DPP - Daily Practice Problems

Chapter-wise Sheets

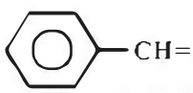
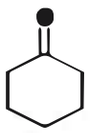
Date : Start Time : End Time :

CHEMISTRY CC29

SYLLABUS : Polymers

Max. Marks : 180 **Marking Scheme :** + 4 for correct & (–1) for incorrect **Time : 60 min.**

INSTRUCTIONS : This Daily Practice Problem Sheet contains 45 MCQ's. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.

1. Which of the following catalyst is used in preparation of high density polythene ?
   (a) Peroxide catalyst
   (b) Ziegler - Natta catalyst
   (c) Wilkinson's catalyst
   (d) Pd - catalyst
2. Among cellulose, polyvinyl chloride, nylon and natural rubber, the polymer in which the intermolecular force of attraction is weakest is
   (a) nylon (b) polyvinyl chloride
   (c) cellulose (d) natural Rubber
3. Polyvinylalcohol can be prepared by
   (a) polymerization of vinyl alcohol
   (b) alkaline hydrolysis of polyvinyl acetate
   (c) polymerization of acetylene
   (d) reaction of acetylene with H_2SO_4 in presence of $HgSO_4$
4. Which of the following polymer is an example of fibre ?
   (a) Silk (b) Dacron
   (c) Nylon-6, 6 (d) All of these
5. Which compound/set of compounds is used in the manufacture of nylon 6?
   (a) 
   (b) $HOOC(CH_2)_4COOH + NH_2(CH_2)_6NH_2$
   (c) $CH_2=CH-\overset{CH_3}{\overset{|}{C}}=CH_2$
   (d) 
6. The polymer containing strong intermolecular forces e.g. hydrogen bonding, is
   (a) teflon (b) nylon 6, 6
   (c) polystyrene (d) natural rubber
7. Which one of the following polymers is prepared by condensation polymerisation?
   (a) Teflon (b) Natural rubber
   (c) Styrene (d) Nylon-6, 6

RESPONSE GRID					
1. ⓐⓑⓒⓓ	2. ⓐⓑⓒⓓ	3. ⓐⓑⓒⓓ	4. ⓐⓑⓒⓓ	5. ⓐⓑⓒⓓ
6. ⓐⓑⓒⓓ	7. ⓐⓑⓒⓓ			

Space for Rough Work

8. Three dimensional molecules with cross links are formed in the case of a
   (a) thermoplastic (b) thermosetting plastic
   (c) both (a) and (b) (d) none of the above

9. In elastomer, intermolecular forces are
   (a) strong (b) weak
   (c) nil (d) none of these

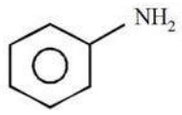
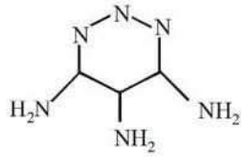
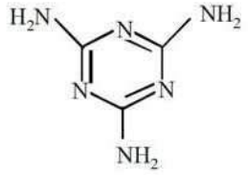
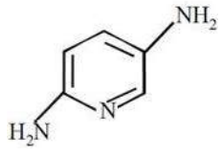
10. Nylon 6, 6 is a polyamide obtained by the reaction of
   (a) $COOH(CH_2)_4COOH + NH_2C_6H_4NH_2$
   (b) $COOH(CH_2)_4COOH + NH_2(CH_2)_6NH_2$
   (c) $COOH(CH_2)_6COOH + NH_2(CH_2)_4NH_2$
   (d) $COOHC_6H_4COOH$-(p) $+ NH_2(CH_2)_6NH_2$

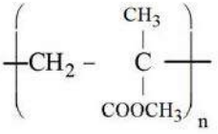
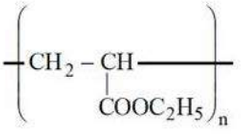
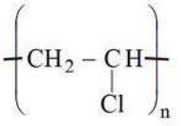
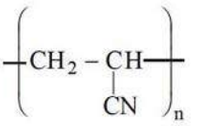
11. Buna-N synthetic rubber is a copolymer of:
   (a) $H_2C=CH-CH=CH_2$ and $H_5C_6-CH=CH_2$
   (b) $H_2C=CH-CN$ and $H_2C=CH-CH=CH_2$
   (c) $H_2C=CH-CN$ and $H_2C=CH-\underset{\displaystyle CH_3}{\underset{|}{C}}=CH_2$
   (d) $H_2C=CH-\underset{\displaystyle Cl}{\underset{|}{C}}=CH_2$ and $H_2C=CH-CH=CH_2$

12. Interparticle forces present in nylon-6, 6 are
   (a) van der Waal's
   (b) hydrogen bonding
   (c) dipole-dipole interactions
   (d) None of the above

13. Monomer of $\left[-\underset{\displaystyle CH_3}{\underset{|}{C}}-CH_2-\right]_n$ is
   (a) 2-Methylpropene (b) Styrene
   (c) Propylene (d) Ethene

14. Which of the following is not correctly matched?
   (a) Neoprene; $\left[-CH_2-\underset{\displaystyle Cl}{\underset{|}{C}}=CH-CH_2-\right]_n$
   (b) Nylon-6, 6: $\left[-NH-(CH_2)_6-NH-CO-(CH_2)_4-\overset{\displaystyle O}{\overset{\|}{C}}-\bullet-\right]_n$
   (c) Terylene; $\left[-OCH_2-CH_2-O-\overset{\displaystyle O}{\overset{\|}{C}}-C_6H_4-\overset{\displaystyle O}{\overset{\|}{C}}-\right]_n$
   (d) PMMA: $\left[-CH_2-\underset{\displaystyle COOCH_3}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}}-\right]_n$

15. Which of the following compound is used for preparation of melamine formaldehyde polymer ?
   (a) 
   (b) 
   (c) 
   (d) 

16. Acrilan is a hard, horny and a high melting material. Which of the following represents its structure?
   (a)  (b) 
   (c)  (d) 

17. Bakelite is obtained from phenol by reacting with
   (a) $(CH_2OH)_2$ (b) CH_3CHO
   (c) CH_2COCH_3 (d) HCHO

RESPONSE GRID					
	8. ⓐⓑⓒⓓ	9. ⓐⓑⓒⓓ	10. ⓐⓑⓒⓓ	11. ⓐⓑⓒⓓ	12. ⓐⓑⓒⓓ
	13. ⓐⓑⓒⓓ	14. ⓐⓑⓒⓓ	15. ⓐⓑⓒⓓ	16. ⓐⓑⓒⓓ	17. ⓐⓑⓒⓓ

Space for Rough Work

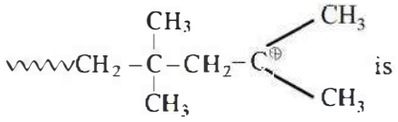
18. Polymer formation from monomers starts by
(a) condensation reaction between monomers
(b) coordinate reaction between monomers
(c) conversion of monomer to monomer ions by protons
(d) hydrolysis of monomers.

19. Melamine plastic crockery is a codensation polymer of
(a) HCHO and melamine
(b) HCHO and ethylene
(c) melamine and ethylene
(d) None of these

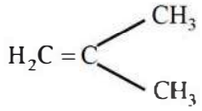
20. Which of the following is a polyamide?
(a) Bakelite (b) Terylene
(c) Nylon-6, 6 (d) Teflon

21. Terylene is a condensation polymer of ethylene glycol and
(a) benzoic acid (b) phthalic acid
(c) salicyclic acid (d) terephthalic acid

22. The monomer of the polymer;



is

(a)  (b) $CH_3CH=CHCH_3$

(c) $CH_3CH=CH_2$ (d) $(CH_3)_2C=C(CH_3)_2$

23. Generally, molecular mass of a polymer is over
(a) 100 (b) 500
(c) 1,000 (d) 10,000

24. Plexiglas (PMMA) is a polymer of
(a) acrylic acid (b) methyl acrylate
(c) methyl methacrylate (d) None of these

25. Which one of the following is not a condensation polymer ?
(a) Melamine (b) Glyptal
(c) Dacron (d) Neoprene

26. Dacron is obtained by the condensation polymerisation of:
(a) Dimethyl terephthalate and ethylene glycol
(b) Terephthalic acid and formaldehyde
(c) Phenol and phthalic acid
(d) Phenol and formaldehyde

27. Which of the following is not a copolymer?
(a) Buna–S (b) Baketite
(c) Neoprene (d) Dacron

28. Ziegler-Natta catalyst is
(a) $K[PtCl_3(C_2H_4)]$ (b) $(Ph_3P)_3RhCl$
(c) $Al_2(C_2H_5)_6+TiCl_4$ (d) $Fe(C_5H_5)_2$

29. Dacron is a –
(a) crease resistant
(b) polyamide
(c) addition polymer
(d) polymer of ethylene glycol and phthalic acid

30. The turbidity of a polymer solution measures
(a) the light scattered by solution
(b) the light absorbed by a solution
(c) the light transmitted by a solution
(d) None of these

31. Which of the following polymers do not involve cross linkages?
(a) Melmac (b) Bakelite
(c) Polythene (d) Vulcanised rubber

32. Which of the following statements are correct?
(i) Buna–N being resistant to the action of petrol, lubricating oil and organic solvents is used in making oil seals.
(ii) Biodegradable polymers are manufactured because of low chemical resistance, strength and durability of conventional polymers.
(iii) PHBV is a copolymer used in the manufacture of orthopaedic devices.
(iv) Nylon 2–nylon 6 is a biodegradable polymer.
(a) (i), (ii) and (iii) (b) (ii), (iii) and (iv)
(c) (i), (iii) and (iv) (d) (i) and (iv)

33. Arrange the following in increasing order of their melting point.
(1) Nylon 2,2; (2)Nylon 2,4; (3)Nylon2,6; (4)Nylon 2,10
(a) 1,2,3,4 (b) 3,4,2,1
(c) 2,1,3,4 (d) 4,3,2,1

34. A copolymer of isobutylene and isoprene is called:
(a) butyl rubber (b) buna-S
(c) buna-N (d) thiokol

RESPONSE GRID					
	18. ⓐ ⓑ ⓒ ⓓ	19. ⓐ ⓑ ⓒ ⓓ	20. ⓐ ⓑ ⓒ ⓓ	21. ⓐ ⓑ ⓒ ⓓ	22. ⓐ ⓑ ⓒ ⓓ
	23. ⓐ ⓑ ⓒ ⓓ	24. ⓐ ⓑ ⓒ ⓓ	25. ⓐ ⓑ ⓒ ⓓ	26. ⓐ ⓑ ⓒ ⓓ	27. ⓐ ⓑ ⓒ ⓓ
	28. ⓐ ⓑ ⓒ ⓓ	29. ⓐ ⓑ ⓒ ⓓ	30. ⓐ ⓑ ⓒ ⓓ	31. ⓐ ⓑ ⓒ ⓓ	32. ⓐ ⓑ ⓒ ⓓ
	33. ⓐ ⓑ ⓒ ⓓ	34. ⓐ ⓑ ⓒ ⓓ			

Space for Rough Work

35. Ebonite is
(a) natural rubber
(b) synthetic rubber
(c) highly vulcanized rubber
(d) polypropene

36. Orlon is a polymer of
(a) styrene (b) tetrafluoroethylene
(c) vinyl chloride (d) acrylonitrile

37. Among the following polymers the strongest molecular forces are present in
(a) elastomers (b) fibres
(c) thermoplastics (d) thermosetting polymers

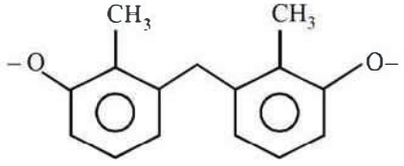
38. Caprolactam polymerises to give
(a) terylene (b) teflon
(c) glyptal (d) Nylon-6

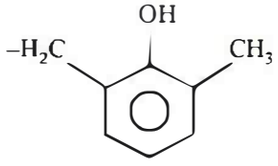
39. Match Column-I (Monomer) with Colum-II (Polymer) and select the correct answer using the codes given below the lists:

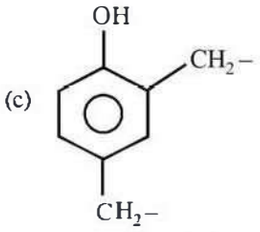
	Column-I		Column-II
A.	Hexamethylenediamine	I.	Bakelite
B.	Phenol	II.	Dacron
C.	Phthalic acid	III.	Glyptal
D.	Terephthalic acid	IV.	Melamine
		V.	Nylon

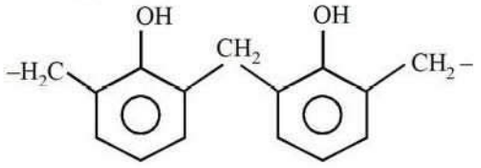
(a) A– V; B – I; C – II; D – III
(b) A – V; B – I; C – III; D – II
(c) A – IV; B – III; C – I; D – II
(d) A– IV; B – III; C – II; D – I

40. Which of the following is novolac ?

(a) 

(b) 

(c) 

(d) 

41. Match the polymers given in Column-I with their chemical names given in Column-II

	Column-I		Column-II
A.	Nylon 6	I.	Polyvinyl chloride
B.	PVC	II.	Polyacrylonitrile
C.	Acrolein	III.	Polycaprolactum
D.	Natural rubber	IV.	Low density polythene
E	LDP	V.	cis-polyisoprene

(a) A – III; B – I; C – II; D – V; E – IV
(b) A – IV; B – II; C – V; D – III; E – I
(c) A – V; B – IV; C – I; D – II; E – III
(d) A – IV; B – V; C – III; D – II; E – I

42. Two condensation polymers are made
(1) ethylene diamine + ethane–1, 2– dicarboxylic acid
(2) trimethylenediamine + ethane–1, 2– dicarboxylic acid
if both polymers of same molecular weight are obtained then which of the following statements is/are correct ?
(i) Polymer (1) is found to melt at lower temperature.
(ii) Polymer (2) is found to melt at lower temperature.
(iii) H-bonding is major factor.
(a) (i), (ii) and (iii) (b) Only(ii)
(c) (i)and(iii) (d) (ii)and(iii)

43. Which of the following polymer is used for making phonograph records ?
(a) Bakelite (b) Dacron
(c) Teflon (d) PVC

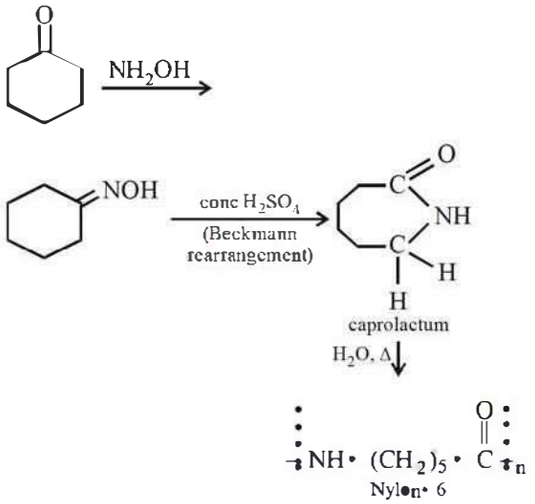
44. Which of the following statements is not true about low density polythene?
(a) Tough
(b) Hard
(c) Poor conductor of electricity
(d) Highly branched structure

45. Polymer used in bullet proof glass is
(a) PMMA (b) Lexan
(c) Nomex (d) Kevlar

RESPONSE GRID					
	35. ⓐⓑⓒⓓ	36. ⓐⓑⓒⓓ	37. ⓐⓑⓒⓓ	38. ⓐⓑⓒⓓ	39. ⓐⓑⓒⓓ
	40. ⓐⓑⓒⓓ	41. ⓐⓑⓒⓓ	42. ⓐⓑⓒⓓ	43. ⓐⓑⓒⓓ	44. ⓐⓑⓒⓓ
	45. ⓐⓑⓒⓓ				

Space for Rough Work

1. **(b)** High density polythene is formed when addition polymerisation of ethene takes place in a hydrocarbon solvent in presence of catalyst such as Ziegler-Natta catalyst.
2. **(d)** Nylon and cellulose, both have intermolecular hydrogen bonding, polyvinyl chloride has dipole-dipole interactions, while natural rubber has van der Waal forces which are weakest.
3. **(b)** Vinyl alcohol, CH_2= CHOH, monomer of polyvinyl alcohol exists mainly as CH_3CHO; hence polyvinyl alcohol is best prepared by the alkaline hydrolysis of polyvinyl acetate which in turn is prepared by the polymerisation of vinyl acetate
4. **(d)** Silk is protein fibre. Dacron is polyester fibre and Nylon-6, 6 is polyamide fibre.
5. **(d)** Nylon–6 can be manufactured from



6. **(b)** Nylon– 6, 6 has amide linkage and capable of forming hydrogen bonding.
7. **(d)** Copolymer of adipic acid and hexamethylene diamine.

$$n\ HOOC(CH_2)_4COOH + nH_2N(CH_2)_6NH_2 \rightarrow$$

Adipicacid — Hexamethylenediamine

$$\{C-(CH_2)_4-C-NH-(CH_2)_6-NH\}_n$$

Nylon 6,6

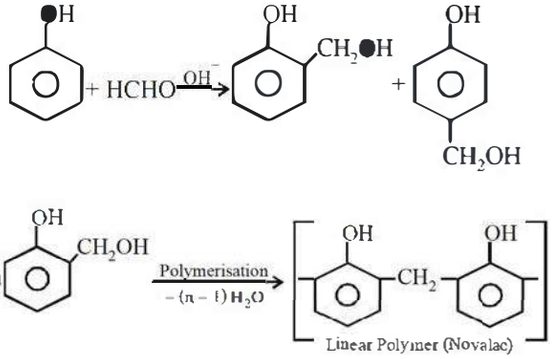
8. **(b)** Thermosetting plastics consist of chain molecules which are chemically bonded, or cross-linked, with each other when heated. When thermosetting plastics cross-link, the molecules create a permanent, 3-D network that can be considered one giant molecule.
9. **(b)** Elastomers are the polymers having very weak intermolecular forces of attraction between the polymer chain. The weak forces permit the polymer to be stretched.
10. **(b)** $nHOOC(CH_2)_4COOH + nH_2N(CH_2)_6NH_2$

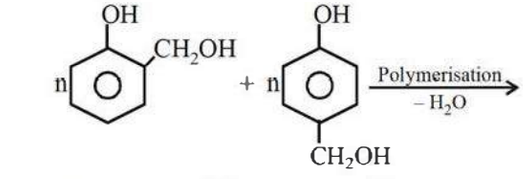
adipic acid — Hexamethylene diamine

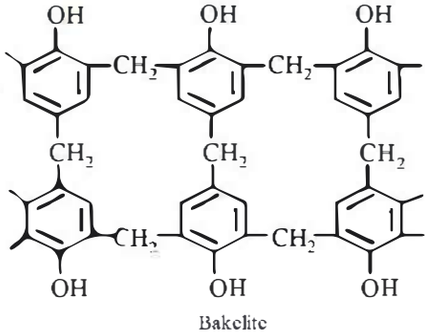
$$\xrightarrow[\text{Polymerisation}]{525K} [-C-(CH_2)_4-C-NH-(CH_2)_6-NH-]_n$$

Nylon 6, 6

11. **(b)** Buna – N is a copolymer of butadiene (CH_2= CH–CH= CH_2) and acrylonitrile (CH_2= CHCN).
12. **(b)** Nylon-6, 6 is a polyamide having –CONH– ; oxygen of CO of amide linkage is linked to H of NH of the other –CONH–linkage
13. **(a)** Formula of the monomer indicated in bracket, $(CH_3)_2C=CH_2$, corresponds to 2-methylpropene
14. **(b)** Nylon-6,6 is a polyamide, hence it has only–CONH– linkage and no –COO- linkage
15. **(c)**
16. **(d)**
17. **(d)** Phenol and formaldehyde undergo condensation polymerisation under two different conditions to give a cross linked polymer called bakelite.







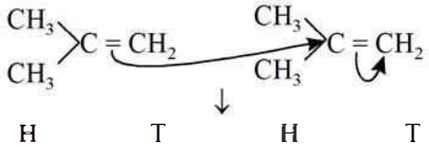
18. **(a)** Polymerisation starts either by condensation or addition reactions between monomers. Condensation polymers are formed by the combination of monomers with the elimination of simple molecules. Where as the addition polymers are formed by the addition together of the molecules of the mononer or monomers to form a large molecule without elimination of any thing.

19. **(a)** Melamine plastic crockery is a copolymer of HCHO and melamine.

20. **(c)** Nylon-6, 6 is a general name for all synthetic fibres forming polyamides.

21. **(d)**

22. **(a)** Addition of monomers follows isoprene rule



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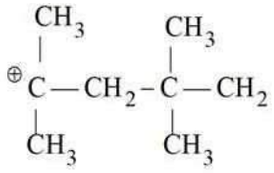
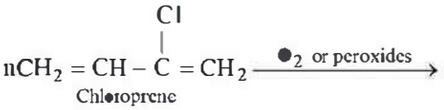
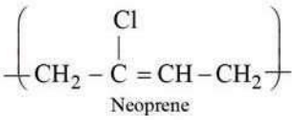


23. **(d)** **24.** **(c)**

25. **(d)** Neoprene is an addition polymer of isoprene.

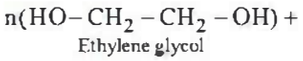


Chloroprene

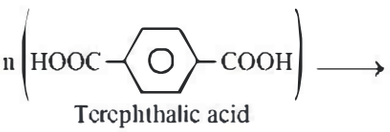


Neoprene

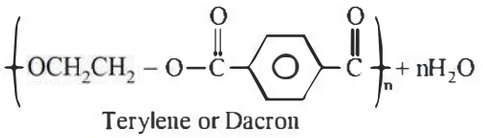
26. **(a)** The polymer of ethylene glycol and tere-phthalic acid is known as **terylene** or **dacron**.



Ethylene glycol



Terephthalic acid



Terylene or Dacron

It is a **condensation polymer.**

[**Note:** Now a days dimethyl terepthalate is used instead of terephthalic acid. This is due to the fact that terephthalic acid is non-volatile and very slightly soluble in most of the solvents. Dimethyl terepthalate on the other hand, can be purified by distillation very easily]. Thus, option (a) is correct.

27. **(c)** Neoprene is a homopolymer of chloroprene.

28. **(c)**

29. **(a)** Dacron is a polyester and is the condensation polymer of ethylene glycol and terephthalic acid. It is a crease resistant.

30. **(a)** Molecules of a polymer, being large in size, scatter light.

31. **(c)** Polythene is a linear polymer

32. **(c)** Biodegradable polymers are manufactured because conventional polymers are quite resistant to the environmental degradation which leads to accumulation of polymeric solid waste materials causing acute environmental problems.

33. **(d)** As the amide density along the chain increases the melting point increases.

34. **(a)** Butyl rubber is a copolymer of isobutylene and isoprene.

35. **(c)** Ebonite is a hard highly vulcanized rubber, containing 20-30%, rubber

36. **(d)** Orlon is a trade name of polyacrylonitrile

37. **(d)** Thermosetting polymers have strongest molecular forces. These are crosslinked polymers.

38. **(d)**

39. **(b)** A – V; B – I; C – III; D – II

40. **(d)**

41. **(a)** A – III; B – I; C – II; D – V; E – IV

42. **(d)** Number of hydrogen bonds is greater in polymer (1) than in (2) as the density of amide bond is greater in (1) therefore the chain links to each other strongly in (1) than in (2) hence (1) melts at higher temperature.

43. **(a)** Bakelite is used for making phonograph records.

44. **(c)**

45. **(b)**