

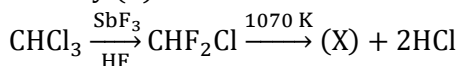
15.POLYMERS

Single Correct Answer Type

- Which of the following is an addition polymer?
 - Nylon-6
 - Dacron
 - High-density polythene
 - Nylon-6, 6
- Nylon-6 is prepared from:
 - Adipic acid and hexamethylenediamine
 - Caprolactum
 - Urea and formaldehyde
 - None of these
- Which of the following is coated as a thin layer on the inner side of non-stick pans?
 - Bakelite
 - PVC
 - Teflon
 - Polypropylene
- Which of the following can be remelted time and again without producing any change?
 - Thermosetting polymers
 - Thermoplastic polymers
 - Bakelite
 - Melamine
- The monomer of the polymer

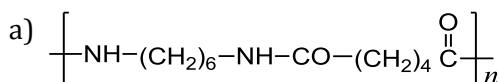
$$\sim\text{CH}_2-\underset{\text{CH}_3}{\overset{\text{CH}_3}{\text{C}}}-\text{CH}_2-\overset{\oplus}{\text{C}}(\text{CH}_3)_2$$
 is:
 - $(\text{CH}_3)_2\text{C} = \text{C}(\text{CH}_3)_2$
 - $\text{CH}_3 - \text{CH} = \text{CH}_2$
 - $\text{CH}_3\text{CH} = \text{CHCH}_3$
 - $\text{H}_2\text{C} - \text{C}(\text{CH}_3)_2$
- All terpenes have carbon skeletons made up of:
 - Isoprene units
 - Vinyl units
 - Alkenes
 - Ethylene units
- The monomer unit of silicon, a water repellent, acid resistant, and heat resistant, polymer, is:
 - Si
 - SiO_2
 - R_2SiO
 - None of these
- Which of the following is an example of copolymer?
 - Buna-S
 - PAN
 - Polythene
 - PTFE
- If N_1, N_2, N_3, \dots are the number of molecules with molecular masses M_1, M_2, M_3, \dots respectively, then mass average molar is expressed as:
 - $\frac{\sum N_i M_i^2}{\sum N_i M_i}$
 - $\frac{\sum N_i M_i}{\sum N_i}$
 - $\frac{\sum M_i^2}{\sum N_i}$
 - $\frac{\sum N_i M_i}{\sum M_i}$
- Which of the following is a biodegradable polymer?
 - Cellulose
 - Nylon-6
 - Polyvinyl chloride
 - Polythene
- The commercial name of polymethyl (methacrylate) is:
 - Lucite
 - Plexiglas
 - Perspex
 - All the above
- Bakelite is:
 - Chain-growth polymer
 - Step-growth polymer
 - Both (a) and (b)
 - Elastomer
- GuttaPercha is:
 - trans*-Polyisoprene
 - Non-elastic and softens to a plastic-like material on heating
 - Used in underwater cables and golf balls
 - All the above
- Which of the following is the biodegradable polymer of polyamide class?
 - Nylon-6, 6
 - Nylon-2-nylon-6
 - Dextran
 - PHBV
- $$\text{CH}_2=\underset{\text{CH}_3}{\text{C}}-\text{CH}=\text{CH}_2,$$
 Isoprene, is the repeating unit in:
 - Vitamin A
 - Terpenes
 - Rubber (natural)
 - All the above
- Mass-average molecular mass of a polymer is determined by:
 - Light scattering and ultracentrifuge method
 - Osmotic pressure
 - Depression of freezing point
 - Elevation in boiling point

17. Identify (X):

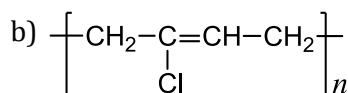


- a) $\text{F}_2\text{C} = \text{CF}_2$ b) $\text{ClFC} = \text{CFCl}$ c) $\text{F}_2\text{C} = \text{CFCl}$ d) $\text{F}_2\text{C} = \text{CCl}_2$
18. Which of the following is used in paints?
a) Terylene b) Chloroprene c) Glyptal d) Nylon
19. Molecular weights of macromolecules are determined by:
a) Elevation of boiling point b) Depression in freezing point
c) Osmotic pressure d) None of these
20. Polymer used in bullet-proof glass is:
a) Nomex b) Lexan c) PMMA d) Kevlar
21. Which of the following is not correctly matched?

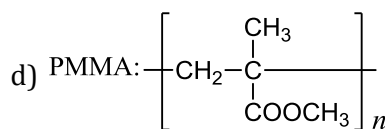
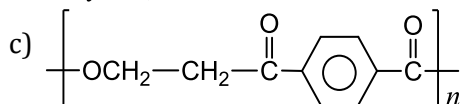
Nylon-6,6;



Neoprene;



Terylene;



22. Terylene (Dacron) is the polyester of:
a) Hexamethylenediamine and adipic acid b) Vinyl chloride and formaldehyde
c) Melamine and formaldehyde d) Ethylene glycol and terephthalic acid
23. Which polymer is generally used in carry bags?
a) Polyester b) Bakelite c) Polyethylene d) Alkyd resin
24. Which of the following is a chain-growth polymer?
a) Nucleic acid b) Starch c) Polystyrene d) Proteins
25. Which of the following is a copolymer?
a) Polytetrafluoroethylene b) Polyvinyl chloride
c) Polyethylene d) Nylon-6, 6
26. A polymeric sample in which 30% molecules have a molecular mass 20,000, 40% have 30,000 and the rest 30% have 60,000. The (\overline{M}_n) and (\overline{M}_w) of this sample are:
a) 36,000, 43,333 b) 43,333, 36,000 c) 72,000, 86,666 d) 86,666, 72,000
27. Number-average molecular mass of a polymer is determined by:
a) Light scattering and ultracentrifuge method b) Osmotic pressure
c) Depressing of freezing point d) Elevation in boiling point
28. Which of the following is a chain-growth polymer?
a) Nylon b) Dacron c) Glyptal d) Polypropylene
29. Which of the following sets contains only thermoplastics?
a) Glyptal, Melmac, PAN b) Polythene, Bakelite, Nylon-6
c) PVC, PMMA, Polystyrene d) Polypropylene, Urea-formaldehyde, Teflon
30. Teflon, styron, and neoprene are all:
a) Copolymers b) Monomers
c) Homopolymers d) Condensation polymers
31. Saran is a copolymer of:
a) Vinyl chloride and vinyl acetate
b) Vinylidene chloride (1, 1-dichloroethene) and vinyl chloride
c) Ethylene chloride and vinyl chloride
d) Vinyl acetate and methyl acetate
32. Interparticle forces present in Nylon-6, 6 are:
a) Dipole-dipole interactions b) Hydrogen bonding

- c) Van der Waals force
d) None of these
33. Which is not a macromolecule?
a) DNA
b) Insulin
c) Palmitate
d) Starch
34. Which of the following is not a condensation polymer?
a) Nylon-6, 6
b) PTEE
c) Dacron
d) Glyptal
35. Polyurethanes:
a) Have structural features of both an ester and an amide
b) Have the formula
$$\text{H}_2\text{N}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}-\text{CH}_2-\text{CH}_3$$

c) Are obtained from *p*-phenylene diisocyanate and ethylene glycol
d) Are used as foam rubber in upholstery
36. In the vulcanisation of rubber:
a) Sulphur reacts to form a new compound
b) Sulphur cross-links are introduced
c) Sulphur forms a very thin protective layer over rubber
d) All the statements are correct
37. A copolymer is:
a) Styrene butadiene rubber
b) Polythene
c) Terylene
d) Nylon
38. Which one is not the chain-growth polymer?
a) Natural rubber
b) Polythene
c) Polypropylene
d) Terylene
39. Which of the following monomers gives the polymer neoprene on polymerisation?
a) $\text{CCl}_2 = \text{CCl}_2$
b) $\text{CH}_2 = \text{CHCl}$
c) $\text{CH}_2 = \text{C}(\text{Cl}) - \text{CH} = \text{CH}_2$
d) $\text{CF}_2 = \text{CF}_2$
40. Glyptal is the polymer of:
a) Ethylene glycol
b) Ethylene glycol and phthalic acid
c) Ethylene glycol and adipic acid
d) Caprolactum
41. Which of the following statements is not true about polymers?
a) Polymers have high viscosity
b) Polymers do not carry any charge
c) Polymers scatter light
d) Polymers have low molecular weight
42. Which of the following is the polymers can be used for lubrication and as an insulator?
a) SBR
b) PAN
c) PTFE
d) PVC
43. Which of the following is a step-growth polymer?
a) Polyacrylonitrile
b) Polyisoprene
c) Nylon
d) Polythene
44. Polymer formation from monomers starts by:
a) Condensation reaction between monomers
b) Conversion of monomer to monomer ions by protons
c) Coordination reaction between monomers
d) Hydrolysis of monomers
45. Which of the following is not correct regarding terylene?
a) Condensation polymer
b) Synthetic fibre
c) Step-growth polymer
d) Thermosetting plastic
46. Nylon-6 is made from:
a) Adipic acid
b) Chloroprene
c) 1, 3-Butadiene
d) Caprolactam
47. If N_1, N_2, N_3, \dots are the number of molecules with molecular masses M_1, M_2, M_3, \dots , respectively, the number-average molecular mass is expressed as:
a) $\frac{N_1 M_1^2 + N_2 M_2^2 + \dots}{N_1 M_1 + N_2 M_2 + \dots} = \frac{\sum Ni Mi^2}{\sum Ni Mi}$
b) $\frac{N_1 M_1 + N_2 M_2 + \dots}{N_1 + N_2 + \dots} = \frac{\sum Ni Mi}{\sum Ni}$
c) $\frac{\sum Mi^2}{\sum Ni}$
d) $\frac{\sum Ni Mi}{\sum Mi}$

48. Orlonahs a unit of:
 a) Vinly cyanide b) Isoprene c) Glycol d) Acrolein
49. Natural rubber is:
 a) All-*trans* polyisoprene b) Chloroprene
 c) Buna-S d) All-*cis* polyisoprene
50. The repeating units of PTFE are:
 a) $\text{Cl}_2\text{CH} - \text{CH}_3$ b) $\text{F}_2\text{C} = \text{CF}_2$ c) $\text{F}_3\text{C} - \text{CF}_3$ d) $\text{FCIC} = \text{CF}_2$
51. The basic unit of neoprene is:
 a) Chloroprene b) Isoprene c) Styrene d) Butadiene
52. Which one is a synthetic polymer?
 a) Starch b) Silk c) Protein d) Neoprene
53. Which of the following is a polyamide?
 a) Teflon b) Nylon-6,6 c) Bakelite d) Terylene
54. The abbreviation PDI refers to:
 a) Name of the polymer b) Polydispersity index of the polymer
 c) Application of the polymer d) Polydiagonal index
55. The weakest interparticle forces are present in:
 a) Thermosetting polymers b) Thermoplastic polymers
 c) Fibres d) Elastomers
56. Acrilan is a hard material and has high melting point. Which of the following represents its structure?
 a) $\left(\text{CH}_2 - \underset{\text{CN}}{\text{CH}} \right)_n$ b) $\left(\text{CH}_2 - \underset{\text{COOCH}_3}{\text{CH}} \right)_n$ c) $\left(\text{CH}_2 - \underset{\text{Cl}}{\text{CH}} \right)_n$ d) $\left(\text{CH}_2 - \underset{\text{COOC}_2\text{H}_5}{\text{CH}} \right)_n$
57. Which of the following is a natural polymer?
 a) Bakelite b) Cellulose c) PVC d) Neoprene
58. Which one is not a step polymer?
 a) Nylon-6, 6 b) Nylon-6 c) Glyptal d) PMMA
59. SBR (GRS, Buna-S, Cold Rubber) is obtained by free radical copolymerisation of:
 a) Buta-1, 3-diene (70 %) and 30% phenyl ethene (styrene)
 b) Chloroprene and styrene
 c) Vinyl acetylene and styrene
 d) Isoprene and 1, 3-butadiene
60. Natural rubber is a polymer of:
 a) Styrene b) Ethyne c) Butadiene d) Isoprene
61. The turbidity of a polymer solution measures:
 a) Light absorbed by the solution b) Light transmitted by the solution
 c) Light scattered by the solution d) None of the above
62. Peptide bond is a key feature in:
 a) Polysaccharide b) Proteins c) Nucleotide d) Vitamins
63. The formation of polyethylene from calcium carbide takes place as follows:
 $\text{CaC}_2 + 2\text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2 + \text{C}_2\text{H}_2$
 $\text{C}_2\text{H}_2 + \text{H}_2 \rightarrow \text{C}_2\text{H}_4$
 $n\text{C}_2\text{H}_4 \rightarrow (\text{CH}_2 - \text{CH}_2)_n$
 The amount of polyethylene obtained from 64 kg of CaC_2 is:
 a) 14 kg b) 7 kg c) 21 kg d) 28 kg
64. Free radical polymerisation requires a free radical initiator. The most commonly used free radical initiator is:
 a) $\text{Ph} - \text{CO} - \text{O} - \text{O} - \text{COPh}$, benzoylperoxide b) $(\text{CH}_3)_3\text{C} - \text{O} - \text{O} - \text{C}(\text{CH}_3)_3$, *tert*-butyl peroxide

- c) $\begin{array}{c} \text{C}_6\text{H}_5-\text{N} \rightarrow \text{O, azoxybenzene} \\ || \\ \text{C}_6\text{H}_5-\text{N} \end{array}$ d) CH_2N_2 , diazomethane
65. Which one of the following is used to make 'non-stick' cookware?
 a) Polystyrene b) PVC
 c) Poly (ethylene terephthalate) d) Polytetrafluoroethylene
66. Synthetic human hair wigs are made from a copolymer of vinyl chloride and acrylonitrile, which is called:
 a) PVC b) Polyacrylonitrile c) Cellulose d) Dynel
67. $\sim\left\{ \text{NH}(\text{CH}_2)_6\text{NHCO}(\text{CH}_2)_4\text{CO} \right\}_n$ is:
 a) Addition polymer b) Copolymer
 c) Homopolymer d) Thermosetting polymer
68. Zeigler-Natta catalysts
 a) Are triethylaluminium titanium tetrachloride complex $(\text{C}_2\text{H}_5)_3\text{Al} + \text{TiCl}_4$
 b) Are used to prepare stereospecific addition polymers
 c) Are employed to have stereochemical control of the polymerisation process
 d) All the above
69. Which of the following is a fully fluorinated polymer?
 a) Thiokol b) Teflon c) Neoprene d) PVC
70. If N_1, N_2, N_3, \dots are the number of molecules with molecular masses M_1, M_2, M_3, \dots , respectively, the number, Z-average molar mass (M_z) is defined as:
 a) $\frac{\sum N_i M_i^2}{\sum N_i M_i}$
 b) $\frac{\sum N_i M_i}{\sum N_i}$
 c) $\frac{\sum N_i M_i^3}{\sum N_i M_i^2}$
 d) $\frac{\sum N_i M_i^3}{\sum N_i M_i}$
71. The PDI (polydispersity index) is the ratio of weight to number-average molecular masses (M_w/M_n). In natural polymers, which are generally monodispersed, PDI is.....and in synthetic polymers which are always polydispersed, PDI is..... because M_w is always than M_n
 a) Greater than 1, 1, higher b) 1, greater than 1, higher
 c) Less than 1, 1, lower d) 1, less than 1, lower
72. A polymer of prop-2-enitrile is called:
 a) Saran b) Orlon c) Dacron d) Teflon
73. Soft drink and baby-feeding bottles are generally made of:
 a) Polyurea b) Polyurethane c) Polyester d) Polystyrene
74. The chemical name of melamine is:
 a) 2, 4-Diamino-1, 3, 5-triazine b) 2-Amino-1, 3, 5-triazine
 c) 2, 4, 6-Triamino-1, 3, 5-triazine d) 1, 3, 5-Triamino-2, 4, 6-triazine
75. Terylene is a condensation polymer of ethylene glycol and
 a) Salicylic acid b) Phthalic acid c) Benzoic acid d) Terephthalic acid
76. Nylon threads are made of:
 a) Polyvinyl polymer b) Polyethylene polymer c) Polyester polymer d) Polyamide polymer
77. One would come across the terms isotactic, syndiotactic, and atactic in connection with the chemistry of:
 a) Polymers b) Dyes c) Crystals d) Textiles
78. GRA is a copolymer of:
 a) Butadiene and acrylonitrile b) Butadiene and adipic acid
 c) Chloroprene and acrylonitrile d) Chloroprene and adipic acid
79. The interparticle forces between linear chains in Nylon-6, 6 are:

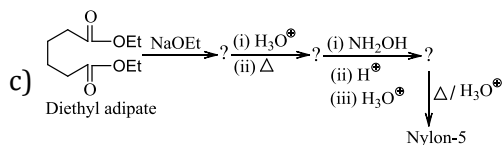
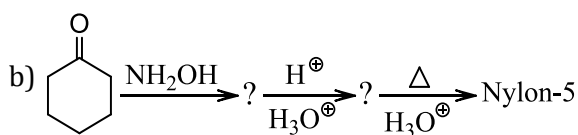
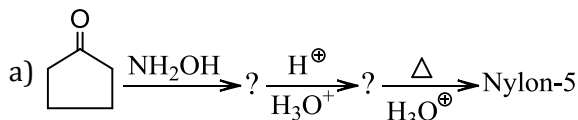
- a) H-bonds b) Covalent bonds c) Ionic bonds d) Coordinate bonds
80. Isotactic polypropylene polymer is one in which:
 a) All methyl groups are on one side of the extended chain. It is a highly crystallite, has high melting point, and forms strong fibers
 b) The methyl groups present alternate regularly from one side to the other
 c) The methyl groups are distributed at random. It is a soft, elastic, and rubbery material
 d) None of these
81. The method of choice for determining the molecular weight of a polymer is:
 a) Osmotic pressure b) Gas density
 c) Lowering of freezing point d) Direct weighing of a single molecule
82. The starting material of PCTFE is:
 a) Monochlorotrifluoro ethylene b) Tetrafluoroethylene
 c) Vinyl chloride d) Styrene
83. Which is used for the formation of nylon-6, 6?
 a) Sulphurous acid b) Adipic acid c) Sulphur hexafluoride d) Phthalic acid
84. $F_2C = CF_2$ is a monomer of:
 a) Teflon b) Glyptal c) Buna-S d) Nylon-6
85. Cellulose is a condensation polymer of:
 a) Maltose b) β -Glucose c) α -Glucose d) β -Fructose
86. Among cellulose poly (vinyl chloride), nylon and natural rubber, the polymer in which the intermolecular force of attraction is weakest in
 a) Nylon b) Poly (vinyl chloride) c) Cellulose d) Natural rubber
87. The polymer obtained from condensation of sebacic acid and hexamethylenediammine is called:
 a) Terylene b) Nylon-6 c) Nylon-6, 10 d) Dacron
88. Which of the following is a common example of fibres?
 a) Bakelite b) Buna-S c) Nylon-6, 6 d) Nylon-6
89. Monomer of
- $$\text{Monomer of } \left[\begin{array}{c} \text{CH}_3 \\ | \\ \text{---C---CH}_2\text{---} \\ | \\ \text{CH}_3 \end{array} \right]_n \text{ is:}$$
- a) 2-Methylpropene b) Ethene c) Propylene d) Styrene
90. Which of the following represents the example of a homopolymer?
 a) PMMA b) Bakelite c) Glyptal d) Neoprene
91. Chloroprene is the repeating unit in:
 a) PVC b) Neoprene c) Polystyrene d) Polythene
92. Which of the following is not a polymer?
 a) Sucrose b) Teflon c) Starch d) Enzyme
93. Which of the following sets contains only copolymers?
 a) SBR, Glyptal, Nylon-6, 6 b) Polythene, Polyester, PVC
 c) Nylon-6, Butyl rubber, Neoprene d) Melmac, Bakelite, Teflon

Multiple Correct Answers Type

94. Which of the following are used as chain transfer agents?
 a) CCl_4 b) CBr_4 c) Benzoquinone d) Benzoyl peroxide
95. Which of the following can be used as plasticisers?
 a) Sodium hexametaphosphate b) Di-*n*-butylphthalate
 c) Tricresyl phosphate d) Diethyl phthalate
96. Which is used in the formation of nylon-66?
 a) Sulphurhexa fluoride b) Adipic acid c) Sulphurous acid d) Phthalic acid

97. Which of the following polymers contain 1, 3-butadiene as one of the monomers?
 a) Butyl rubber b) Nitrile rubber c) ABS plastic d) SBR
98. Which of the following processes can be used to prepare polystyrene?
 a) Anionic b) Cationic c) Free radicals d) Ziegler-Natta
99. Which of the following are polyamide polymers?
 a) Nylon-6, 10 b) Nylon-6, 6 c) Nylon-5 d) Perlon-U
100. Which of the following are condensation polymers?
 a) Polypropylene b) Nylon-6 c) Glyptal d) Teflon
101. Vulcanised rubber resists:
 a) Wear and tear due to friction b) Cryogenic temperature
 c) High temperature d) Action of acids
102. Which of the following fibres are made of polyamides?
 a) Wool b) Natural silk c) Rayon d) Nylon
103. Which of the following are used as free radical chain initiators?
 a) Benzoyl peroxide b) *t*-Butyl peroxide c) CCl₄ d) Benzoquinone
104. Which of the following are biodegradable polymers?
 a) Nylon-6, 6 b) PHBV c) Nylon-2-Nylon-6 d) Polychloroprene
105. Among the following elastomers are
 a) Natural rubber b) Low sulphur rubber c) Buna-S d) Butyl rubber
106. Which of the following polymers can be made by cationic addition polymerisation mechanism?
 a) PVC b) PP c) HDPE d) LDPE
107. Among the following chain transfer reagent are
 a) Carbon tetrachloride b) Benzoyl peroxide c) Benzoquinone d) Carbon tetrabromide
108. Which of the following are biodegradable polymers?
 a) PHBV b) Nylon-2, 6
 c) Polyglycolic and polylactic acids d) Perlon-U
109. Which of the following statements are correct about Nylon-6, 6?
 a) Nylon fibres have higher tensile strength than terylenefibres
 b) Nylon fibres have lower tensile strength than terylenefibres
 c) In nylon, there is strong intermolecular H-bonding, while in terylene there is weak dipole-dipole interaction
 d) In nylon, there is weak dipole-dipole interaction, while in terylene there is strong intermolecular H-bonding
110. Which of the following fibers are made of polyamides?
 a) Wool b) Natural rubber c) Artificial silk d) Nylon
111. Which of the following polymers can be made by addition polymerisation reaction?
 a) Nylon-6 b) Perlon-U c) HDPE d) LDPE
112. The field of polymer chemistry was revolutionised by:
 a) Kharasch in USA b) Karl Ziegler in Germany
 c) Giulio Natta in Italy d) Barton in England
113. Which of the following polymers can be made by free radical addition polymerisation mechanism?
 a) PE b) HDPE c) LDPE d) Teflon
114. Which of the following are condensation copolymers?
 a) Nylon-6 b) Nylon-6, 6 c) Dacron d) Glyptal
115. Polymerisation of buta-1, 3-diene by free radical mechanism gives:
 a) *trans*-1, 4-Polybutadiene b) *cis*-1, 4-Polybutadiene
 c) Polyvinyl polythene d) Polyallylpolyethene
116. Nylon-5, 10 can be prepared by:
 a) H₂N(CH₂)₅NH₂ + Decanoic acid (Sebacic acid)
 b) HOOC(CH₂)₃ + COOH + H₂N(CH₂)₁₀NH₂
 c) H₂N(CH₂)₆NH₂ + HOOC(CH₂)₈COOH

- d) $\text{H}_2\text{N}(\text{CH}_2)_{10}\text{NH}_2 + \text{HOOC}(\text{CH}_2)_4\text{COOH}$
117. Which of the following are biopolymers?
 a) Nucleic acid b) Leather c) Bakelite d) Orlon
118. Which of the following statements are correct about phenol-formaldehyde resin?
 a) Novolac or resol is a linear polymer and is used in the manufacture of adhesive
 b) Bakelite is a cross-linked polymer and is used in making switches and plugs
 c) Novolac is prepared when (P/F) (phenol/formaldehyde) ratio is greater than 1, whereas bakelite is prepared when (P/F) ratio is less than 1
 d) Novolac is prepared when $P/F < 1$, and bakelite is prepared when $P/F > 1$
119. Which of the following are not thermosetting polymers?
 a) Bakelite b) Polystyrene c) PVC d) Melmac
120. By which of the following reaction sequence can nylon-5 be prepared?



- d) All
121. Polymerisation may occur through intermediate formation of:
 a) Carbocations b) Carbanions c) Free radicals d) Carbenes
122. Which of the following are polyester polymers?
 a) Bakelite b) Dacron c) Glyptal resins d) Nylon-5
123. Which of the following are biopolymers?
 a) Nucleic acids b) Leather c) Bakelite d) Orlon
124. Which of the following polymers can be made by anionic addition polymerisation mechanism?
 a) PVC b) PAN c) Teflon d) PP
125. Which of the following polymers can be made by condensation polymerisation reaction?
 a) Dacron b) Nylon-6,6 c) Bakelite d) PE
126. Which of the following are plasticisers?
 a) DOP b) DBP c) Cresyl phosphate d) Sodium adipate
127. Which monomer would polymerise in isotactic, syndiotactic, and atactic forms?
 a) $\text{CH}_2 = \text{CCl}_2$ b) $\text{CH}_3 - \text{CH} = \text{CH}_2$ c) $\text{Ph} - \text{CH} = \text{CH}_2$ d) All
128. Which of the following are polycarbamate ester polymers?
 a) Polyurethane b) Perlon-U c) Melmac d) Saran
129. Which of the following are addition homopolymers?
 a) Teflon b) SBR c) PVC d) Natural rubber
130. Which of the following is a monomer of Teflon?
 a) Difluoroethane b) Trifluoroethane c) Tetrafluoroethane d) None of these

Assertion - Reasoning Type

This section contain(s) 0 questions numbered 131 to 130. Each question contains STATEMENT 1(Assertion) and STATEMENT 2(Reason). Each question has the 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

- a) Statement 1 is True, Statement 2 is True; Statement 2 **is** correct explanation for Statement 1
- b) Statement 1 is True, Statement 2 is True; Statement 2 **is not** correct explanation for Statement 1
- c) Statement 1 is True, Statement 2 is False
- d) Statement 1 is False, Statement 2 is True

131

Statement 1: Bakelite is a thermosetting plastic.

Statement 2: In thermosetting plastics, the polymeric chains are held together by strong covalent bonds.

132

Statement 1: PDI (polydispersity index) of natural polymer is unity, while that of synthetic polymer is greater than unity

Statement 2: Natural polymer are homogeneous

133

Statement 1: Novolac is soft and has a low melting point

Statement 2: It is a highly cross-linked polymer

134

Statement 1: Thermoplastics become soft on heating and hard on cooling.

Statement 2: Thermoplastics are linear polymer and the polymeric chains are held together by weak intermolecular forces.

135

Statement 1: In vulcanization of rubber, sulphur cross links are introduced.

Statement 2: Vulcanization is a free radical initiated chain reaction.

136

Statement 1: Buta-1, 3-diene is the monomer of GuttaPercha

Statement 2: GuttaPercha is formed through cationic addition polymerisation

137

Statement 1: PMMA is used for making lenses and light covers.

Statement 2: It has excellent light transmission properties.

138

Statement 1: Natural rubber is *cis*-polyisoprene.

Statement 2: *trans*-polyisoprene cannot be formed.

139

Statement 1: Bakelite is hard and has high melting point

Statement 2: Intermolecular forces of attraction in it are H-bonding

140

Statement 1: Polybutadiene is an example of step-growth polymer

Statement 2: Copolymerisation of butadiene and acrylonitrile gives Buna-N

141

Statement 1: M_n (number-average molecular mass) of a polymer is determined by osmotic pressure method, while M_w (weight-average molecular mass) is determined by ultracentrifuge method

Statement 2: Osmotic pressure is a colligative property

142

Statement 1: PUF (Polyurethane foam) is spongy

Statement 2: During the preparation of PUF, CO_2 is evolved, which forms bubbles that are trapped within the bulk of polymer. As it solidifies, it gives spongy product

143

Statement 1: Styrene is more reactive than propylene towards cationic polymerization

Statement 2: The carbocation resulting from styrene is more stable than that resulting from propylene

144

Statement 1: Nylon fibres are stronger than terylene fibres

Statement 2: Intermolecular forces of attraction in terylene are H-bonding

145

Statement 1: Teflon has high thermal stability and chemical inertness

Statement 2: It has strong (C – F) bonds

146

Statement 1: Nylon-6 is prepared by polymerization of caprolactam.

Statement 2: It is a polyamide

147

Statement 1: Nylon 610 is a condensation copolymer.

Statement 2: It contains dioic acid having 6C atoms and a diamine having 10C atoms.

148

Statement 1: Polyvinyl alcohol is obtained by polymerization of vinyl alcohol.

Statement 2: Polyvinyl alcohol is prepared by hydrolysis of polyvinyl acetate.

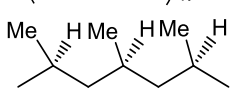
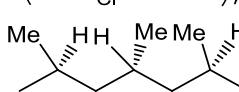
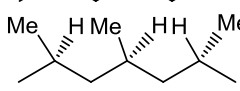
Statement 1: Plexiglas is the commercial name of PMMA

Statement 2: It is used in making contact lens, because it has an excellent light transmission property

Matrix-Match Type

This section contain(s) 0 question(s). Each question contains Statements given in 2 columns which have to be matched. Statements (A, B, C, D) in **columns I** have to be matched with Statements (p, q, r, s) in **columns II**.

150.

Column-I	Column- II
(A) Isotactic polypropene	(p) $\left(\text{CH}_2 - \underset{\text{COOMe}}{\overset{\text{Me}}{\text{C}}} \right)_n$
(B) Syndiotactic polypropene	(q) 
(C) Atactic polypropene	(r) $\left(\text{CH}_2 - \underset{\text{Cl}}{\overset{\text{Cl}}{\text{C}}} - \text{CH}_2 - \underset{\text{Cl}}{\text{CH}} \right)_n$
(D) Saran	(s) 
(E) Plexiglas or Lucite or Acrylite or Perspex	(t) 

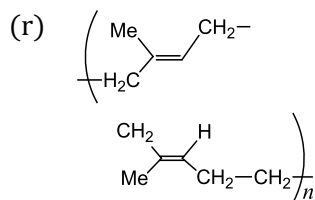
CODES :

	A	B	C	D	E
a)	s	t	r	p	q
b)	t	r	p	q	q
c)	r	p	q	s	q
d)	q	s	t	r	q

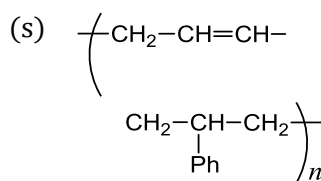
151.

Column-I	Column- II
(A) Neoprene	(p) $\left(\text{CH}_2 - \text{CH} = \text{CH} - \underset{\text{CN}}{\text{CH}} - \text{CH}_2 \right)_n$
(B) GuttaPercha	(q) $\left(\text{CH}_2 - \underset{\text{Cl}}{\text{C}} = \text{CH} - \text{CH}_2 \right)_n$

(C) Buna-S



(D) Buna-N



CODES :

	A	B	C	D
a)	q	r	s	p
b)	r	s	p	q
c)	s	p	q	r
d)	p	q	r	s

152. Match List I(Polymers) with List II(Monomers) and select the correct answer using the codes given below

Column-I

Column- II

(A) Buna N

(1) Phthalic acid and ethylene glycol

(B) Nylon 66

(2) Terephthalic acid and ethylene glycol

(C) Dacron

(3) Hexamethylenediamine and adipic acid

(D) Glyptal plastic

(4) Isobutylene and isoprene

(5) Arylonitrile and butadiene

CODES :

	A	B	C	D
a)	2	1	4	5
b)	3	4	1	2
c)	4	3	2	1
d)	5	3	1	2

153.

Column-I

Column- II

(A) Perlon-U or Polyurethane

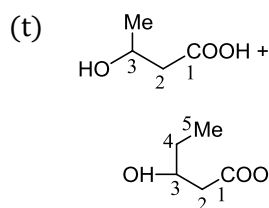
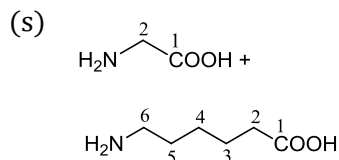
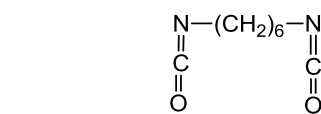
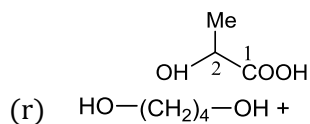
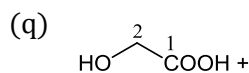
(p) Phenol + CH₂ = 0

(B) Resol or Novolac

(C) PHBV

(D) Polyglycolic and polylactic acid

(E) Nylon-2,6



CODES :

	A	B	C	D	E
a)	t	q	s	r	p
b)	q	s	r	p	p
c)	r	p	t	q	p
d)	p	t	q	s	p

154.

Column-I

- (A) Number-average molecular mass (M_n)
(B) Weight-average molecular mass (M_w)
(C) PDI of natural polymer
(D) PDI of synthetic polymer

Column- II

- (p) Light scattering and ultracentrifuge methods
(q) Osmotic pressure method
(r) PDI=1
(s) PDI>1

CODES :

	A	B	C	D
a)	P	r	s	q
b)	q	p	r	s
c)	r	s	q	p
d)	s	q	p	r

155.

Column-I

Column- II

- (A) HDPE
 (B) Polypropene
 (C) PVC
 (D) Dacron

- (p) Cationic addition polymerisation
 (q) Condensation polymerisation
 (r) Free radical addition polymerisation
 (s) Anionic addition polymerisation

CODES :

	A	B	C	D
a)	s	q	r	p
b)	q	r	p	s
c)	r	p	s	q
d)	p	s	q	r

156.

Column-I

Column- II

- (A) Acrilon
 (B) Vinyon
 (C) Dynel or Vinyon-N
 (D) Natural rubber
 (E) PCTFE

- (p) $\begin{array}{c} \text{Cl} \quad \text{F} \\ \diagdown \quad / \\ \text{C}=\text{C} \\ / \quad \diagdown \\ \text{F} \quad \text{F} \end{array}$
 (q) $\begin{array}{c} \text{CN} \\ | \\ \text{CH}_2=\text{CH} \end{array}$
 $+ \begin{array}{c} \text{OCOMe} \\ | \\ \text{CH}_2=\text{CH} \end{array}$
 (r) $\begin{array}{c} \text{Me} \\ | \\ \text{CH}_2=\text{C}-\text{CH}=\text{CH}_2 \end{array}$
 (s) $\begin{array}{c} \text{CH}_2=\text{CH} \\ | \\ \text{Cl} \end{array} + \begin{array}{c} \text{CH}_2=\text{CH} \\ | \\ \text{CN} \end{array}$
 (t) $\begin{array}{c} \text{CH}_2=\text{CH} \\ | \\ \text{Cl} \end{array} + \begin{array}{c} \text{CH}_2=\text{CH} \\ | \\ \text{OCOMe} \end{array}$

CODES :

	A	B	C	D	E
a)	t	s	r	p	q
b)	q	t	s	r	q
c)	s	r	p	q	q
d)	r	p	q	t	q

157.

Column-I

Column- II

- (A) Number-average molecular mass (M_n)
 (B) Weight-average molecular mass (M_w)

- (p) $\frac{\sum NiMi^3}{\sum_i NiMi^2}$
 (q) $\frac{\sum NiMi}{\sum_i Ni}$

(C) Z-average molecular mass (M_z)

$$(r) \frac{\sum NiMi^3}{\sum_i NiMi}$$

(D) Polydispersity index (PDI)

$$(s) \frac{M_w}{M_n}$$

CODES :

	A	B	C	D
a)	Q	r	p	s
b)	r	p	s	q
c)	p	s	q	r
d)	s	q	r	p

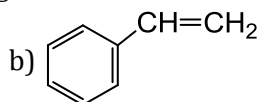
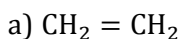
Linked Comprehension Type

This section contain(s) 17 paragraph(s) and based upon each paragraph, multiple choice questions have to be answered. Each question has atleast 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

Paragraph for Question Nos. 158 to -158

A polymer is a large molecule made by linking together repeating units of small molecule called monomers. The process of linking them up is called polymerization. On the basis of mode of polymerization, polymers are of two types; addition polymers and condensation polymers. Addition polymers are formed by repeated addition of monomer molecules possessing double or triple bonds. Addition polymers may be homopolymer (single monomeric species) or copolymers (two different monomers). The condensation polymers are formed by repeated condensation reaction between two different bifunctional or trifunctional monomeric units with the elimination of small molecules such as H_2O , alcohol etc

158. Which one of the following cannot form addition polymers?



d) None of these

Paragraph for Question Nos. 159 to - 159

Neoprene is synthetic rubber which is obtained by polymecrisation of 2-chloro -1, 3 butadiene. In it the configuration of polymer is trans. Its properties are improved by vulcanisation, which is infact the hardening of rubber by heating in presence of sulphur causes cross- linking of separate polymer chains through disulphide bonds and thus vulcanized chains are locked together in one giant molecule. Cross-linking prevents the polymer from being torn when it is stretched, and the cross- links provide a reference framework for the material to return to when the stretching force is removed

159. The tensile strength, elasticity and resistance to abrasion can be increased by a process called

a) Diazotisation

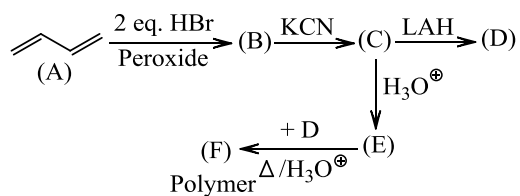
b) Vulcanisation

c) Isomerisation

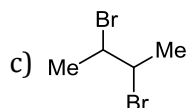
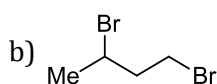
d) Polymerisation

Paragraph for Question Nos. 160 to - 160

This section contains six paragraphs. Based on each paragraph, four-six multiple choice questions have to be answered. Each question has four choices (a), (b), (c), and (d), out of which only one is correct

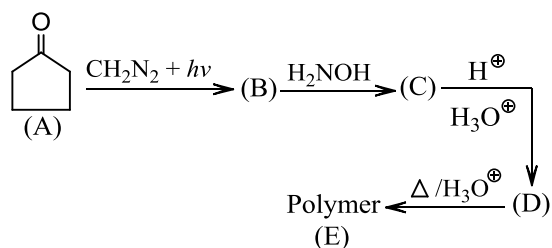


160. Compound (B) is:

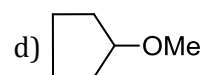
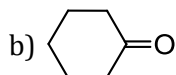
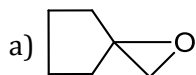


d) All

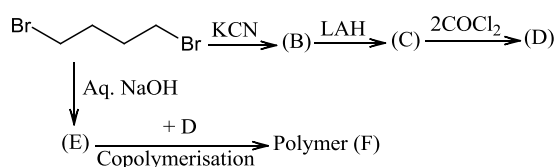
Paragraph for Question Nos. 161 to - 161



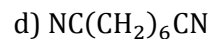
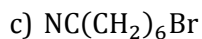
161. Compound (B) is:



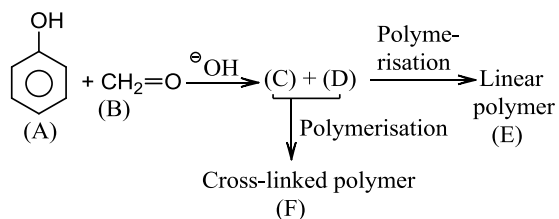
Paragraph for Question Nos. 162 to - 162



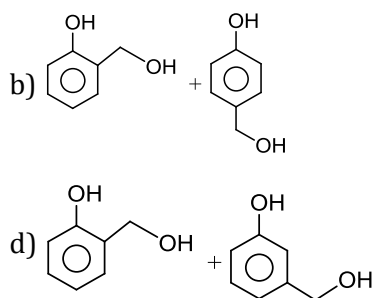
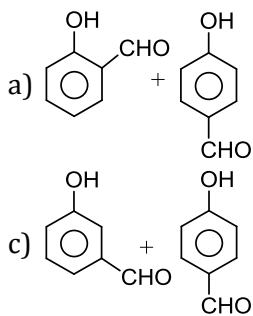
162. Compound (B) is:



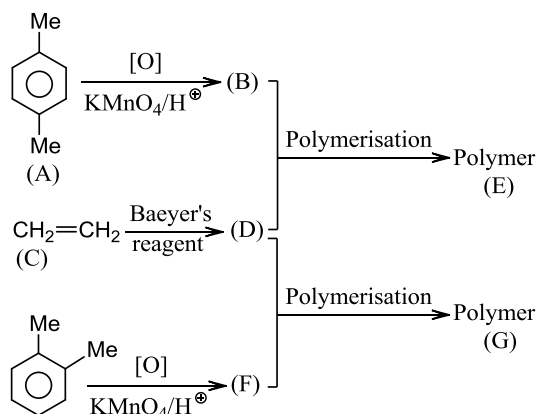
Paragraph for Question Nos. 163 to - 163



163. Compounds (C) and (D) are:



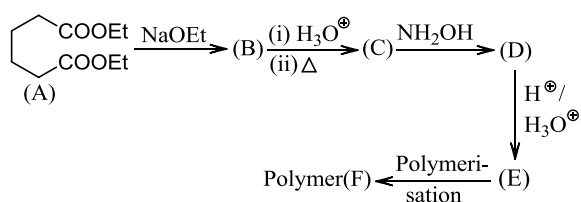
Paragraph for Question Nos. 164 to - 164



164. Polymer (E) is:

- a) Dacron b) Terylene c) Myler d) All

Paragraph for Question Nos. 165 to - 165



165. The conversion (A) to (B) is called:

- a) Claisen ester condensation b) Dieckmann reaction
c) Intramolecular Claisen ester condensation d) Claisen-Schmidt reaction

: ANSWER KEY :

1) c	2) b	3) c	4) b	9) a,b,d	10) a,b	11) b,c	12)
5) d	6) a	7) c	8) a	a,b,c,d			
9) a	10) a	11) d	12) b	13) b	14) a,d	15) a,b,c	16)
13) d	14) b	15) d	16) a	a,c			
17) a	18) c	19) c	20) b	17) a,b,d	18) c,d	19) b,c	20)
21) c	22) d	23) c	24) c	a,b,c			
25) d	26) a	27) b	28) d	21) a,b,c,d	22) a,b,c	23) a	24)
29) c	30) c	31) b	32) b	a,b			
33) c	34) b	35) c	36) b	25) a,b,c	26) b,c	27) a,c	28)
37) a	38) d	39) c	40) b	a,b,c			
41) d	42) c	43) c	44) a	29) b,c	30) a,b	31) a,b,c	32)
45) d	46) d	47) b	48) a	a,b,c			
49) d	50) b	51) a	52) d	33) a,b,c	34) b,c	35) a,b	36)
53) b	54) b	55) d	56) a	a,c,d			
57) b	58) d	59) a	60) d	37) d	1) b	2) a	3) c
61) c	62) b	63) d	64) a	4) a			
65) d	66) d	67) b	68) a	5) c	6) d	7) a	8) c
69) b	70) c	71) b	72) a	9) c	10) d	11) a	12) a
73) d	74) c	75) d	76) d	13) a	14) c	15) a	16) b
77) a	78) a	79) a	80) a	17) c	18) d	19) a	1) d
81) a	82) a	83) b	84) a	2) a	3) d	4) c	
85) b	86) d	87) c	88) c	5) b	6) c	7) b	8) a
89) a	90) d	91) b	92) a	1) c	2) b	3) a	4) b
93) a	1) a,b	2) b,c	3) b	5) b	6) b	7) d	8)
4) a,b,c,d				b,c			
5) a,b,c,d	6) a,b,c	7) b,c	8)				
a,d							

: HINTS AND SOLUTIONS :

63 (d)

n mol of $\text{CaC}_2 = n$ mol of $\text{C}_2\text{H}_4 = n$ mol of $-(\text{CH}_2-\text{CH}_2)-$

$n \times 64 \text{ kg} = n \times 28 \text{ kg} = n \times 28 \text{ kg}$

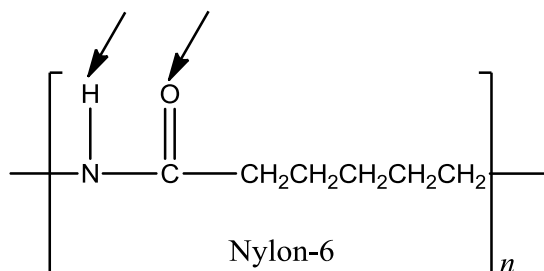
Amount of polyethene = 28 kg

81 (a)

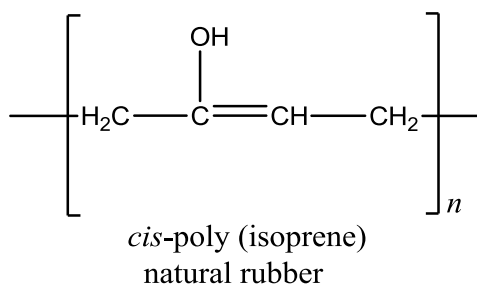
Osmotic pressure method is best for the determination of molecular weight of polymers and proteins since O. P., through very small, is measurable. On the other hand, in other colligative properties (e.g., ΔT_b , ΔT_f , $\Delta p/p^0$ methods), the difference is very small and cannot be measured. Moreover, in O.P. method, heating is not required, while in other methods, heating is required which changes the properties of polymer and proteins

86 (d)

Nylon has amide linkage capable of forming intermolecular H-bonding as:

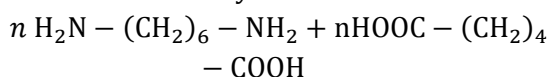


Due to H-bonding, nylon has strong intermolecular attraction. Cellulose is a polyhydroxy compound, also capable of forming strong intermolecular H-bonding. Polyvinyl chloride is a polar polymer due to carbon chlorine bond and it possesses strong dipole-dipole attraction. Natural rubber is poly-isoprene, a hydrocarbon, possesses weak van der Waals' attraction.

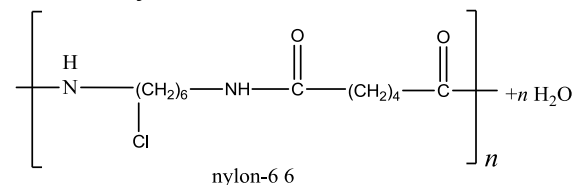


96 (b)

Hexamethylenediamine and adipic acid is used in the formation of nylon-66.



hexamethylenediamine



97 (a,b,c,d)

(c) ABS (refers to styrene butadiene styrene)

(d) SBR (refers to styrene butadiene rubber)

(a) Butyl rubber also refers to butadiene

(b) Nitrile rubber refer to Buna-N

100 (b,c)

Glyptal and nylon-6 are condensation polymers.

102 (a,b,d)

Rayon is made of cellulose

105 (a,b,c,d)

Elastomers are polymers in which the polymer chain are held together by van der Waals' forces of attraction. Example-natural rubber vulcanized rubber, buna-S and butyl rubber

107 (a,d)

Carbon tetra chloride and carbon tetra bromide act as chain transfer reagent in vinyl polymerization

110 (a,b,d)

Only artificial silk is a polysaccharide while all other are polypeptides (proteins)

111 (c,d)

Alkenes undergo addition polymerisation

113 (a,b,c)

These do not contain EDG or EWG, so they can be prepared by free radical addition polymerisation

114 (a,b,c,d)

All polyesters and polyamides are condensation polymers

116 (a)

Nylon-5, 10 refers to 5-C-atom diamine and 10-C-atom dibasic acid (first numeral refers to diamine and second numeral refers to dicarboxylic acid)

117 (a,b)

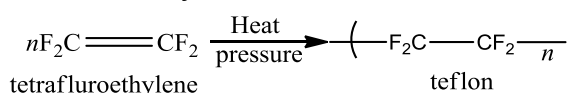
Nucleic acid and leather are biopolymers.

125 (a,b,c)

Polyester and polyamide undergo condensation polymerisation

130 (d)

Teflon is an addition polymer of tetrafluoroethylene.



It is used to make non-sticky utensils.

131 (b)

Bakelite is a thermosetting plastic. These are cross linked high polymers formed from their monomers by condensation polymerisation. The chains are held together by strong covalent bonds.

133 (c)

Novolac is a linear-chain polymer

134 (a)

Reason is the correct explanation of assertion.

135 (c)

Vulcanization is a process of treating natural rubber with sulphur or some compound of sulphur under heat so, as to modify its properties. The cross linking gives mechanical strength to the rubber.

136 (d)

GuttaPercha is synthetic rubber and its monomer is isoprene.

Since isoprene has EDG, so it is prepared by cationic addition polymerisation

137 (a)

Statement I is the correct explanation of statement II

138 (c)

Statement II is incorrect, because of the presence of double bond polyisoprene can exist in two geometrical isomeric forms

139 (c)

It is a highly cross-linked polymer

140 (d)

Polybutadiene is an example of chain-growth polymer (addition polymerisation)

143 (a)

Statement I is the correct explanation of A.

144 (c)

Intermolecular forces of attraction in nylon are H-bonding

145 (a)

Both statements are correct, and statement 2 is the correct explanation of statement 1

146 (b)

Correct explanation is nylon-6 is condensation polymer of 6-amino hexanoic acid

147 (c)

Nylon 610-monomer units.

1. $\text{H}_2\text{N}(\text{CH}_2)_6\text{NH}_2$ (hexamethylene diamine)

2. $\text{HOOC}(\text{CH}_2)_{10}\text{COOH}$ (sebacic acid)

148 (d)

Polyvinyl alcohol cannot be prepared by polymerisation of vinyl alcohol since it readily tautomerises to acetaldehyde

152 (d)

Buna-N is a polymer of acrylonitrile ($\text{CH}_2=\text{CHCN}$) and butadiene ($\text{CH}_2=\text{CH}-\text{CH}=\text{CH}_2$)

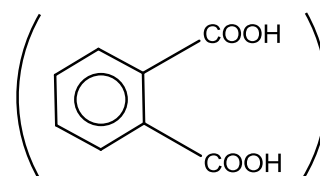
Nylon-66 is a polymer of hexamethylenediamine ($\text{NH}_2-(\text{CH}_2)_6-\text{NH}_2$) and adipic acid ($\text{HOOC}-(\text{CH}_2)_4-\text{COOH}$).

Dacron (terylene) is a polymer of terephthalic acid.

($\text{HOOC}-\text{C}_6\text{H}_4-\text{COOH}$) and ethylene

Glycol ($\text{HOCH}_2-\text{CH}_2\text{OH}$)

Glyptal plastic is a polymer of phthalic acid



158 (c)

$\text{HOOC}(\text{CH}_2)_2\text{COOH}$ From condensation polymers.

159 (b)

Vulcanization is responsible for tensile strength, elasticity and resistance to abrasion of rubber.