

DEPARTMENT OF CHEMISTRY
NAMBOL L. SANOI COLLEGE, NAMBOL

QUESTION BANK FOR CHEMISTRY (ELECTIVE)
PREVIOUS 3 YEARS (2016-2018)

SEMESTER - VI
PAPER- IX / CH- 609 :

ORGANIC CHEMISTRY

UNIT-1: Organo sulphur compounds

Very Short Answer Type Carrying 1 mark
(1 MARK QUESTIONS)

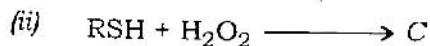
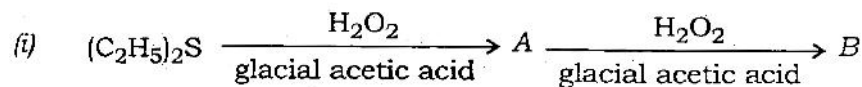
- (a) What happens when thiols are oxidised with nitric acid? (2017)
 (b) Give the products formed when thiols undergo desulphurisation with Raney nickel. (2017)
 (c) Write the structure of methanethiol. (2018)
 (d) Give an example of sulphur ylid. (2018)

SHORT ANSWER TYPE
(2 MARKS QUESTIONS)

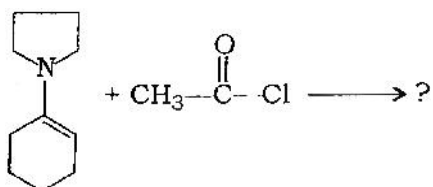
- (a) Identify the products A and B formed in the following reaction : (2016)
 $(\text{CH}_3)_2\text{S} \xrightarrow{\text{Br}_2} \text{A} \xrightarrow{\text{H}_2\text{O}} \text{B}$

SHORT ANSWER TYPE
(3 MARKS QUESTIONS)

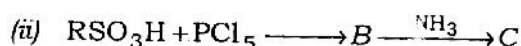
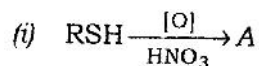
- (a) Describe one method each of the formation of (i) thiol, (ii) thioether and (iii) sulphonic acid from alkyl halides. (2016)
 (b) Identify the products A, B and C formed in the following reactions : (2017)



- (c) Give the product and mechanism of the following reaction :



- (d) Write the products A, B and C in the following reactions :

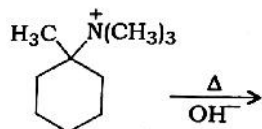


(2018)

UNIT-2: Elimination reactions**Very Short Answer Type Carrying 1 mark**

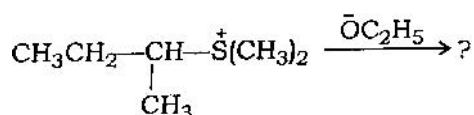
(1 MARK QUESTIONS)

- (a) Draw the energy profile diagram for the E1cB reaction. (2016)
- (b) Write the major product of the following reaction : (2016)

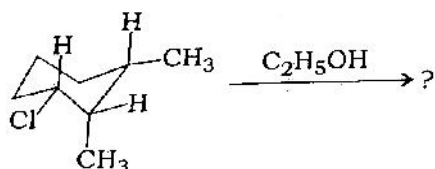
**SHORT ANSWER TYPE**

(2 MARKS QUESTIONS)

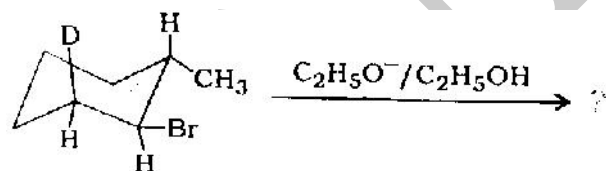
- (a) Distinguish between the Hofmann's rule and the Saytzeff's rule. (2016)
- (b) What products are expected on E2 elimination of the following substrate? Give reason. (2017)



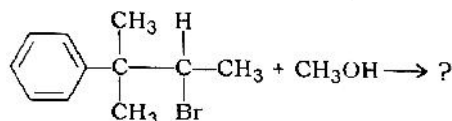
- (c) Predict the major product from the E1 elimination of the following compound and explain it. (2017)



- (d) Write the most stable product of the following reaction giving explanation : (2018)



- (e) Predict the major product of the reaction with mechanism : (2018)

**SHORT ANSWER TYPE**

(3 MARKS QUESTIONS)

- (a) Discuss the role of the substrate structure on the reactivity of E2/S_N2 product ratio. (2017)
- (b) When 3,3-dimethyl-2-butanol is dehydrated, it gives a mixture of alkenes. Explain the reactions. (2018)

UNIT-3: Organic synthesis via enolates**Very Short Answer Type Carrying 1 mark**

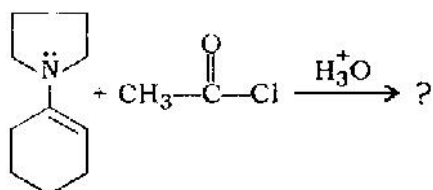
(1 MARK QUESTIONS)

- (a) Write one synthetic application of ethyl acetoacetate. (2016)

SHORT ANSWER TYPE

(2 MARKS QUESTIONS)

- (a) Give the structure of keto-enol tautomerism of acetoacetic ester. How is tautomer different from resonance? (2017)
- (b) Write the reaction steps for the conversion of diethyl malonate into dimethyl diethyl malonate. (2017)
- (c) Describe the base-catalyzed conversion of a keto-form to the enol-form of ethyl acetoacetate. (2018)
- (d) Give the product and mechanism of the following reaction :

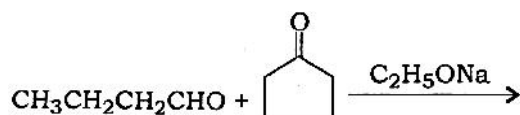


(2018)

SHORT ANSWER TYPE

(3 MARKS QUESTIONS)

- (a) Write the intramolecular condensation product of diethyl adipate with sodium ethoxide. What is the name of the reaction? (2016)
- (b) Give the product and relevant mechanism of the following reaction :



(2016)

- (c) Write the reaction sequence for the conversion of diethyl malonate into mono- and di-substituted acetic acids. (2018)

UNIT-4: Heterocyclic compounds**Very Short Answer Type Carrying 1 mark**

(1 MARK QUESTIONS)

- (a) How can furan be converted into furoic acid? (2017)
- (b) What happens when a mixture of acetylene and hydrogen cyanide is passed through a red hot tube? (2018)

SHORT ANSWER TYPE

(2 MARKS QUESTIONS)

- (a) Explain the aromatic character of pyrrole, furan and thiophene. (2016)
- (b) Write the synthesis of pyridine starting from pentamethylene diamine. (2017)

SHORT ANSWER TYPE

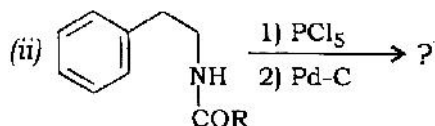
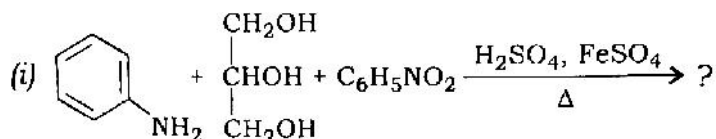
(3 MARKS QUESTIONS)

- (a) Compare the basicity of pyridine with that of pyrrole and pyrrolidine. (2017)
- (b) Starting from 1,4-diketone, how can furan, pyrrole and thiophene derivatives be synthesized? (2018)

(6 MARKS QUESTIONS)

1. What is the IUPAC name of indole? Discuss the mechanism of Fischer indole synthesis. How can indole be converted into quinoline? (2017)

2. Explain the following reactions by providing relevant mechanism :



(2018)

UNIT-5: Medicinal chemistry

Very Short Answer Type Carrying 1 mark

(1 MARK QUESTIONS)

- (a) Write the structure of phenacetin. (2017)
 (b) What are antibacterial drugs? (2018)

SHORT ANSWER TYPE

(2 MARKS QUESTIONS)

- (a) Write the preparation of sulphaguanidine from sulphaniamide. (2016)
 (b) What is the IUPAC name of chloramphenicol (antibiotic)? Where is it effectively used? (2016)

SHORT ANSWER TYPE

(3 MARKS QUESTIONS)

- (a) Write the synthesis of phenacetin starting from paracetamol. (2016)

(6 MARKS QUESTIONS)

- (1) Outline the synthesis of any two of the following:
 (a) Sulphadiazine
 (b) Plasmoquin
 (c) Chloramphenicol (2016)
- (2) Write notes on the synthesis of the following:
 (a) Sulphadiazine
 (b) Plasmoquin (2018)

UNIT-6: Chromatography

Very Short Answer Type Carrying 1 mark

(1 MARK QUESTIONS)

- (a) What is the basic principle of chromatography? (2016)
 (b) Why is the non-polar solvent used in column chromatography? (2017)
 (c) What is the difference between thin layer chromatography (TLC) and preparatory thin layer chromatography? (2017)

SHORT ANSWER TYPE

(2 MARKS QUESTIONS)

- (a) Nowadays, it is insignificant to say 'gas-liquid chromatography (GLC)' rather it is simply 'gas chromatography'. Justify it. (2018)

SHORT ANSWER TYPE

(3 MARKS QUESTIONS)

- (a) What are the main differences between thin-layer chromatography (TLC) and preparatory thin-layer chromatography (PTLC)? (2016)
- (b) Explain the working principle of gas chromatography with a block diagram. (2017)
- (c) What is meant by the term R_f value? On what factors does the R_f value of a compound depend? (2018)

UNIT-7: Mass spectroscopy**Very Short Answer Type Carrying 1 mark**

(1 MARK QUESTIONS)

- (a) What will be the most abundant general characteristic m/e of alkanes? (2016)

SHORT ANSWER TYPE

(2 MARKS QUESTIONS)

- (a) What are molecular ion peak and base peak? (2017)
- (b) Determine the structure of the compound which shows m/e peaks at 86, 71, 43 and 42. (2017)
- (c) What are the advantages of double focussing mass spectrometer over the single focussing one? (2018)
- (d) What are the probable results of bombardment of compound AB (g) by a stream of electrons of about 70 eV ? (2018)

SHORT ANSWER TYPE

(3 MARKS QUESTIONS)

- (a) Write the fragmentation processes involved in mass spectroscopy of cyclohexane. (2017)
- (b) A compound, C_6H_{12} , gives following m/e values with the corresponding relative abundances : 56 (99.9%), 84 (70.5%) and 41 (67.6%)
Interpret the nature of fragmentation of the compound showing corresponding cations. (2018)

UNIT-8: Nuclear Magnetic Resonance Spectroscopy**SHORT ANSWER TYPE**

(2 MARKS QUESTIONS)

- (a) What is spin-spin coupling in NMR? (2016)
- (b) Explain how anisotropic effects affect the chemical shift values of protons in alkynes. (2017)
- (c) Briefly give two factors which affect chemical shift value in nuclear magnetic resonance spectroscopy. (2018)

SHORT ANSWER TYPE

(3 MARKS QUESTIONS)

- (a) What is the coupling constant J ? Give its significance in NMR-spectroscopy. Explain the splitting of signals in the 1H -NMR spectrum of ethyl bromide with a diagram. Compare the coupling constants of ethyl bromide with that of highly pure sample of ethanol. (2017)

(6 MARKS QUESTIONS)

1. Draw and explain the splitting of signals in the 1H NMR spectrum of 1,1,2-trichloro-ethane. Also, comment on the factors affecting the chemical shift values of the protons in this compound. Predict the multiplicities of the signals in the 1H NMR spectrum of 1,1-dichloroethane. (2018)

UNIT-9: Electron Paramagnetic Resonance Spectroscopy**Very Short Answer Type Carrying 1 mark**

(1 MARK QUESTIONS)

- (a) What is anisotropic-g of an electron in ESR? (2016)
- (b) Draw the ESR spectrum of H atom. (2016)
- (c) How are EPR signals plotted? (2017)
- (d) Give the equation corresponding to the energy of an ESR transition when the external magnetic applied field is B_0 . (2017)
- (e) What is hyperfine splitting in ESR spectroscopy? (2018)
- (f) Give the g value for a free unbound electron. (2018)

SHORT ANSWER TYPE

(3 MARKS QUESTIONS)

- (a) Explain the principle of ESR spectroscopy. (2016)
- (b) What is hyperfine splitting in ESR spectroscopy? Explain the ESR spectrum of benzene anion radical $C_6H_6^-$ with a diagram. (2017)
- (c) Explain the ESR spectrum of diethyl ether radical. (2018)

UNIT-10: Green Chemistry**Very Short Answer Type Carrying 1 mark**

(1 MARK QUESTIONS)

- (a) What phenomenon takes place to the liquid medium when ultrasound is applied to it? (2017)
- (b) Why is microwave considered to be more efficient source of heating than the conventional heating? (2017)
- (c) How are the bubbles formed during saponification? (2018)
- (d) Why is pericyclic reaction considered under green chemistry? (2018)

SHORT ANSWER TYPE

(2 MARKS QUESTIONS)

- (a) What is green chemistry? Write its limitations. (2016)

SHORT ANSWER TYPE

(3 MARKS QUESTIONS)

- (a) Describe the characteristics of an ionic liquid that can be used as green solvent in organic synthesis. (2017)
- (b) Discuss any three principles of green chemistry. (2018)
