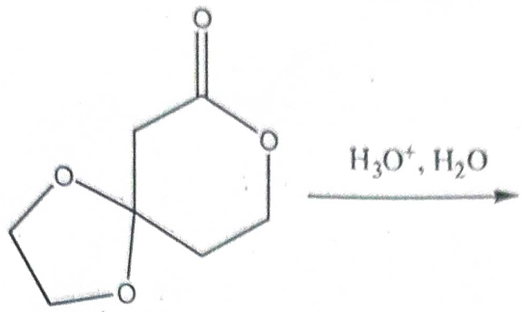
B) $CH_3Cl, AlCl_3; HNO_3, H_2SO_4; Fe, HCl; NaOH$

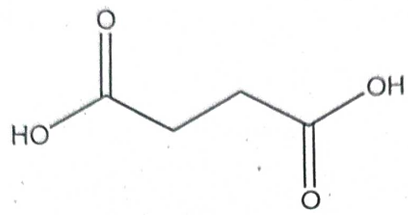
C) $HNO_3, H_2SO_4; Fe, HCl; NaOH; CH_3Cl, AlCl_3$

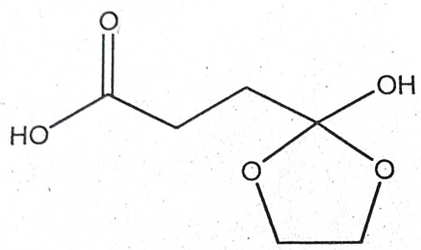
D) $HNO_3, H_2SO_4; CH_3Cl, AlCl_3; Fe, HCl; NaOH$

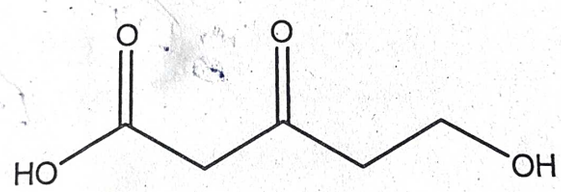
06) (B)

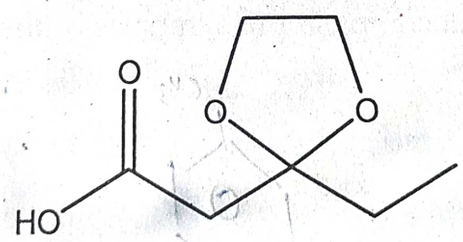
62. What is the product of the following reaction?



A) 

B) 

C) 

D) 

63. Predict the product of the following reaction.

$PhCH_2OH$ + PCC (pyridiniumchlorochromate) in methylene chloride $\rightarrow$

A) Benzophenone

B) Benzoic acid

C) Benzaldehyde

D) Benzyl chloride

64. Base induced condensation of an aldehyde or ketone with an α-halo ester in the presence of a base to form an α,β-epoxy ester is known as

A) Finkelstein Reaction
B) Adkins–Peterson reaction
C) Dieckmann condensation
D) Darzen condensation

65. Sodium azide is an important compound found in car airbags. One method of producing it is

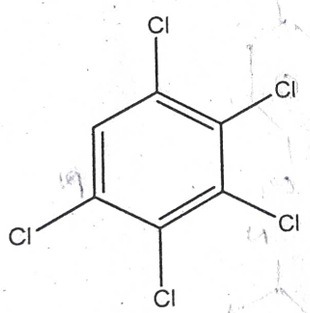
$$2NaNH_2 + N_2O \longrightarrow NaN_3 + NaOH + NH_3$$

By calculating atom economy, determine the percentage of wasted starting material.

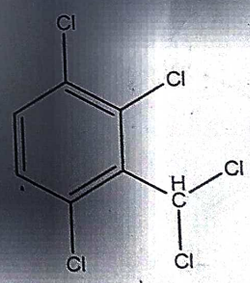
A) 53.3%
B) 46.7 %
C) 43.1%
D) 57.6%

66. Hydrolysis of a compound $C_7H_3Cl_5$ gives an acid of the formula $C_7H_4Cl_2O_2$. Decarboxylation of the acid gives a neutral substance, the nitration of which gives only one mono nitro derivative. What is the structure of the original compound

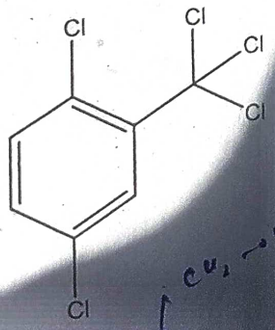
A)



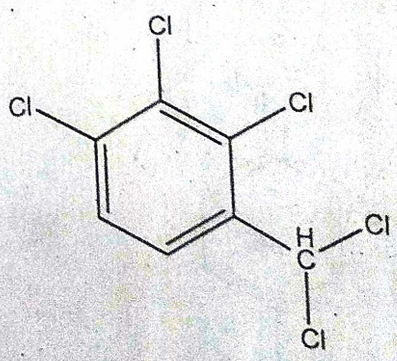
B)



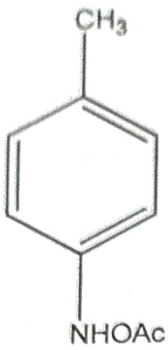
C)

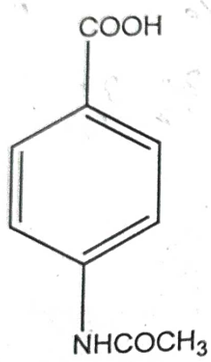


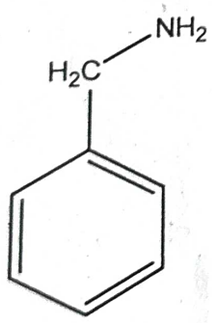
D)

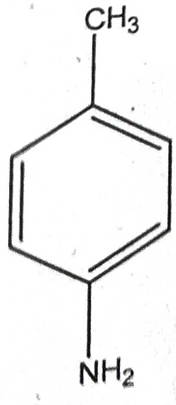


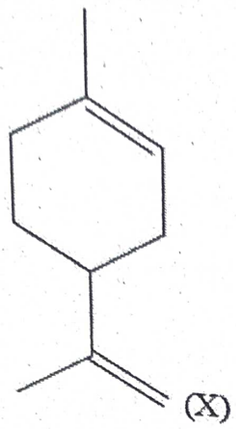
67. An organic compound C_7H_9N (A) dissolves in dilute HCl and reacts with acetic anhydride giving $C_2H_{11}NO$ (B). A solid $C_9H_9O_3N$ (C) precipitates when B is heated with neutral aqueous $KMnO_4$ and subsequently acidified with HCl. C gives only one mononitro derivative on nitration. What is A

A) 

B) 

C) 

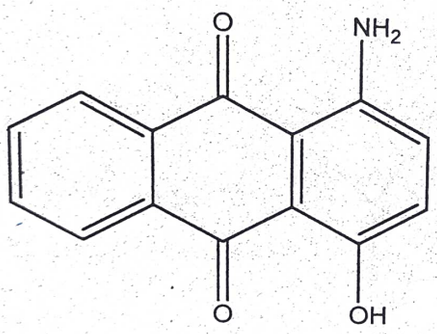
D) 

68. 

(X)

Dehydration of Y with potassium hydrogen sulphate gives X. What is Y

A) Terpineol
B) Limonene
C) Dipentene
D) Cymene

69. 

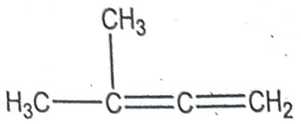
is a anthraquinone dye with a name

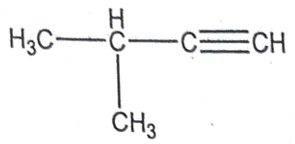
A) Disperse Red 15
B) Indanthrene Blue R
C) Tyrian Purple
D) Indigo

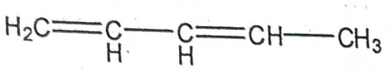
70. Which of the following is yielded when Ethylene glycol is treated with phosphorus tri-iodide?

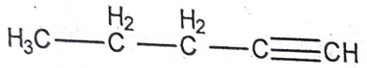
A) Ethylene di-iodide
B) Ethylene
C) Ethane
D) Ethyl iodide

71. A compound A (C_5H_8) reacts with ammonical $AgNO_3$ to give a white precipitate and on oxidation with hot alkaline $KMnO_4$ give the acid $(CH_3)_2CHCOOH$. Here A is

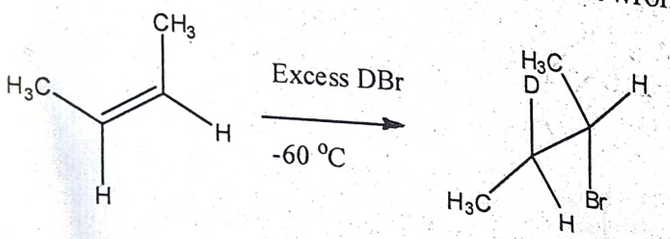
A) 

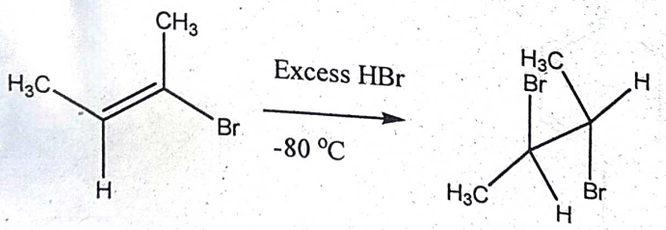
B) 

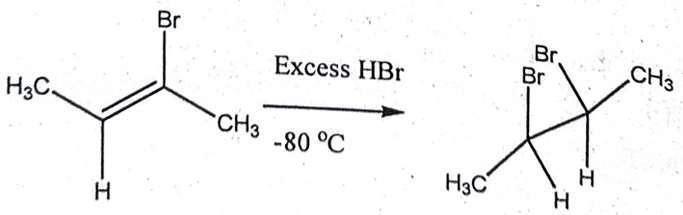
C) 

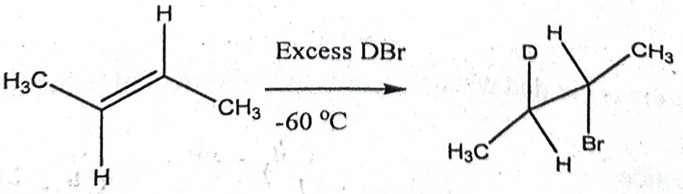
D) 

72. In which of the following equations is the main product wrong?

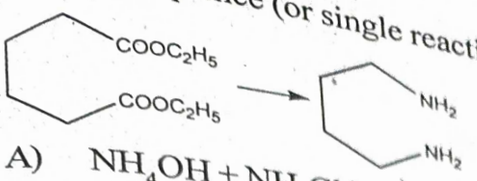
A) 

B) 

C) 

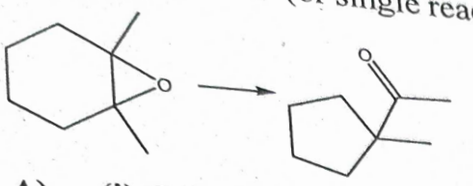
D) 

73. Pick the sequence (or single reaction) that best achieves the selected synthesis.



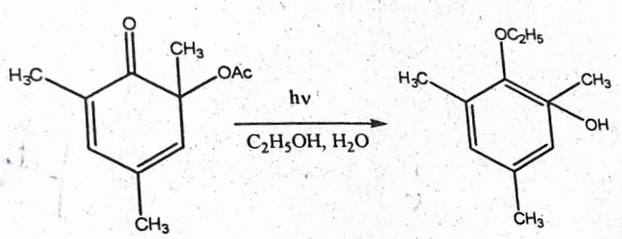
A) $NH_4OH + NH_4Cl$ in water; heat to reflux
B) (i) N_2H_4 (excess) (ii) HNO_2; $H_3O^{(+)}$; 5° C
C) (i) NH_2OH (oxime formation) (ii) strong acid or PCl_5
D) None of the above

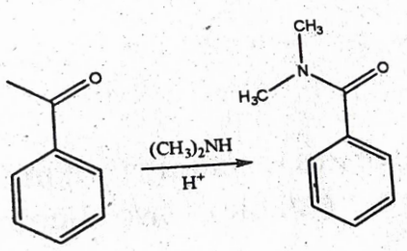
74. Pick the sequence (or single reaction) that best achieves the selected synthesis

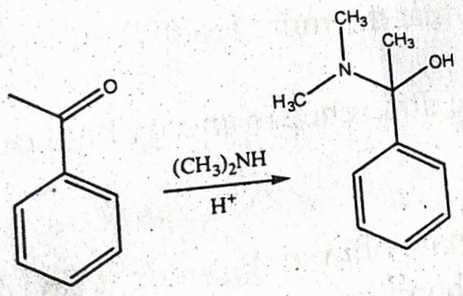


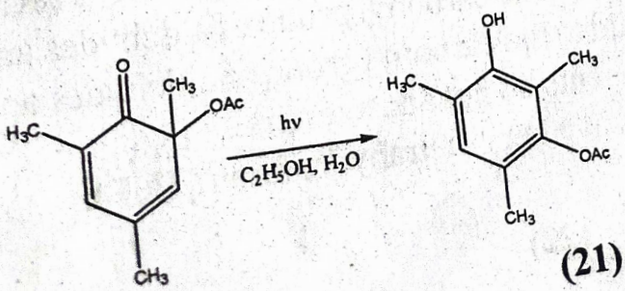
A) (i) $C_7H_7SO_2Cl$ in pyridine (ii) Acetone + H_2O, 50° C
B) (i) $C_6H_5CO_3H$ in CH_2Cl_2; (ii) $LiAlH_4$ in ether; (iii) H_2O
C) H_2SO_4 (catalyst) in CH_3CN
D) (i) $LiAlH_4$ in ether; (ii) H_2O; (iii) $C_6H_5CO_3H$ in CH_2Cl_2

75. Which of the following reactions show a correct main product?

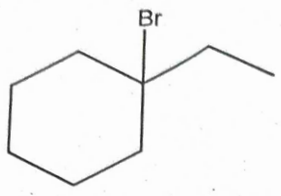
A)


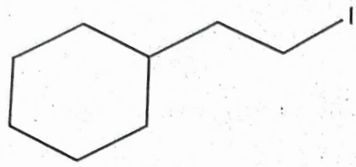
B)


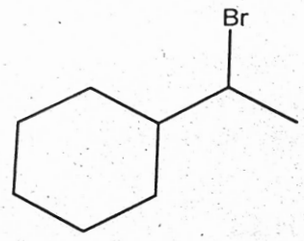
C)


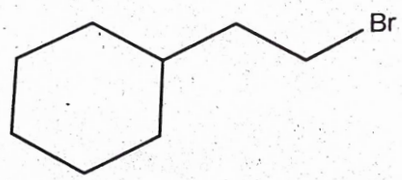
D)


76. Rank the reactivity of the following molecules toward $NaOCH_3$ in decreasing order

I 

II 

III 

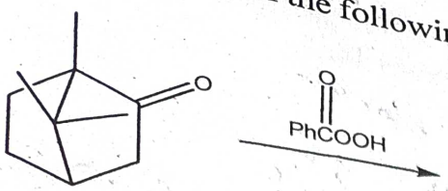
IV 

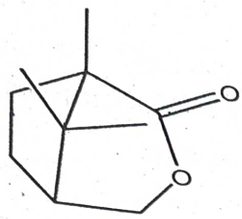
A) II, IV, III, I
B) IV, II, III, I
C) II, III, IV, I
D) I, IV, III, II

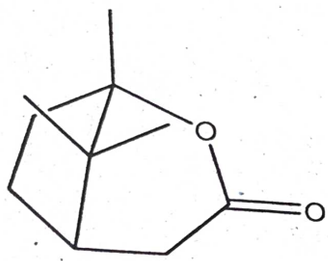
77. Which of the following statements is true?
A) The rate determining step is always the last step in a reaction mechanism.
B) The stability/reactivity principle says that the more stable of two chemicals will b more reactive
C) The reactivity/selectivity principle says that the more reactive of two chemical will be less selective.
D) The activation barrier for a reaction is the difference in energy between reactan and final products.

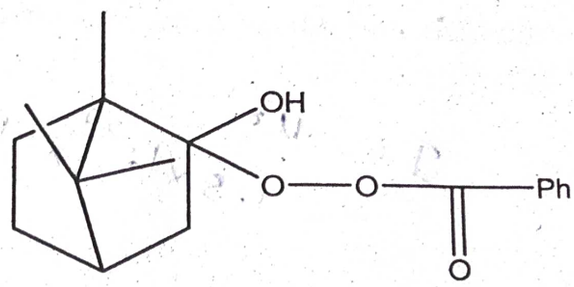
78. Which of the following statements about organometallic compounds is FALSE?
A) Alkyllithium reagents (RLi) add to the carbonyl group of aldehydes and ketones
B) Grignard reagents (RMgBr) add to the carbonyl group of aldehydes and ketones
C) Alkyllithium and Grignard reagents do not add to esters.
D) Grignard reagents are prepared in ether or tetrahydrofuran (THF).

79. The product(s) of the following reaction is/are



A) 

B) 

C) 

D) All the above

80. In the following question a statement of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct option out of the choices given below each question.

Assertion (A): Addition of bromine to butene gives two optical isomers

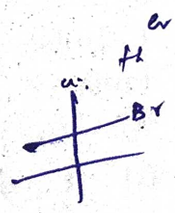
Reason (R): The product of bromine to butene contains one asymmetrical carbon atom

A) A and R are true and R is the correct explanation of A

B) A and R are true and R is not the correct explanation of A

C) A is true R is false

D) A is false R is true



[P.T.O.

81. The speed ratio of silver and nitrate ions in a solution of silver nitrate electrolyzed between silver electrodes is 0.916. The transport number of silver ion is
A) 0.521
B) 0.479
C) 0.321
D) 0.621

82. The main difference between electrochemical and electrolytic cell is that
A) Electrochemical cell is based upon redox reaction which is spontaneous
B) Electrolytic cell is based upon redox reaction which is spontaneous
C) Salt bridge is not used in electrochemical cell
D) Salt bridge is used in Electrolytic cell

83. Which of the following is not a limitation of distribution law
A) The temperature must remain constant throughout the experiment
B) The liquids should be mutually immiscible
C) The solution should be dilute
D) The solute should not have same molecular state in both solvents

84. What is the moment of inertia of a diatomic molecule whose internuclear distance is 150 pm and the reduced mass is 1.5×10^{-27} kg.
A) 3.575×10^{-47} kg m^2
B) 3.475×10^{-47} kg m^2
C) 3.375×10^{-47} kg m^2
D) 3.675×10^{-47} kg m^2

85. Which of the statement(s)is/are correct about free energy
A) If ΔG is negative, the process is non-spontaneous
B) If ΔG is positive, the process does not occur in the forward direction
C) If ΔG is zero, the system is not in equilibrium
D) All above statements are correct

86. Calculate the entropy change when two moles of an ideal gas expand reversibly from a initial volume of 4 dm^3 to a total volume of 40 dm^3 at a constant temperature of 298K
A) 40.01 J K^{-1} mol^{-1}
B) 36.29 J K^{-1} mol^{-1}
C) 34.19 J K^{-1} mol^{-1}
D) 38.29 J K^{-1} mol^{-1}

87. Calculate the certainty in position of an electron if uncertainty in velocity is 5.7×10^{5} ms^{-1} ($h=6.6 \times 10^{-34}$ kg m^2 s^{-1}; mass of electron$=9.1 \times 10^{-31}$ kg)

A) 1.03×10^{-10} m

B) 2.03×10^{-10} m

C) 1.03×10^{-8} m

D) 2.03×10^{-8} m

88. The ionic strengths of solutions that contain 0.3M $CaCl_2$, 0.3M Na_3PO_4 is

A) 0.9 and 1.0, respectively

B) 1.8 and 0.9, respectively

C) 0.9 and 1.8, respectively

D) 1.8 and 2.1, respectively

89. A suspension of 1g of haemoglobin in 1 litre of water has an osmatic pressure of 3.6×10^{-4} atm at 25 °C. Estimate the particle weight of the haemoglobin.

A) 6.8×10^{4} g/mole

B) 6.3×10^{4} g/mole

C) 6.1×10^{4} g/mole

D) 6.5×10^{4} g/mole

90. A compound AB having partly ionic and partly covalent character has the dipole moment 1.03 debye. The percent ionic character on the basis of charge (4.8×10^{-10} esu) separated by equilibrium bond length 1.3 A° is

A) 13.50 %

B) 19.50 %

C) 16.50 %

D) 26.50 %

[P.T.O.

91. Use the following data to calculate the lattice energy of calcium oxide.
The enthalpy of formation of calcium oxide (solid) = -630 KJ/mole
The enthalpy of sublimation of calcium = +190 KJ/mole
First ionization energy of Ca = +590 KJ/mole
Second ionization energy of Ca= +1140 KJ/mole
The enthalpy of dissociation of O_2 (g) = +490 KJ/mole
First electron affinity of O (g) = -140 KJ/mole
Second electron affinity of O (g) = +840 KJ/mole
A) -3495 KJ/mole
B) 3495 KJ/mole
C) -3710 KJ/mole
D) 3710 KJ/mole

92. Which one of the following minerals does not contain silica tetrahedrons?
A) Quartz
B) Halite
C) Muscovite
D) Feldspar

93. According to VSEPR, the geometries of PCl_5 and SF_6 are
A) Pyramidal and Octahedral, respectively
B) Trigonal bipyramidal and Octahedral, respectively
C) Pyramidal and cubic, respectively
D) Cubic and Octahedral, respectively

94. _____ is used in Rast method, used for the determination of the molar mass non-volatile solute
A) Camphor
B) Sodium chloride
C) Quartz
D) Naphthene

95. VSEPR theory is used to predict the molecular shape. This theory does not take this i account.
A) Isoelectronic species
B) Transition metal compounds
C) Ionic compounds
D) All of the above

96. Which of the following statements is incorrect about the coordination compounds
A) Cyanocobalamin contains cobalt.
B) Haemoglobin contains iron
C) Chlorophyll contains manganese.
D) Carboxypeptidase-A contains zinc

97. Which of the following oxide are intermediate in the synthesis of nitric acid using Ostwald's process?
A) NO
B) N_2O_3
C) N_2O
D) None of the above

98. Paramagnetic nature of oxygen is explained by
A) Valence bond theory
B) Heitler-London theory
C) Hund Mulliken theory
D) None of the above

99. The element which exists in a liquid state for a wide range of temperatures and can be used for measuring high temperatures is
A) B
B) In
C) Ga
D) Al

100. Which of the following polymer is a condensation and cross-linked polymer
A) Bakelite
B) Nylon-2 and Nylon-6
C) Dacron
D) Nylon 6,6

101. The temperature at which the conductivity of a material becomes infinite is called
A) Critical temperature
B) Absolute temperature
C) Mean temperature
D) Crystallization temperature

102. After 24 hrs, out of the 1gm radioactive isotope, only 0.100 gm remains behind. What is its half-life period?
A) 10 h
B) 20 h
C) 7 h
D) 14 h

103. Which of the following statements is incorrect about molecularity of a reaction
A) It is the number of reacting species that must collide in order to bring a chemical change.
B) It can be zero, negative integer and fractional.
C) It is equal to the sum of the stoichiometric coefficient of the reaction.
D) All the statements are incorrect

104. In the following question a statement of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct option out of the choices given below each question.
Assertion (A): If aluminium atoms replace a few silicon atoms in a three-dimensional network of silicon dioxide, the overall structure acquires a negative charge.
Reason (R): Aluminosilicates contain potassium, sodium, and calcium cations surrounded by a negatively charged network.
A) Both A and R are correct and R is the correct explanation of A.
B) Both A and R are correct but R is not the correct explanation of A.
C) Both A and R are not correct
D) A is not correct but R is correct

105. Two elements that are used to absorb neutrons to control chain reactions during nuclear fission are
A) Boron and Plutonium
B) Boron and cadmium
C) Cadmium and uranium
D) Boron and uranium

106. On treatment with NaOH, the metal 'M' forms a white gelatinous precipitate 'X'. The precipitate was found to be soluble in excess NaOH. When compound 'X' was heated strongly, it gave an oxide which was used in chromatography as an adsorbent. The metal 'M' is:
A) Zn
B) Ca
C) Al
D) Fe

107. Which of the following is considered as a metalloid?
A) Sc
B) Bi
C) Pb
D) Te

108. Which of the following statement is not correct about Helium
A) Helium is fairly rare on Earth
B) Helium is the third most abundant element in the universe.
C) Helium is a major component of stars
D) Crude natural gas often contains helium.

109. Formal Oxidation State of Noble Gas and Number of Lone Pairs on Central Atom in case of $XeOF_4$ is
A) +8 and 1, respectively
B) +6 and 0, respectively
C) +8 and 0, respectively
D) +6 and 1, respectively

110. Which of the following statements is incorrect
A) Bond angle in $N(CF_3)_3$ is larger than in $N(CH_3)_3$
B) Bond angle in NCl_3 is less than in NF_3
C) The O-S-O bond angle in $FSO_2(OCH_3)$ is larger than in $FSO_2(CH_3)$
D) The X-S-X bond angle in OSF_2 is less than $OSCl_2$

111. According to the concept of hard and soft acids and bases (HSABs)
A) Polarizable acids and bases are soft and nonpolarizable acids and bases are hard
B) Hard acids bind to hard bases and soft acids bind to soft bases
C) Both statements are correct
D) None of the statements are correct

112. Octahedral complexes of copper (II) undergo Jahn Teller distortion and maximum distortion is observed in
A) $[Cu(H_2O)_6]SO_4$
B) $[Cu(en)(H_2O)_4]SO_4$
C) Cis-$[Cu(en)_2Cl_2]$
D) Trans-$[Cu(en)_2Cl_2]$

113. The relative intensities of absorption bands are governed by a series of selection rules. Which of the following statement is correct?
A) Transitions between states of the same symmetry with respect to inversion are forbidden.
B) Transitions between states of different spin multiplicities are allowed.
C) Both the statements are correct
D) None of the above statements are correct

114. The purple colour of $KMnO_4$ is due to
A) Intersystem crossing
B) Metal to ligand charge transfer
C) d-d transition
D) Ligand to metal charge transfer

115. In the following question a statement of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct option out of the choices given below each question.
Assertion (A): Melting points of alkali metals decrease with an increasing atomic number
Reason (R): Metallic bonding between the atoms becomes weaker with increasing atomic size.
A) Both A and R are correct and R is the correct explanation of A.
B) Both A and R are correct but R is not the correct explanation of A.
C) Both A and R are not correct
D) A is not correct but R is correct

[P.T.O.

116. Match the flame colours in Bunsen burner with the metal salts

a.	Lithium	p.	Crimson-red
b.	Sodium	q.	Yellow
c.	Copper	r.	Blue-green

A) a-q, b-p, c-r
B) a-p, b-q, c-r
C) a-p, b-r, c-q
D) a-r, b-q, c-p

117. The rate constant for first order reaction is 60/s. How much time will it take to reduce the concentration of the reaction to 1/10 of its initial value?

A) $3.68 \times 10^{-4}\ s^{-1}$
B) $3.68 \times 10^{-2}\ s^{-1}$
C) $3.83 \times 10^{-2}\ s^{-1}$
D) $4.08 \times 10^{-2}\ s^{-1}$

118. The rate constant of a reaction becomes equal to the pre-exponential factor when:

A) The absolute temperature is zero
B) The activation energy is infinity
C) The absolute temperature is infinity
D) The activation energy is zero

119. For CO_2 molecule, bending mode of vibration will be

A) Raman active and IR active
B) Raman inactive and IR inactive
C) Raman active and IR inactive
D) Raman inactive and IR active

120. Among HCl, NO, CO, Cl_2, C_2H_4, N_2 the microwave active species are

A) CO, Cl_2, C_2H_4
B) HCl, NO, CO
C) Cl_2, C_2H_4, NO
D) HCl, Cl_2, N_2