DPP - Daily Practice Problems

Name : _____ Date : _____

Start Time : _____ End Time : _____

CHEMISTRY 47

SYLLABUS : Haloalkanes and Haloarenes-II : Properties and Uses of Halogen Containing Compounds

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 Treatment of ammonia with excess of ethyl chloride will yield
(a) diethyl amine
(b) ethane
(c) tetraethyl ammonium chloride
(d) methyl amine

Q.2 Chlorobenzene is
(a) less reactive than benzyl chloride
(b) more reactive than ethyl bromide
(c) nearly as reactive as methyl chloride
(d) more reactive than isopropyl chloride

Q.3 Reaction of *ter*-butyl bromide with sodium methoxide produces
(a) isobutane
(b) isobutylene
(c) sodium-*ter*-butoxide
(d) *ter*-butyl methyl ether

Q.4 Arrange the following compounds in order of increasing dipole moment :
toluene (I),
m-dichlorobenzene (II),
o-dichlorobenzene (III),
p-dichlorobenzene (IV)
(a) I < IV < II < III (b) IV < I < II < III
(c) IV < I < III < II (d) IV < II < I < III

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

Space for Rough Work

Q.5 CCl_4 cannot give precipitate with $AgNO_3$ due to
(a) formation of complex with $AgNO_3$
(b) evolution of Cl_2 gas
(c) chloride ion is not formed
(d) $AgNO_3$ does not give silver ion

Q.6 Ethyl bromide reacts with silver nitrite to form
(a) Nitroethane
(b) Nitroethane and ethyl nitrite
(c) Ethyl nitrite
(d) Ethane

Q.7 Chlorobenzene on fusing with solid NaOH gives
(a) Benzene (b) Benzoic acid
(c) Phenol (d) Benzene chloride

Q.8 A compound (A) has a molecular formula C_2Cl_3OH. It reduces Fehling solution and on oxidation gives a monocarboxylic acid (B). (A) is obtained by action of chlorine on ethyl alcohol. (A) is
(a) Chloral (b) $CHCl_3$
(c) CH_3Cl (d) Chloroacetic acid

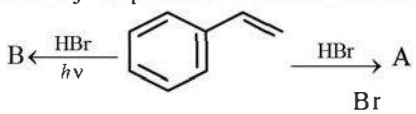
Q.9 A sample of chloroform being used as anaesthetic is tested by
(a) Fehling solution
(b) Ammoniacal Cu_2Cl_2
(c) $AgNO_3$ solution after boiling with alcoholic KOH solution
(d) none of these

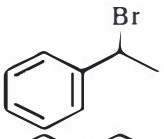
Q.10 Among the following, the one which reacts most readily with ethanol is
(a) *p*- nitrobenzyl bromide
(b) *p*- chlorobenzyl bromide
(c) *p*-methoxybenzyl bromide
(d) *p*- methylbenzyl bromide

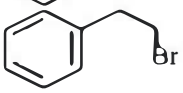
Q.11 Two percent of ethanol is added during the oxidation of chloroform to stop the formation of carbonyl chloride. In this reaction ethanol acts as
(a) auto catalyst (b) negative catalyst
(c) positive catalyst (d) none of these

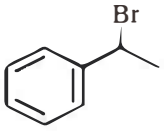
Q.12 The major product obtained on treatment of $CH_3CH_2CH(F)CH_3$ with CH_3O^-/CH_3OH is
(a) $CH_3CH_2CH(OCH_3)CH_3$ (b) $CH_3CH{=}CHCH_3$
(c) $CH_3CH_2CH{=}CH_2$ (d) $CH_3CH_2CH_2CH_2OCH_3$

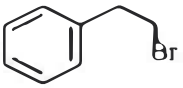
Q.13 Identify the products A and B in the following reaction.

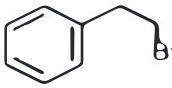


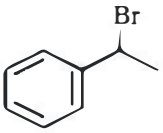
(a) Both A and B are 

(b) Both A and B are 

(c) A is 

& B is 

(d) A is 

& B is 

Q.14 The compound $(CH_3)_2-\underset{\displaystyle OH}{\underset{|}{C}}-CCl_3$ is
(a) Chloretone
(b) Chloroquine
(c) Chloropicrin
(d) Chloropropyl chloride

Q.15 The fire extinguisher, pyrene is
(a) CO_2 (b) CCl_4 (c) CS_2 (d) $CHCl_3$

Q.16 B.H.C is used as
(a) insecticide (b) pesticide
(c) herbicide (d) weedicide

Q.17 An organic halide is shaken with aqueous NaOH followed by the addition of dil. HNO_3 and silver nitrate solution and gives white ppt. The substance can be
(a) $C_6H_4(CH_3)Br$ (b) $C_6H_5CH_2Cl$
(c) C_6H_5Cl (d) None of these

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

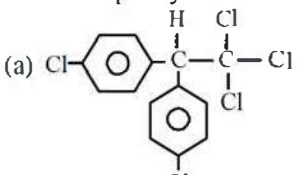
Space for Rough Work

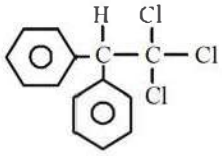
Q.18 Which plastic is obtained from $CHCl_3$ as follows ?

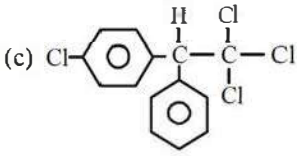
$$CHCl_3 \xrightarrow[SbF_3]{HF} X \xrightarrow{800^0\,C} Y \xrightarrow{\text{Polymerisation}} \text{Plastic}$$

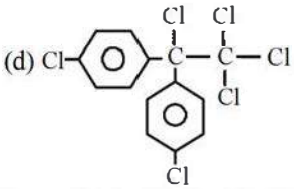
(a) Bakelite (b) Teflon (c) Polythene (d) Perspex

Q.19 Which one of the following is the correct formula of dichlorodiphenyl trichloroethane

(a) 

(b) 

(c) 

(d) 

Q.20 The set of compounds in which the reactivity of halogen atom in the ascending order is

(a) Vinyl chloride, chloroethane, chlorobenzene
(b) Vinyl chloride, chlorobenzene, chloroethane
(c) Chloroethane, chlorobenzene, vinyl chloride
(d) Chlorobenzene, vinyl chloride, chloroethane

Q.21 Which of the following is boiled with ethyl chloride to form ethyl alcohol ?

(a) Alcoholic KOH (b) Aqueous KOH
(c) H_2O (d) H_2O_2

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 Freon is not used

(1) as local anaesthetic
(2) for dissolving impurities in metallurgical process
(3) in printing industry
(4) in refrigerator

Q.23 Which of the following statements about benzyl chloride are correct ?

(1) It can be oxidised to benzaldehyde by boiling with copper nitrate solution
(2) It is a lachrymatory liquid and answers Beilstein's test
(3) It gives a white precipitate with alcoholic silver nitrate.
(4) It is less reactive than alkyl halides

Q.24 A mixture of two organic chlorine compounds was treated with sodium metal in ether solution. Isobutane was obtained as a product. The two chlorine compounds are

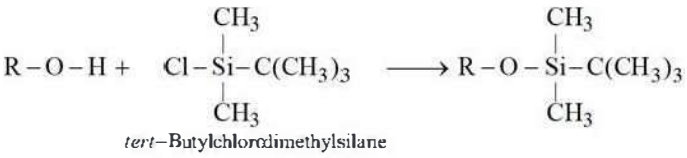
(1) Methyl chloride (2) Ethyl chloride
(3) Isopropyl chloride (4) Propyl chloride

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

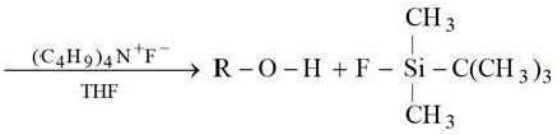
Grignard reagents (RMgX) are prepared by the reaction of an organic halide and magnesium metal in ether solvent.

$$R - X + Mg \xrightarrow{R-\bullet-R} R - MgX$$

The solvent (usually diethyl ether or tetrahydrofuran) plays a crucial role in the formation of Grignard reagent. Alkyl halides are more reactive than aryl and vinyl halides. Indeed, aryl and vinyl chlorides do not form Grignard reagents in diethyl ether. However, an alkyl halide containing an alcoholic – OH group is converted to Grignard reagent by first protecting the –OH group with *tert*-butyldimethylsilyl ether which is inert to Grignard reagent. The protecting group is finally liberated by treatment with fluoride ion.



tert–Butylchlorodimethylsilane

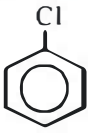
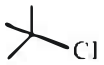
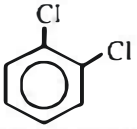


RESPONSE GRID					
	18. ⓐⓑⓒⓓ	19. ⓐⓑⓒⓓ	20. ⓐⓑⓒⓓ	21. ⓐⓑⓒⓓ	22. ⓐⓑⓒⓓ
	23. ⓐⓑⓒⓓ	24. ⓐⓑⓒⓓ			

Space for Rough Work

Q.25 Grignard reactions generally occur in dry ether because
(a) The stronger acid diethyl ether will displace the weaker RH acid from its salt.
(b) The stronger acid H_2O will displace the weaker acid RH from its salt
(c) Water slows down the reaction
(d) Water mixes with ether preventing ether to perform its function.

Q.26 Grignard reagent can't be prepared from

(a) 
(b) 
(c) 
(d) 

Q.27 The function of tetrahydrofuran in the preparation of Grignard reagent is that it
(a) acts as a solvent
(b) helps in maintaining the reactivity of magnesium
(c) both
(d) none of the two

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 : Aqueous hydrohalogen acids are used to prepare alkyl halides from alkenes.
Statement-2 : Hydrogen iodide readily reacts with alkenes to form alkyl halides.

Q.29 Statement -1 : Electron withdrawing groups in aryl halides increase the reactivity towards nucleophilic substitution.
Statement -2 : 2, 4-Dinitrochlorobenzene is less reactive than chlorobenzene.

Q.30 Statement -1 : Optically active 2-iodobutane on treatment with NaI in acetone undergoes racemization.
Statement-2 : Repeated Walden inversions on the reactant and its product eventually gives a racemic mixture.

RESPONSE GRID	25.ⓐⓑⓒⓓ 26.ⓐⓑⓒⓓ 27.ⓐⓑⓒⓓ 28.ⓐⓑⓒⓓ 29. ⓐⓑⓒⓓ 30.ⓐⓑⓒⓓ

DAILY PRACTICE PROBLEM SHEET 47 - 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

47

1. **(c)**

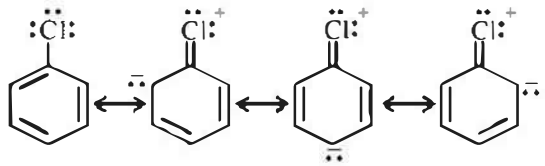
$$C_2H_5Cl \xrightarrow{NH_3} C_2H_5-NH_2 \xrightarrow{C_2H_5Cl} (C_2H_5)_2NH$$

$$\xrightarrow{C_2H_5Cl} (C_2H_5)_3N \xrightarrow{C_2H_5Cl} [(C_2H_5)_4N]^+Cl^-$$

Tetraethyl ammonium chloride

If NH_3 is in excess, then 1° amine will be the main product, if C_2H_5Cl is in excess then mixture of 1°, 2°, 3° and quaternary ammonium salt is obtained.

2. **(a)** In chlorobenzene, the lone pairs present on Cl atom get involved in resonance with π electrons of benzene due to which C – Cl bond acquires double bond character, i.e. it becomes shorter and hence strong. Hence, reactivity decreases.



3. **(b)**

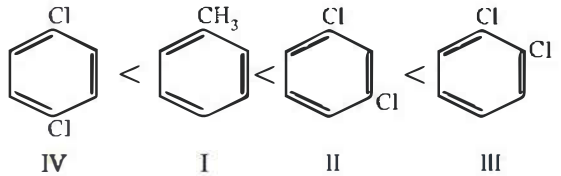
$$CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-Br + CH_3ONa \xrightarrow{\text{Elimination}}$$

$$CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}=CH_2 + CH_3OH + NaBr$$

Isobutylene

Methoxide ion (CH_3O^-) is a strong base. Therefore, it abstract proton from 3° alkyl halide and favours elimination reaction.

4. **(b)** In *p*-dichlorobenzene, the two equal dipoles are in opposite directions, hence the molecule has zero dipole moment. In *o*- and *m*- dichlorobenzenes, the two dipoles are at 60° and 120° apart respectively, and thus according to parallelogram law of forces, the dipole moment of *o*-dichlorobenzene is much higher than that of *m*-isomer. Lastly, toluene with a +I group possesses little dipole moment. Thus the overall order is



IV < I < II < III

5. **(c)** CCl_4 is a covalent compound. Hence it does not give Cl^- ion in solution.

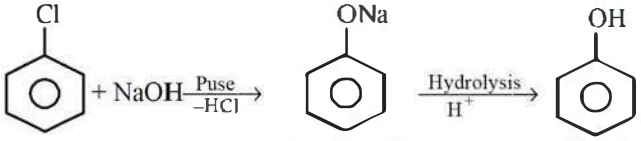
6. **(a)**

$$C_2H_5Br + Ag-O-N=O \longrightarrow C_2H_5-\overset{\displaystyle O}{\overset{\|}{N}}\!\!\rightarrow\!\!O + AgBr$$

Nitro ethane

Ag – O – N = O is a covalent compound. Therefore, attack of nucleophile occurs through nitrogen atom. Hence, nitroethane is formed.

7. **(c)**



Sod. phenoxide — Phenol

8. **(a)**

$$\underset{A}{C_2Cl_3OH} + \text{Fehling sol.} \longrightarrow \underset{\text{Red ppt}}{Cu_2O}$$

It means –CHO group is present.

$$\xrightarrow{\text{Oxidation}} \underset{\text{Monocarboxylic acid (B)}}{CCl_3-COOH}$$

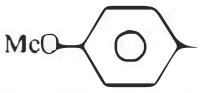
Hence A should be $CCl_3.CHO$

$$C_2H_5OH + Cl_2 \rightarrow CH_3CHO + 2HCl$$

$$CH_3CHO + 3Cl_2 \rightarrow \underset{\text{Chloral (A)}}{CCl_3CHO} + 3HCl$$

9. **(c)** A pure sample does not give ppt with aq. $AgNO_3$.

10. **(c)** The corresponding carbocation,



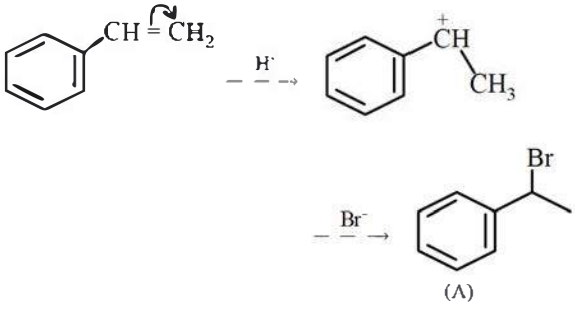
is stabilized due to + R effect, the methyl group (+ R effect not possible) is less electorn supplier than methoxy group.

11. **(b)** Any substance which when added to a chemical reaction inhibits or decreases the rate of reaction is called negative catalyst.

$^-OCH_3$ is a strong base and causes elimination.

12. **(b)** According to Saytzeff's rule, the major product will be that one which contains more number of substituents around the double bond.

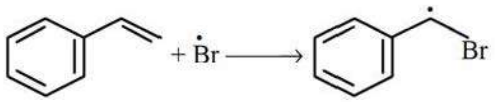
13. **(c)** Formation of A involves electrophilic addition reaction

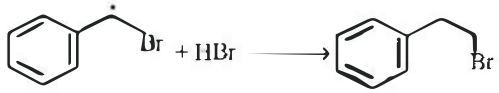


(A)

Formation of B involves free radical addition reaction

(i) $HBr \xrightarrow{h\nu} \dot{H} + \dot{Br}$

(ii) 

(iii) 

14. (a) $(CH_3)_2C=O + CHCl_3 \rightarrow (CH_3)_2C(OH)CCl_3$

Chloretone

15. (b) CCl_4 is stable to red heat. Its vapours are highly non-inflammable i.e., do not catch fire. It is because of this property CCl_4 is used as a fire extinguisher. But now a days its use as a fire extinguisher is restricted because with water vaporous, it forms highly poisonous phosgene gas

$$CCl_4 + H_2O \rightarrow \underset{\text{Phosgene}}{COCl_2} + 2HCl$$

16. (a) Benzene hexachloride is an insecticide, generally known as gammexane.

17. (b)

18. (b) $2CHCl_3 \xrightarrow[SbF_3]{HF} 2CHF_2Cl \xrightarrow[-2HCl]{800^0C}$

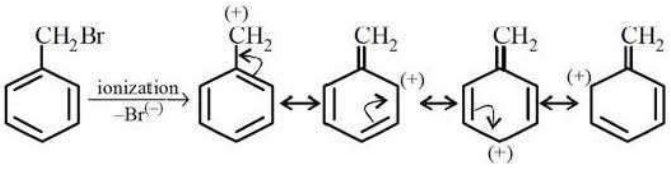
$$CF_2 = CF_2 \xrightarrow{\text{Polymerisation}} (-CF_2 - CF_2 -)n$$

19. (a) **20. (d)**

21. (b) $C_2H_5Cl + KOH_{(aq)} \rightarrow C_2H_5OH + KCl$

22. (a) Freon (CCl_2F_2) is an odourless, non-corrosive, non toxic gas which is stable even at high temperatures and pressures. It has low B. Pt, low specific heat and can be easily liquified by applying pressure at room temperature. It is therefore, widely used as refrigerant (cooling agent) in refrigerators and air conditioners.

23. (a) Benzyl chloride is more reactive than alkyl halide towards nucleophilic substitution reactions due to the reason that the carbocation formed after the removal of halide ion is stabilized by resonance.



24. (d) $CH_3-\underset{\underset{CH_3}{|}}{CH}-Cl + 2Na + Cl-CH_3 \xrightarrow[\text{Ether}]{\text{Dry}}$

Isopropyl chloride — Methyl chloride

$$CH_3-\underset{\underset{CH_3}{|}}{CH}-CH_3 + 2NaCl$$

Isobutane

25. (b) $\underset{\text{Stronger base}}{RMgX} + \underset{\text{Stronger acid}}{H_2O} \rightleftharpoons$

$$\underset{\text{Weaker acid}}{RH} + \underset{\text{Weaker base}}{Mg(X)OH}$$

26. (a) Chlorobenzene and *o*-dichlorobenzene can be converted into corresponding Grignard reagent using THF as solvent.

27. (c) Solvent molecules (THF or ether) coordinate with Mg of the Grignard reagent and thus prevent the latter to form coating on the magnesium shavings which would have made Mg unreactive for R–X.

28. (c) Dry gascous hydrohalogen acids are better electrophiles. In aqueous solution, H_2O, acting as nucleophile may produce alcohol.

Thus, statement-1 is false and statement-2 is true.

29. (d) Halobenzenes become reactive to nucleophilic substitution reactions when electorn withdrawing groups (nitro, cyano) are present at ortho/para position.

Thus statement-1 is true and statement-2 is false.

30. (a)