DPP - Daily Practice Problems

Name : _____ Date : _____

Start Time : _____ End Time : _____

CHEMISTRY 25

SYLLABUS : Hydrocarbons-1-(Alkanes)

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 $(CH_3-CH_2-)_3B \xrightarrow{H^+} A$, $(CH_3-CH_2-)_3B \xrightarrow[+NaOH]{AgNO_3} B$

The ratio of molecular weight of A and B is-

(a) ≈ 1 (b) ≈ 2

(c) ≈ 3 (d) ≈ 4

Q.2 Which of the following has maximum melting point ?

(a) C_4H_{10} (b) C_5H_{12}

(c) C_6H_{14} (d) C_7H_{16}

Q.3 How much volume of air will be needed for complete combustion of 10 lit. of ethane ?

(a) 135lit. (b) 35lit.

(c) 175lit. (d) 205lit.

Q.4 $C_2H_6 + SO_2 + Cl_2 \xrightarrow{U.V.Light}$ product. In this reaction product will be -

(a) C_2H_4 (b) CH_3CH_2Cl

(c) $CH_3CH_2SO_2Cl$ (d) C_2H_2

Q.5 When *n*-butane is heated in the presence of $AlCl_3/HCl$ it will be converted into –

(a) Ethane (b) Propane

(c) Butene (d) Isobutane

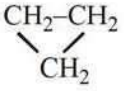
RESPONSE GRID	1. ⓐⓑⓒⓓ	2. ⓐⓑⓒⓓ	3. ⓐⓑⓒⓓ	4. ⓐⓑⓒⓓ	5. ⓐⓑⓒⓓ

Space for Rough Work

Q.6 Product of the Wolff-Kishner reduction is –
(a) Alkene (b) Alkyne
(c) Alkane (d) Amine

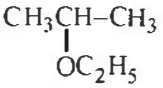
Q.7 Consider the following reaction,

$$CH_3CH=CH_2 \xrightarrow[2.CH_3COOH]{1.BH_3}$$

The product formed is -
(a) $CH_3CH_2CH_2OH$ (b) $CH_3CH(OH)CH_3$
(c) $CH_3CH_2CH_3$ (d) 

Q.8 Consider the following reactions.

$$CH_3CHOHCH_3 \xrightarrow{HBr} A \xrightarrow[C_2H_5OH]{Zn-Cu} B$$

The end product (B) is -
(a) $CH_3CH_2CH_3$ (b) 
(c) $CH_3CHBrCH_3$ (d) $CH_3CH=CH_2$

Q.9 Which of the following should be subjected to Wurtz reaction to obtain the best yield of *n*-hexane?
(a) Ethyl chloride and *n*-butyl chloride
(b) Methyl bromide and *n*-propyl bromide
(c) *n*-Propyl bromide
(d) Ethyl bromide and *n*-butyl bromide

Q.10 2-Methylbutane on reacting with bromine in the presence of sunlight gives mainly -
(a) 1-Bromo-3-methylbutane
(b) 2-Bromo-3-methylbutane
(c) 2-Bromo-2-methylbutane
(d) 1-Bromo-2-methylbutane

Q.11 Alkyl halides react with dialkylcopper reagents to give -
(a) Alkenyl halides (b) Alkanes
(c) Alkyl copper halides (d) Alkenes

Q.12 Which of the following reactions is expected to readily give a hydrocarbon product in good yield ?
(a) $(CH_3)_3C-Cl \xrightarrow{C_2H_5OH}$
(b) $RCO_2K \xrightarrow{electrolysis}$
(c) $CH_3-CH_3 \xrightarrow[h\nu]{Cl_2}$
(d) $RCO_2Ag \xrightarrow{Br_2}$

Q.13 Which of the following alkyl bromides may be used for the synthesis of 2, 3-dimethylbutane by Wurtz reaction ?
(a) *n*-Propyl bromide (b) Isopropyl bromide
(c) Isobutyl bromide (d) *n*-Butyl bromide

Q.14 The number of conformation (s) for ethane are–
(a) 1 (b) 2
(c) 3 (d) Infinite

Q.15 The Kolbe synthesis of alkane using a sodium salt of butanoic acid gives -
(a) *n*-hexane (b) isobutane
(c) *n*-butane (d) propane

Q.16 Methyl bromide is heated with zinc in closed tube produces
(a) Methane (b) Ethane
(c) Ethylene (d) Methanol

Q.17 Which method is suitable for preparation of higher alkanes from a lower alkyl halide ?
(a) Reduction
(b) Hoffmann bromamide reaction
(c) Hunsdiecker reaction
(d) Wurtz reaction

Q.18 Iodoethane reacts with sodium in presence of ether. The product is :
(a) Pentane (b) Propane
(c) Butene (d) Butane

Q.19 The product from the reaction of methyl magnesium bromide and ethyl alcohol is –
(a) Methane (b) Ethane
(c) Propane (d) Butane

RESPONSE GRID					
	6. ⓐⓑⓒⓓ	7. ⓐⓑⓒⓓ	8. ⓐⓑⓒⓓ	9. ⓐⓑⓒⓓ	10. ⓐⓑⓒⓓ
	11. ⓐⓑⓒⓓ	12. ⓐⓑⓒⓓ	13. ⓐⓑⓒⓓ	14. ⓐⓑⓒⓓ	15. ⓐⓑⓒⓓ
	16. ⓐⓑⓒⓓ	17. ⓐⓑⓒⓓ	18. ⓐⓑⓒⓓ	19. ⓐⓑⓒⓓ	

Space for Rough Work

Q.20 Correct order of boiling point is–

(a) *n*-Pentane < neohexane < isohexane < 3-methylpentane

(b) Neohexane < *n*-pentane < isohexane < 3-methylpentane

(c) 3-methylpentane < neohexane < *n*-pentane < isohexane

(d) *n*-Pentane < isohexane < 3-methylpentane < neohexane

Q.21 Which alkane will give only one monochlorinated product?

(a) $CH_3CH_2CH_3$ (b) $CH_3CH_2CH_2CH_3$

(c) $(CH_3)_4C$ (d) $CH_3(CH_2)_3CH_3$

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 Which of the following compounds cannot be prepared by Wurtz reaction ?

(1) $CH_3\underset{\displaystyle CH_3}{\underset{|}{C}}H-CH_3$ (2) CH_3CH_3

(3) $(CH_3)_2CHCH_3$ (4) $CH_3CH_2CH_2CH_3$

Q.23 Which of the following reaction can be used to prepare methane?

(1) Catalytic reduction of methyl iodide

(2) Clemmensen reduction

(3) Reduction of methyl iodide by using a zinc-copper couple

(4) Wurtz reaction

Q.24 Following compounds can be reduced to corresponding alkanes by HI & red P :-

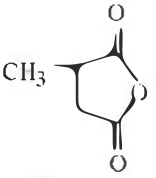
(1) RCOOH (2) ROH

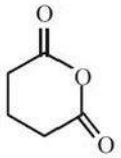
(3) RCHO (4) $RCOOCH_3$

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

A hydrocarbon (X) of the formula C_6H_{12} does not react with bromine water but reacts with bromine in presence of light forming compound (Y). Compound (Y) on treatment with alc. KOH gives compound [Z] which on ozonolysis gives (T) of the formula $C_6H_{10}O_2$. Compound (T) reduces Tollen's reagent and gives compound (W), (W) gives iodoform test and produces compound (U) which when heated with P_2O_5 forms a cyclic anhydride (V).

Q.25 Compound V is–

(a) 

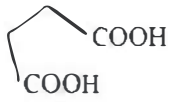
(b) 

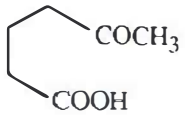
(c) $CH_3-\overset{\displaystyle O}{\overset{\|}{C}}-CH_2-CH_2-CH=O$

(d) $CHO-CH=CH-CHO$

Q.26 Compound W is–

(a) $COOH-(CH_2)_2-COOH$

(b) 

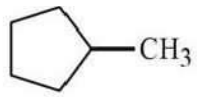
(c) 

(d) $CH_3-CH_2-\underset{\displaystyle CH=O}{\underset{|}{CH}}-COOH$

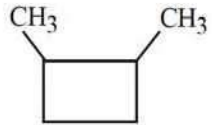
RESPONSE GRID					
	20. ⓐⓑⓒⓓ	21. ⓐⓑⓒⓓ	22. ⓐⓑⓒⓓ	23. ⓐⓑⓒⓓ	24. ⓐⓑⓒⓓ
	25. ⓐⓑⓒⓓ	26. ⓐⓑⓒⓓ			

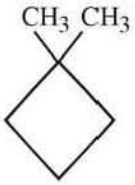
Space for Rough Work

Q.27 Compound X is–

(a) 

(b) 

(c) 

(d) 

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 : Cyclobutane is less stable than cyclopentane

Statement 2 : Presence of bent bonds causes "loss of orbital overlap".

Q.29 Statement 1 : CH_4 does not react with Cl_2 in dark.

Statement 2: Chlorination of CH_4 takes place in sunlight.

Q.30 Statement 1 : Melting point of n-butane is higher than propane.

Statement 2 : It is called oscillation effect.

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

DAILY PRACTICE PROBLEM SHEET 10 - CHEMISTRY			
Total Questions	30	Total Marks	120
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	36	Qualifying Score	56
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

Space for Rough Work

DAILY PRACTICE PROBLEMS

CHEMISTRY SOLUTIONS

25

(1) **(b)** $(CH_3-CH_2)_3B \xrightarrow{H^+} \underset{(A)}{CH_3-CH_3}$, Mol. wt. = 30

$(CH_3-CH_2)_3B \xrightarrow[NaOH]{AgNO_3} \underset{(B)}{CH_3-CH_2-CH_2-CH_3}$,

Mol. wt. = 58

(2) **(c)** Due to symmetrical crystal structure, C_6H_{14} has maximum melting point.

(3) **(c)** $\frac{\text{Volume of hydrocarbon}}{\text{Volume of } O_2} = \frac{2}{(3n+1)}$

$\Rightarrow \frac{10}{x} = \frac{2}{7}$

$\Rightarrow x = 35 = \text{Volume of } O_2$

$\therefore$ Volume of air $= 35 \times 5 = 175$ lit.

(4) **(c)** Above reaction is Reed reaction and product is sulphonyl chloride.

(5) **(d)** In the presence of $AlCl_3/HCl$ if any alkane having more than four carbon is heated, then isomerisation takes place.

(6) **(c)** In the Wolff-Kishner reduction, carbonyl compound is converted into alkane by intermediate hydrazone.

(7) **(c)** $CH_3CH_2CH_3$

(8) **(a)** The end product (B) is $CH_3CH_2CH_3$

(9) **(c)** n-Propyl bromide

(10) **(c)** $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-CH_3 + Br_2 \xrightarrow{\text{Sunlight}}$

$$CH_3-\overset{\displaystyle Br}{\overset{|}{\underset{\displaystyle CH_3}{\underset{|}{C}}}}-CH_2-CH_3 + HBr$$

Ease of substitution of H atoms is 3°> 2°> 1°.

(11) **(b)** $R_2CuLi + R'X \rightarrow R-R' + RCu + LiX$

This is Corey-House reaction.

(12) **(b)** $RCO_2K \xrightarrow{\text{electrolysis}} R-R$

(13) **(b)** Isopropyl bromide.

(14) **(d)** An infinite conformers of ethane are possible including staggered, skew and eclipsed forms.

(15) **(a)** The Kolbe synthesis of alkane using a sodium salt of butanoic acid gives n-hexane.

(16) **(b)** $CH_3-Br + 2Zn + Br-CH_3 \rightarrow$

$$CH_3-Zn-CH_3 + ZnBr_2$$

$CH_3-Zn-CH_3 + CH_3-Br \rightarrow$

$$CH_3-CH_3 + CH_3ZnBr$$

Ethane

(17) **(d)** $2R-CH_2-X + 2Na \xrightarrow{\text{dry ether}}$

$$R-CH_2-CH_2-R + 2NaX$$

(18) **(d)** $2C_2H_5-I + 2Na \xrightarrow{\text{dry ether}} \underset{\text{(butane)}}{C_4H_{10}} + 2NaI$

(19) **(a)** $CH_3MgBr + C_2H_5-OH \rightarrow$

$$CH_4 + Mg\begin{matrix}Br\\OC_2H_5\end{matrix}$$

(20) **(a)** As the branching in isomeric alkane increases the boiling point decreases. So the boiling point order is–

$$CH_3-CH_2-CH_2-CH_2-CH_3 < CH_3-\overset{\displaystyle CH_3}{\overset{|}{\underset{\displaystyle CH_3}{\underset{|}{C}}}}-CH_2-CH_3$$

$$< CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-CH_2-CH_3$$

$$< CH_3-CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-CH_3$$

(21) **(c)**

$$1^\circ CH_3-\overset{\displaystyle 1^\circ CH_3}{\overset{|}{\underset{\displaystyle 1^\circ CH_3}{\underset{|}{C}}}}-1^\circ CH_3$$

Note that all the methyl groups are equivalent.

(22) **(d)** The Wurtz reaction is generally used to form symmetrical alkanes because different alkyl halides such as RX & R'X forms a mixture of RR, R'R' & RR'.

(23) **(d)** $CH_3I + H_2 \xrightarrow{Na/C_2H_5OH} CH_4 + HI$

$CH_3I + 2H \xrightarrow[\text{couple}]{Zn-Cu} CH_4 + HI$

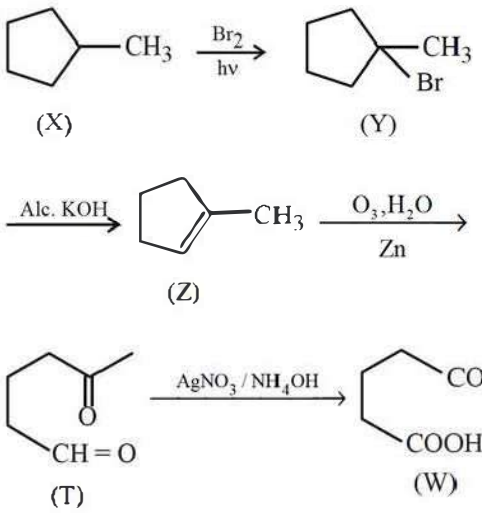
(24) **(a)** $R-\underset{\displaystyle O}{\underset{\|}{C}}-OH + 6HI \xrightarrow{Red\ P}$

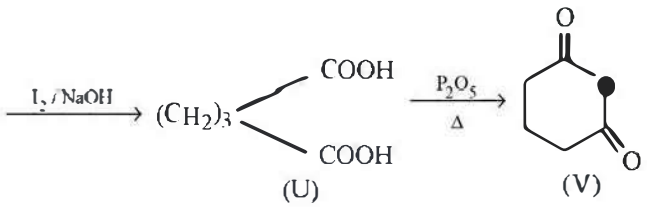
$$R-CH_3 + 2H_2O + 3I_2$$

$R-\underset{\displaystyle O}{\underset{\|}{C}}-H + 4HI \xrightarrow{Red\ P} R-CH_3 + H_2O + 2I_2$

$R-OH + 2HI \xrightarrow{Red\ P} R-H + H_2O + I_2$

(25)(b), (26)(c), (27)(a)





(28) **(d)**

(29) **(b)** The statement-1 that chlorination of CH_4 does not takeplace in dark is correct because it is a free radical reaction and free radicals are obtained in presence of sunlight.

(30) **(b)** Alkanes with odd carbon atoms have the end carbon atoms on the same side of the molecule and in even carbon atom alkane, the end carbon atoms on opposite sides. Thus alkanes with even carbon atoms are packed closely in crystal lattice to permit greater intermolecular attraction and hence higher melting point.