DPP - Daily Practice Problems

Name : _____ Date : _____

Start Time : _____ End Time : _____

CHEMISTRY 49

SYLLABUS : Phenols

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.

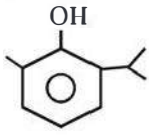
DIRECTIONS (Q.1-Q.21) : There are 21 multiple choice questions. Each question has 4 choices (a), (b), (c) and (d), out of which ONLY ONE choice is correct.

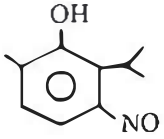
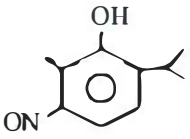
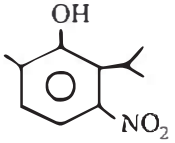
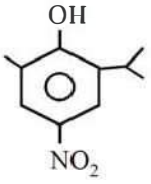
Q.1 Which of the following is phenolic ?
(a) Phthalic acid (b) Phosphoric acid
(c) Picric acid (d) Phenylacetic acid

Q.2 Carbolic acid is
(a) Phenol (b) Phenyl benzoate
(c) Phenyl acetate (d) Salol

Q.3 Which is the strongest acid among the following aromatic compounds ?
(a) *ortho*-Nitrophenol (b) *para*-Chlorophenol
(c) *para*-Nitrophenol (d) *meta*- Nitrophenol

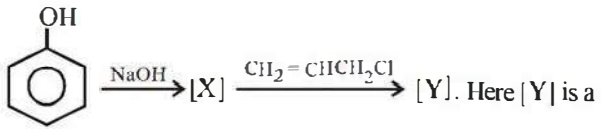
Q.4 When phenol is heated with phthalic anhydride in concentrated sulphuric acid and the hot reaction mixture is poured into a dilute solution of sodium hydroxide, the product formed is
(a) Alizarin (b) Methyl orange
(c) Fluorescein (d) Phenolpthalein

Q.5  $\xrightarrow[\text{(ii) dil. } HNO_3]{\text{(i) } NaNO_2, HCl}$ Z. Here Z is

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

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

Space for Rough Work

Q.6  [Y]. Here [Y] is a

(a) single compound
(b) mixture of 2 compounds
(c) mixture of 3 compounds
(d) no reaction is possible

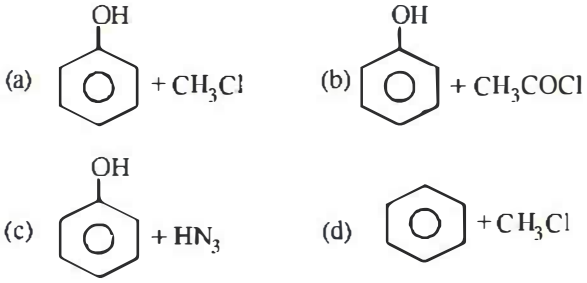
Q.7 Because of reasonance, the oxygen atom of –OH group of phenol
(a) acquires positive charge (b) acquires negative charge
(c) remains uneffected (d) liberates oxygen

Q.8 When phenol is allowed to react with Br_2 in CS_2 solution, the resulting compund is
(a) 2, 4, 6-tribromophenol (b) *m*-bromophenol
(c) *o*- and *p*-bromophenols (d) *o*- and *m*-bromophenols

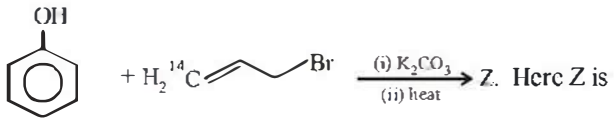
Q.9 What amount of bromine will be required to convert 2 g of phenol into 2, 4, 6-tribromophenol ?
(a) 4.00 (b) 6.00 (c) 10.22 (d) 20.44

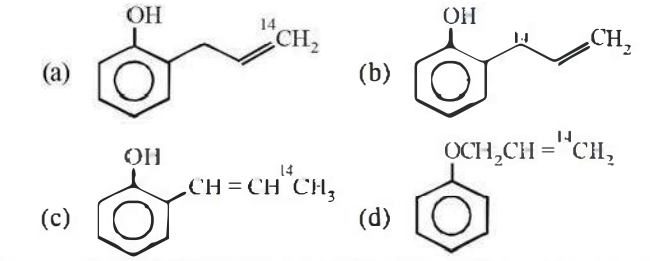
Q.10 Action of diazomethane on phenol liberates
(a) O_2 (b) H_2 (c) N_2 (d) CO_2

Q.11 In Friedal-Crafts acylation, besides $AlCl_3$, the other reactants are

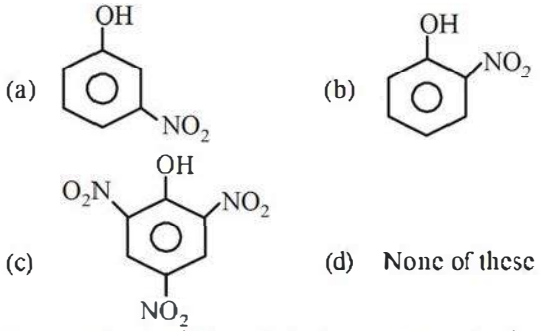


Q.12 Which of the following reagents will produce salicylaldehyde on reaction with phenol ?
(a) $CHCl_3$ / NaOH (b) CCl_4 / NaOH
(c) CH_2Cl_2 / NaOH (d) CH_3Cl / NaOH

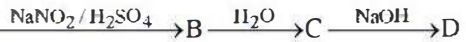
Q.13  Here Z is



Q.14 Which is obtained on treating phenol, with dilute HNO_3?



Q.15 Rate of electrophilic substitution reaction in phenol is
(a) Slower than the rate of benzene
(b) Faster than the rate of benzene
(c) Equal to the rate of benzene
(d) None of these

Q.16 Phenol 
Name of the above reaction is
(a) Liebermann's reaction
(b) Phthalein fusion test
(c) Reimer–Tiemann reaction
(d) Schotten–Baumann reaction

Q.17 Which of the following does not form phenol or phenoxide on direct reaction ?
(a) C_6H_5Cl (b) C_6H_5COOH
(c) $C_6H_5N_2Cl$ (d) $C_6H_5SO_3Na$

Q.18 Phenol is
(a) A weaker base than NH_3
(b) Stronger acid than carbonic acid
(c) Weaker acid than carbonic acid
(d) A neutral compound

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

Space for Rough Work

Q.19 When phenol reacts with ammonia in presence of $ZnCl_2$ at 300°C, it gives

(a) Primary amine (b) Secondary amine

(c) Tertiary amine (d) Both (b) and (c)

Q.20 Phenol is obtained by heating aqueous solution of

(a) Aniline

(b) Benzene diazonium chloride

(c) Benzoic acid

(d) None of these

Q.21 1,2,3–Trihydroxybenzene is also known as

(a) Pyrogallol (b) Phloroglucinol

(c) Resorcinol (d) Quinol

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 statements about phenol are incorrect?

(1) It is insoluble in water

(2) It has lower melting point as compared to aromatic hydrocarbons of comparable molecular weight

(3) It does not show acidic property

(4) It has higher boiling point than toluene

Q.23 $\text{Phenol} \xrightarrow[\text{Distillation}]{Zn} A \xrightarrow[\text{Conc.}HNO_3]{\text{Conc.}H_2SO_4} B \xrightarrow[NaOH]{Zn} C$

In the above reaction.

(1) A is C_6H_6

(2) B is nitrobenzene

(3) C is hydrazobenzene

(4) A is toluene and B is nitrobenzene

Q.24 Which of the following statements are incorrect?

(1) Phenol is less acidic than ethyl alcohol

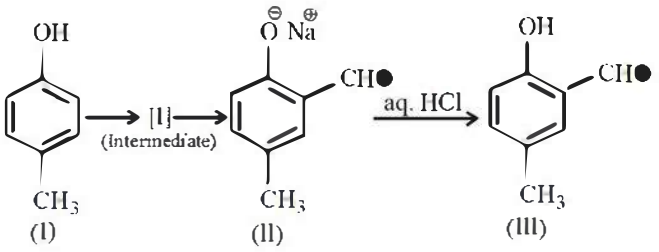
(2) Phenol is more acidic than carbonic acid

(3) Phenol is more acidic than carboxylic acid

(4) Phenol is more acidic than ethyl alcohol

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

Riemer-Tiemann reaction introduces an aldehyde group, on to the aromatic ring of phenol, ortho to the hydroxyl group. This reaction involves electrophilic aromatic substitution. This is a general method for the synthesis of substituted salicylaldehydes as depicted below.



Q.25 Which one of the following reagents are used in the formation of intermediate ?

(a) aq.NaOH + CH_3Cl

(b) aq.NaOH + CH_2Cl_2

(c) aq.NaOH + $CHCl_3$

(d) aq.NaOH + CCl_4

Q.26 The electrophile in the reaction is

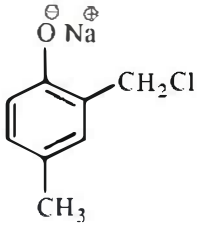
(a) :CHCl (b) $^+CHCl_2$

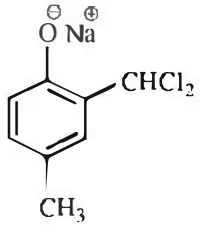
(c) $:CCl_2$ (d) CCl_3

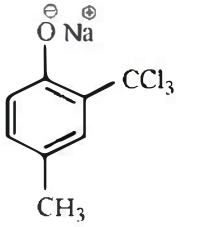
RESPONSE GRID					
	19. ⓐⓑⓒⓓ	20. ⓐⓑⓒⓓ	21. ⓐⓑⓒⓓ	22. ⓐⓑⓒⓓ	23. ⓐⓑⓒⓓ
	24. ⓐⓑⓒⓓ	25. ⓐⓑⓒⓓ	26. ⓐⓑⓒⓓ		

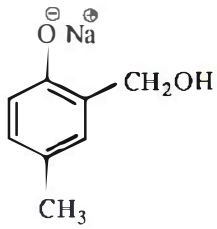
Space for Rough Work

Q.27 The structure of the intermediate I 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 cho3ices, 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 : Phenol is a stronger acid than ethanol
Statement-2 : Groups with + M effect and –I effect decrease acidity at *p*-position

Q.29 Statement-1 : Phenol cannot be converted into ester by direct reaction with carboxylic acid
Statement-2 : Electron withdrawing groups increase the acidity of phenols

Q.30 Statement-1 : Phenol is less acidic than *p*-nitrophenol
Statement-2 : Phenolate ion is more stable than *p*-nitrophenolate ion.

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

DAILY PRACTICE PROBLEM SHEET 49 - CHEMISTRY			
Total Questions	30	Total Marks	120
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	40	Qualifying Score	60
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

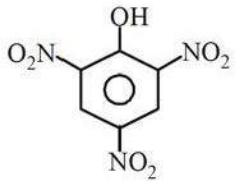
Space for Rough Work

DAILY PRACTICE PROBLEMS

CHEMISTRY SOLUTIONS

49

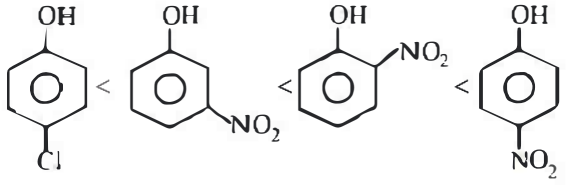
1. **(c)**



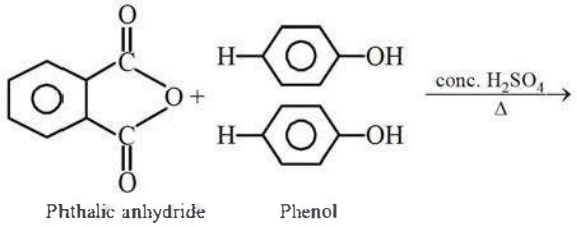
(Picric acid) or 2, 4, 6- trinitrophenol

2. **(a)** 5% Aqueous solution of phenol at room temperature is called carbolic acid.

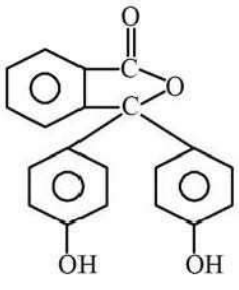
3. **(c)**



4. **(d)**



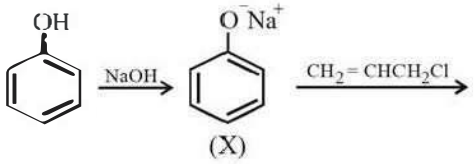
Phthalic anhydride Phenol

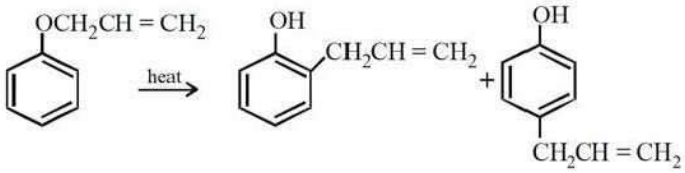


Phenolphthalein

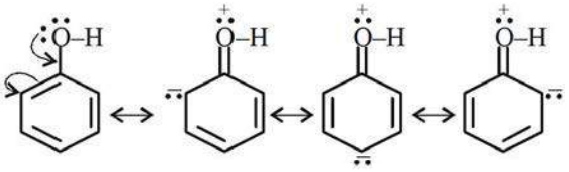
5. **(d)** Nitrosonium ion will go to *p*-position (the least hindered size) with respect to –OH group. Further dil. HNO_3 oxidises –NO group to $-NO_2$ group.

6. **(a)**



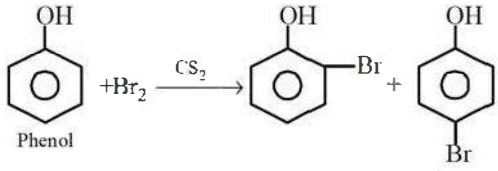


7. **(a)**



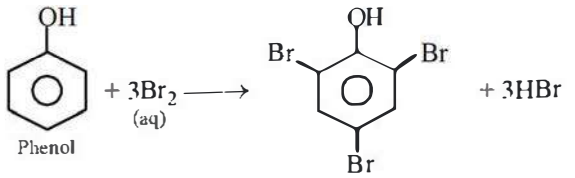
8. **(c)**

(i)



Phenol *o*-and *p*-bromophenols

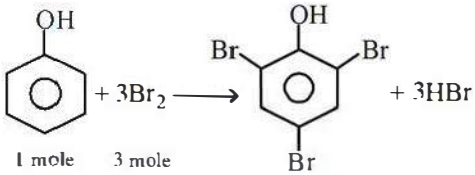
(ii)



Phenol 2, 4, 6-tribromophenol

In aq. solution phenol ionizes to give phenoxide ion in which $C_6H_5O^-$ ions highly activate benzene ring and give trisubstituted product, while in presence of CS_2 (an inert solvent), phenol is unable to ionize due to which benzene ring is comparatively less activated. Hence, monosubstituted product is obtained.

9. **(c)**

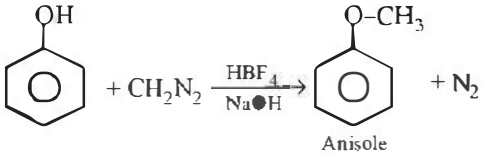


1 mole (94 g) 3 mole (480 g) 1 mole

94 grams of phenol requires 480 gms. of Br_2.

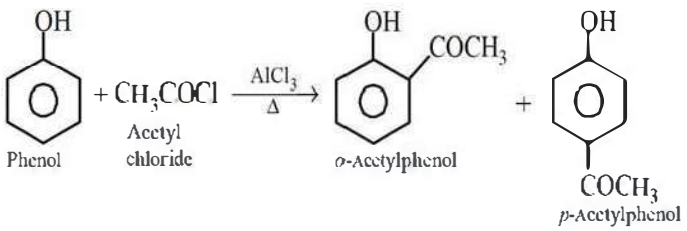
$$2 \text{ gm. of phenol} = \frac{480}{94} \times 2 = 10.22 \text{ gms}$$

10. **(c)**



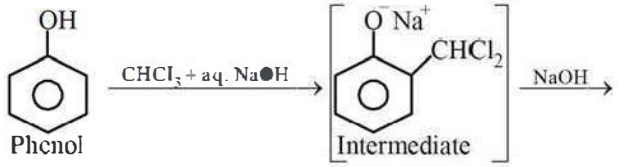
Anisole

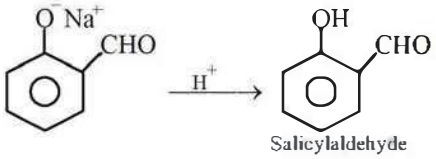
11. **(b)** In Friedel Craft acylation, aromatic compounds such as benzene, phenol etc. undergo acylation with CH_3COCl in the presence of anhydrous $AlCl_3$ and give ortho and para derivatives.



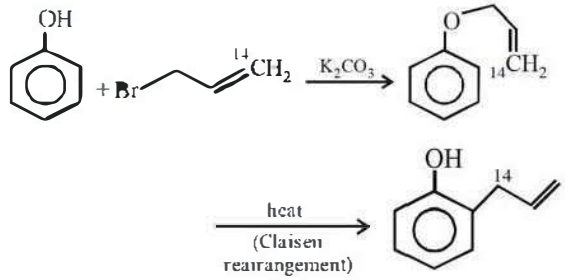
Phenol Acetyl chloride *o*-Acetylphenol *p*-Acetylphenol

12. **(a)** This reaction is known as Reimer Tiemann reaction.



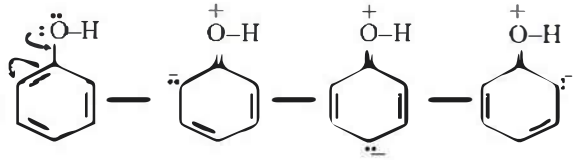


13. **(b)**



14. **(b)**

15. **(b)**



Rate of electrophilic substitution reaction in phenol is faster than in benzene because presence of –OH group increases electron density at *o*– and *p*– positions.

16. **(a)** Liebermann's reaction.

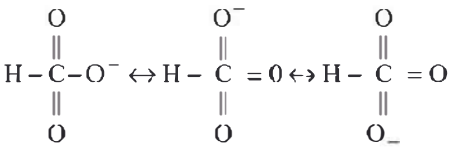
17. **(b)** Benzoic acid.

18. **(c)** Phenol is weaker acid than carbonic acid

C_6H_5OH H_2CO_3

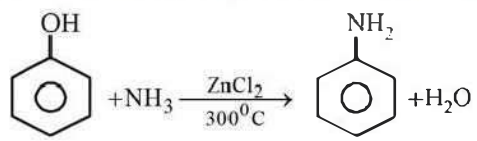
$K_a = 10^{-8} - 10^{-10}$, $K_a = 10^{-7}$,

because the conjugate base of carbonic acid is resonance hybrid of the three equivalent structures; while the

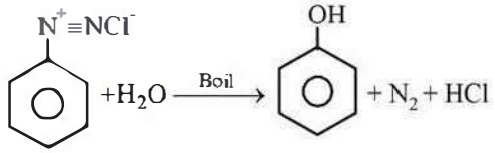


resonationery structures of phenoxide ion are not equivalent.

19. **(a)**



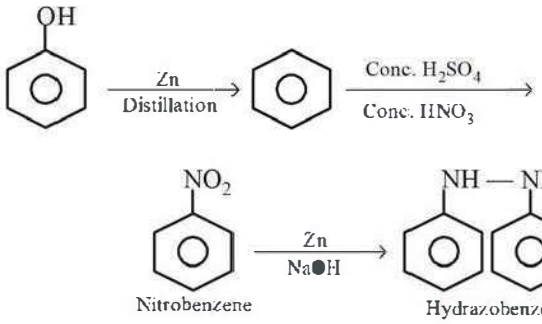
20. **(b)**



21. **(a)**

22. **(a)** Phenol has higher boiling point than toluene because of hydrogen bonding. Thus (1), (2) and (3) are the incorrect statements and option (a) is the correct choice.

23. **(a)**



Thus, statements 1, 2 and 3 are correct

24. **(a)** Relative acidity of the given compounds

	RCOOH	> H_2CO_3	> C_6H_5OH	> HOH	> ROH
	Carboxylic acid	Carbonic acid	phenol	Water	Alcohols
K_a	10^{-5}	10^{-7}	10^{-10}	10^{-14}	10^{-18}

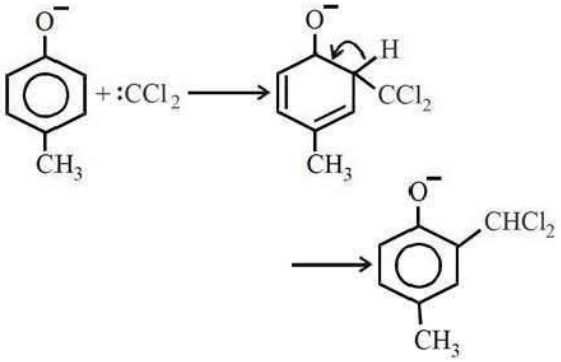
Phenol is more acidic than ethyl alcohol. Thus (1), (2) and (3) are the incorrect statements.

25. **(c)**

26. **(c)** $OH^- + CHCl_3 \rightleftharpoons :\bar{C}Cl_3 + H_2O$

$:\bar{C}Cl_3 \longrightarrow Cl^- + :CCl_2$ (Dichlorocarbene)

27. **(b)**



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

29. **(b)** Phenols cannot be converted into esters by direct reaction with carboxylic acids since phenols are less nucleophilic than alcohols

30. **(d)** *p*-Nitorphenolate ion is more stable than phenolate ion.