DPP - Daily Practice Problems

Name : _____ Date : _____

Start Time : _____ End Time : _____

CHEMISTRY 26

SYLLABUS : Hydrocarbons-2 (Alkenes)

Max. Marks : 120 **Time : 60 min.**

GENERAL INSTRUCTIONS

- The Daily Practice Problem Sheet contains 30 MCQ's. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.
- You have to evaluate your Response Grids yourself with the help of solution booklet.
- Each correct answer will get you 4 marks and 1 mark shall be deduced for each incorrect answer. No mark will be given/ deducted if no bubble is filled. Keep a timer in front of you and stop immediately at the end of 60 min.
- The sheet follows a particular syllabus. Do not attempt the sheet before you have completed your preparation for that syllabus. Refer syllabus sheet in the starting of the book for the syllabus of all the DPP sheets.
- After completing the sheet check your answers with the solution booklet and complete the Result Grid. Finally spend time to analyse your performance and revise the areas which emerge out as weak in your evaluation.

DIRECTIONS (Q.1-Q.21) : There are 21 multiple choice questions. Each question has 4 choices (a), (b), (c) and (d), out of which ONLY ONE choice is correct.

Q.1 The minimum number of C atoms required to be present in an optically active alkene are:

(a) 4 (b) 6 (c) 8 (d) 10

Q.2 $CH_2(H)-CH_2(Cl) \xrightarrow{alk.NaOH} CH_2=CH_2$.

Most probable mechanism for this reaction is -

(a) E1 (b) E2

(c) $E1_{CB}$ (d) α–elimination

Q.3 $CH_3-CH(Cl)-CH(Cl)-CH_3 \xrightarrow{Zn/dust} CH_3-CH=CH-CH_3$

This 2-butene is -

(a) Cis-2-butene (b) Trans -2-butene

(c) Dependent upon reactant (d) Racemic mixture

Q.4 What would be the product when ethene reacts with Br_2 water in presence of brine ?

(a) $CH_2(Br)-CH_2(Br)$

(b) $CH_2(Br)-CH_2(Br)$ & $CH_2(Br)-CH_2(Cl)$

(c) $CH_2(Br)-CH_2(Br)$ & $CH_2(Br)-CH_2(NO_2)$

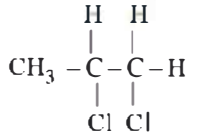
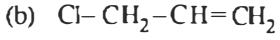
(d) $CH_2(Br)-CH_2(Br)$ & $CH_2(Br)-CH_2(NO_3)$

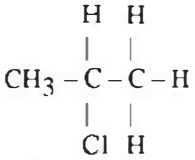
RESPONSE GRID	1. ⓐⓑⓒⓓ	2. ⓐⓑⓒⓓ	3. ⓐⓑⓒⓓ	4. ⓐⓑⓒⓓ

Space for Rough Work

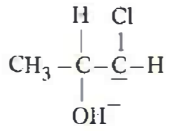
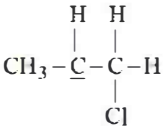
Q.5 What would be the product when 2-pentene reacts with HBr ?
(a) 2-bromopentane (b) 3-bromopentane
(c) Both (a) and (b) (d) 1-bromopentane

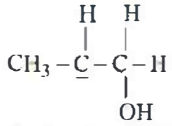
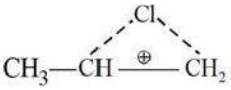
Q.6 What would be the product when propene reacts with chlorine in presence of CCl_4 ?

(a)  (b) 

(c)  (d) 

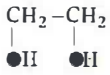
Q.7 Propene + HOCl → A → Final product.
In the above reaction A will be –

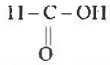
(a)  (b) 

(c)  (d) 

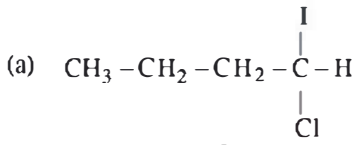
Q.8 In hydroboration it is evident that in the overall reaction a molecule of a water has been added to propene and the addition is :
(a) According to Markownikoff's rule
(b) Contrary to Markownikoff's rule
(c) Not concerned with Markownikoff's rule
(d) None of the above

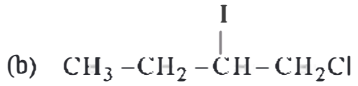
Q.9 What would be the product when ethene is oxidised with acidic $KMnO_4$?

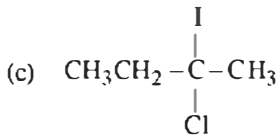
(a)  (b) 

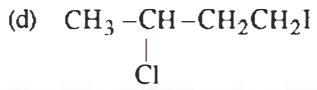
(c)  (d) $CO_2 + H_2O$

Q.10 Predict the product C obtained in the following reaction of butyne-1.

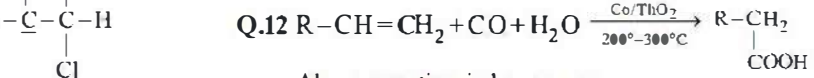
(a) 

(b) 

(c) 

(d) 

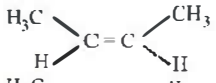
Q.11 Reaction of alkene and peracid gives oxyrane. This reaction is named as –
(a) Peroxidation (b) Oxidation
(c) Priles Chaiev reaction (d) None

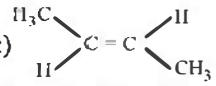
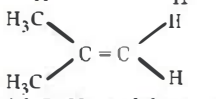
Q.12 

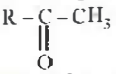
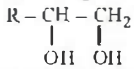
Above reaction is known as –
(a) Oxo reaction (b) Carboxylation
(c) Both of the above (d) None of these

Q.13 NBS reacts with 1-butene to give –
(a) 3-bromobutene-1 (b) 1,2-dibromobutane
(c) 1-bromobutene (d) 1,2-dibromobutene-1

Q.14 The compound which reacts with HBr obeying Markownikov's rule is?

(a) $CH_2 = CH_2$ (b) 

(c)  (d) 

Q.15 Alkene $R-CH=CH_2$ reacts readily with B_2H_6 and the product on oxidation with alkaline hydrogen peroxide produces -
(a) $R-CH_2-CHO$ (b) $R-CH_2-CH_2-OH$
(c)  (d) 

Q.16 Reaction of HBr with propene in the presence of peroxide gives -
(a) 3-bromopropane (b) allyl bromide
(c) n-propyl bromide (d) isopropyl bromide

RESPONSE GRID					
	5. ⓐⓑⓒⓓ	6. ⓐⓑⓒⓓ	7. ⓐⓑⓒⓓ	8. ⓐⓑⓒⓓ	9. ⓐⓑⓒⓓ
	10. ⓐⓑⓒⓓ	11. ⓐⓑⓒⓓ	12. ⓐⓑⓒⓓ	13. ⓐⓑⓒⓓ	14. ⓐⓑⓒⓓ
	15. ⓐⓑⓒⓓ	16. ⓐⓑⓒⓓ			

Space for Rough Work

Q.17 A mixture of 1-chloropropane and 2-chloropropane when treated with alcoholic KOH, gives
(a) 1-Propene
(b) 2- Propene
(c) Isopropylene
(d) A mixture of 1-propene and 2-propene

Q.18 The synthesis of ethene from electrolysis of an aqueous solution of potassium succinate is known as:
(a) Faradays electrolysis
(b) Kolbe- Schmidt reaction
(c) Hoffmann's rearrangement
(d) Kolbe's electrolysis synthesis

Q.19 Which of the following alkenes is the most stable?
(a) $CH_2=CH_2$ (b) $R-CH=CH-R$
(c) $R_2C=CH_2$ (d) $RCH=CH_2$

Q.20 Propene on treatment with chlorine at 500-600°C gives the following product (s) :
(a) $CH_3-CH_2=CH-Cl$ (b) $CH_3-\underset{\displaystyle Cl}{\underset{|}{C}}=CH_2$
(c) $Cl-CH_2-CH=CH_2$ (d) All of these

Q.21 A hydrocarbon reacts with HI to give (X) which on reacting with aqueous KOH forms (Y). Oxidation of (Y) gives 3-methyl-2-butanone. The hydrocarbon is :
(a) $CH_3CH=\underset{\displaystyle CH_3}{\underset{|}{C}}-CH_3$ (b) $CH_2=CH-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_3$
(c) $CH_3-CH_2-\underset{\displaystyle CH_3}{\underset{|}{C}}=CH_2$ (d) $CH\equiv C-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_3$

DIRECTIONS (Q.22-Q.24) : In the following questions, more than one of the answers given are correct. Select the correct answers and mark it according to the following codes:

Codes :
(a) 1, 2 and 3 are correct **(b)** 1 and 2 are correct
(c) 2 and 4 are correct **(d)** 1 and 3 are correct

Q.22 If we take ethylidene chloride and isopropylidene chloride with zinc dust then product will be –
(1) 2-butene (2) 2,3-dimethyl -2-butene
(3) 2-methyl -2-butene (4) 2-methyl-1-butene

Q.23 $RCH=CH_2$ can be obtained by :
(1) $R-\overset{\displaystyle O}{\overset{\|}{C}}-H$ and $(C_6H_5)_3P=CH_2$
(2) By heating $RCH_2CH_2\underset{\displaystyle O}{\underset{\downarrow}{N}}(CH_3)_2$
(3) By heating $RCH_2CH_2OCOCH_3$
(4) By Kolbe synthesis of $C_2H_5COO\,Na$

Q.24 Decolourization of alkaline $KMnO_4$ is used as a test for :
(1) Olefinic hydrocarbons
(2) Aromatic hydrocarbons
(3) Acetylenic hydrocarbons
(4) Saturated hydrocarbons

DIRECTIONS (Q.25-Q.27) : Read the passage given below and answer the questions that follows :

Markownikoff's rule states, "the negative part of addendum is added on the carbon atom carrying lesser number of hydrogen atoms".

$$R-CH=CH_2+\overset{\delta^+}{H}-\overset{\delta^-}{X}\longrightarrow R-\underset{\displaystyle X}{\underset{|}{CH}}-CH_3$$

Unsymmetrical alkene — Alkyl halide

However, addition of HBr on propylene in the presence of sunlight, air or an organic peroxide produces mainly n-propyl bromide instead of isopropyl bromide. In the presence of organic peroxides, addition of HBr takes place by a free radical mechanism as follows.

$$C_6H_5-\overset{\displaystyle O}{\overset{\|}{C}}-O-O-\overset{\displaystyle O}{\overset{\|}{C}}-C_6H_5\xrightarrow{\text{Homolysis}}C_6H_5-\overset{\displaystyle O}{\overset{\|}{C}}-O^{\bullet}$$

Benzoyl peroxide

$$C_6H_5-\overset{\displaystyle O}{\overset{\|}{C}}-O^{\bullet}\longrightarrow\overset{\bullet}{C}_6H_5+CO_2$$

Benzoyloxy free radical — Phenyl free radical

Q.25 Addition of HCl on $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH=CH_2$ forms the following major product :
(a) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-\underset{\displaystyle Cl}{\underset{|}{CH}}-CH_3$ (b) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-CH_2Cl$
(c) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CCl}}-CH_2-CH_3$ (d) $Cl-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-CH_2-CH_3$

RESPONSE GRID					
	17. ⓐⓑⓒⓓ	18. ⓐⓑⓒⓓ	19. ⓐⓑⓒⓓ	20. ⓐⓑⓒⓓ	21. ⓐⓑⓒⓓ
	22. ⓐⓑⓒⓓ	23. ⓐⓑⓒⓓ	24. ⓐⓑⓒⓓ	25. ⓐⓑⓒⓓ	

Space for Rough Work

Q.26 When HCl gas is passed through propene in the presence of benzoyl peroxide, it gives :

(a) n-Propyl chloride

(b) 2-Chloropropene

(c) Allyl chloride

(d) No reaction

Q.27 Reaction of $CH_3CH=CH_2$ with $Br.CCl_3$ in the presence of a peroxide yields the following product.

(a) $CH_3-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_2-CCl_3$

(b) $CH_3-\underset{\displaystyle CCl_3}{\underset{|}{CH}}-CH_2Br$

(c) $BrCH_2-CH=CH_2$ and $CHCl_3$

(d) No reaction takes place

DIRECTIONS (Q.28-Q.30) : Each of these questions contains two statements: Statement-1 (Assertion) and Statement-2 (Reason). Each of these questions has four alternative choices, only one of which is the correct answer. You have to select the correct choice.

(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.

(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1.

(c) Statement-1 is False, Statement-2 is True.

(d) Statement-1 is True, Statement-2 is False.

Q.28 Statement 1 : 1-Buteneon reaction with HBr in the presence of a peroxide produces 1-bromobutane.

Statement 2 : It involves the free radical mechanism.

Q.29 Statement-1 :

$$CH_3-CH=CH_2 \xrightarrow{Cl_2,\ 773K} ClCH_2-CH=CH_2+HCl$$

Statement-2 : At high temperature Cl_2 dissociates into chlorine atoms which bring about the allylic substitution.

Q.30 Statement 1 : Addition of bromine to *trans*-2-butene yields *meso*-2,3-dibromobutane.

Statement 2 : Bromine addition to an alkene is an electrophilic addition.

RESPONSE GRID	26.ⓐⓑⓒⓓ	27.ⓐⓑⓒⓓ	28.ⓐⓑⓒⓓ	29.ⓐⓑⓒⓓ	30.ⓐⓑⓒⓓ

DAILY PRACTICE PROBLEM SHEET 26 - CHEMISTRY			
Total Questions	30	Total Marks	120
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	36	Qualifying Score	60
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

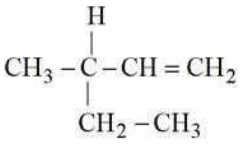
Space for Rough Work

DAILY PRACTICE PROBLEMS

CHEMISTRY SOLUTIONS

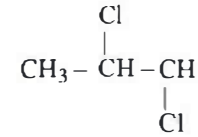
26

(1) **(b)**

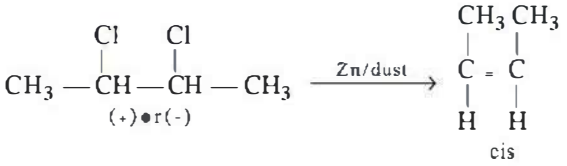


Here the central carbon atom is an asymmetric carbon atom.

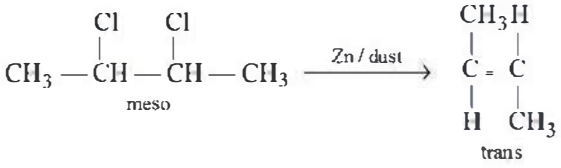
(2) **(b)** 1° halide generally gives E 2 mechanism.

(3) **(c)**  may be of two types.

It may be asymmetrical or meso and they can give different compounds.

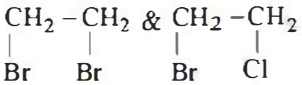


cis

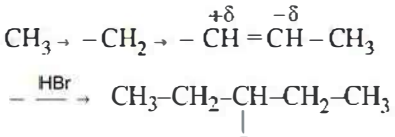


trans

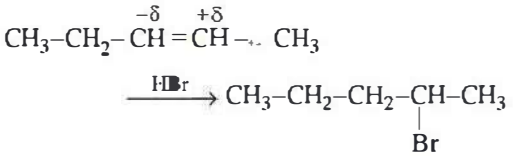
(4) **(b)** In the presence of NaCl solution, the products are



(5) **(c)**

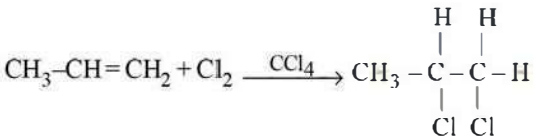


3-bromopentane



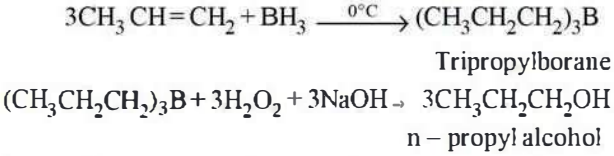
2-bromopentane

(6) **(a)**



(7) **(d)**

(8) **(b)** In hydroboration it is evident that in the overall reaction a molecule of water has been added to propene and the addition is contrary to Markownikoff's rule

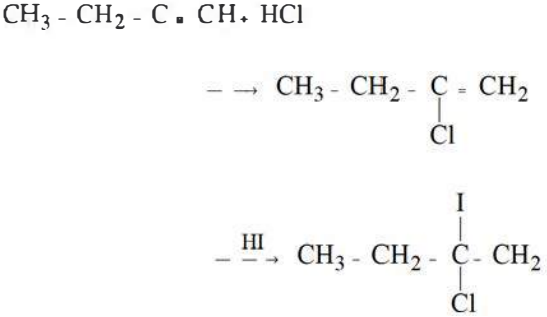


Tripropylborane

n – propyl alcohol

(9) **(d)** Ethene reacts with acidic $KMnO_4$ to form CO_2 and H_2O.

(10) **(c)** This reaction occurs according to Markownikoff's rule which states that when an unsymmetrical alkene undergo hydrohalogenation, the negative part goes to that C-atom which contain lesser no. of H-atom.



(11) **(c)** Reaction is known as Priles Chaiev reaction.

(12) **(c)** Reaction is named as oxo and carboxylation. If $CO + H_2$ is taken then the reaction is named as a hydroformylation.

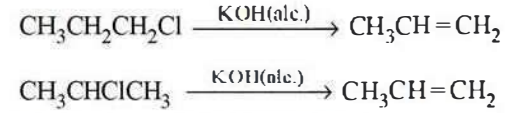
(13) **(a)** NBS is used for the bromo substitution of allylic hydrogen.

(14) **(d)**

(15) **(b)** $R - CH_2 - CH_2 - OH$

(16) **(c)** Reaction of HBr with propene in the presence of peroxide gives n-propyl bromide.

(17) **(a)**



(18) **(d)** The synthesis of ethene from electrolysis of an aqueous solution of potassium succinate is known as Kolbe's electrolysis synthesis.

The reaction takes place as follows :

$$\begin{matrix}CH_2COOK\\|\\CH_2COOK\end{matrix} \dashrightarrow \begin{matrix}CH_2COO^-\\|\\CH_2COO^-\end{matrix}$$

$$\begin{matrix}CH_2COO^-\\|\\CH_2COO^-\end{matrix} \xrightarrow{-2e,\ \text{At anode}} \begin{matrix}CH_2\\\|\\CH_2\\\text{chene}\end{matrix} + 2CO_2$$

$$2K^+ + 2e \dashrightarrow 2K \text{ (at cathode)}$$

$$2K + 2H_2O \dashrightarrow 2KOH + H_2$$

(19) **(c)** The greater the no. of alkyl groups attached to the doubly bonded C atoms, the more stable the alkene is $R_2C=CH_2$.

(20) **(c)** Propene on treatment with chlorine at 500-600°C produces allyl chloride. The reaction takes place as follows :

$$CH_3-CH=CH_2 \xrightarrow[500-600°C]{Cl_2} CH_2Cl-CH=CH_2$$

Allyl chloride

(80%) yield

(21) **(b)**

$$CH_2-\underset{CH_3}{\underset{|}{CH}}-CH-CH_3 \xrightarrow{H^+}$$

$$CH_3-\overset{\oplus}{C}H-\underset{CH_3}{\underset{|}{CH}}-CH_3 \xrightarrow[(ii)\ KOH\ (aq)]{(i)\ I^-}$$

$$CH_3-\underset{OH}{CH}-\underset{CH_3}{CH}-CH_3 \xrightarrow{[O]} CH_3-CO-\underset{CH_3}{CH}-CH_3$$

(22) **(a)**

$$CH_3-CH\begin{matrix}Cl\\Cl\end{matrix} + \begin{matrix}Zn\\Zn\end{matrix} + \begin{matrix}Cl\\Cl\end{matrix}C\begin{matrix}CH_3\\CH_3\end{matrix} \xrightarrow{-2ZnCl_2} CH_3-CH=\underset{CH_3}{\underset{|}{C}}-CH_3$$

2-methyl-2-butene

$$CH_3-CH\begin{matrix}Cl\\Cl\end{matrix} + \begin{matrix}Zn\\Zn\end{matrix} + \begin{matrix}Cl\\Cl\end{matrix}CH-CH_3 \xrightarrow{-2ZnCl_2} CH_3-CH=CH-CH_3$$

2-butene

$$\begin{matrix}CH_3\\CH_3\end{matrix}C\begin{matrix}Cl\\Cl\end{matrix} + \begin{matrix}Zn\\Zn\end{matrix} + \begin{matrix}Cl\\Cl\end{matrix}C\begin{matrix}CH_3\\CH_3\end{matrix} \xrightarrow{-2ZnCl_2} CH_3-\underset{CH_3}{\underset{|}{C}}=\underset{CH_3}{\underset{|}{C}}-CH_3$$

2,3-dimethyl-2-butene

(23) **(a)** $RCH=CH_2$ can be obtained by all above reagents as follows :

(1) $R-\overset{O}{\overset{\|}{C}}-H$ and $(C_6H_5)_3P=CH_2$

$$\dashrightarrow PO(C_6H_5)_3 + RCH=CH_2$$

(2) $RCH_2CH_2\underset{\downarrow O}{N}(CH_3)_2 \xrightarrow[\text{Cope reaction}]{\Delta}$

$$RCH=CH_2 + (CH_3)_2NOH$$

(3) $RCH_2CH_2OCOCH_3 \xrightarrow{\Delta}$

$$RCH=CH_2 + CH_3COOH$$

(24) **(d)** It is the test for unsaturation in molecule.

(25) **(c)** The intermediate 2° carbocation

$$CH_3-\underset{CH_3}{\underset{|}{CH}}-\overset{+}{C}H-CH_3 \longrightarrow CH_3-\overset{+}{\underset{CH_3}{\underset{|}{C}}}-CH_2CH_3$$

undergoes rearrangement to form 3° carbocation.

(26) **(b)** Peroxide effect is noticed only in case of HBr. Addition of HCl follows Markownikoff's rule.

(27) **(a)** Compounds like CCl_4, $CHCl_3$, $BrCCl_3$ etc also show peroxide effect, hence they will show anti-Markownikoff's addition in the presence of peroxides. The reaction with $BrCCl_3$ takes place as

$$CH_3CH=CH_2 + BrCCl_3 \xrightarrow{\text{Peroxide}}$$

$$CH_3-\underset{Br}{\underset{|}{CH}}-CH_2-CCl_3$$

(28) **(a)**

$$H-\underset{H}{\underset{|}{C}}-\underset{H}{\underset{|}{C}}-\underset{H}{\underset{|}{C}}=\underset{H}{\underset{|}{C}}-H + HBr \xrightarrow{\text{Peroxide}} H-\underset{H}{\underset{|}{C}}-\underset{H}{\underset{|}{C}}-\underset{H}{\underset{|}{C}}-\underset{H}{\underset{|}{C}}-Br$$

1-Butene — 1-Bromobutane

In this reaction anti Markownikoff's addition is explained on the basis of the fact that in the presence of peroxide the addition takes place via a free radical mechanism.

(29) **(a)**

(30) **(b)** With *trans*-2-butene, the product of Br_2 addition is meso (optically inactive).

Even though, both assertion and reason are correct. the correct reason for the formation of *meso*-2, 3-dibromobutane from *trans*-2-butene is *anti*-addition of Br_2.