Sohag University
Faculty of Pharmacy
Dept. Pharm. Chem.

2nd Year Pharmacy
Midterm exam: 21/11/2016
Time allowed: 1h

Name: **NO.** ( )

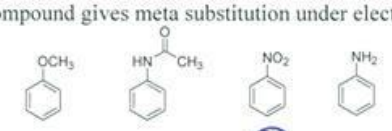
Part I

I) Mark true or false: : (2.5 marks)

1) The Kekule structure of benzene is not true because the number of isomers of disubstituted benzene is four.
2) The NO (nitroso) group is a m-directing group while the OH group is an o- and p-directing one.
3) $AlCl_3$ is added in catalytic amount in Friedel-Crafts alkylation while it is added in more than one equivalent in Friedel-Crafts acylation one.
4) [10]annulene is not aromatic because it does not obey Huckel's rule.
5) Cycloheptatriene is aromatic while cycloheptatrienyl cation is not aromatic one.

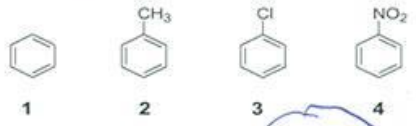
1	2	3	4	5
x	x	√	x	x

II) Which compound gives meta substitution under electrophilic bromination?



a b c d

III) Identify the correct order of reactivity in electrophilic substitution reactions of the following compounds?



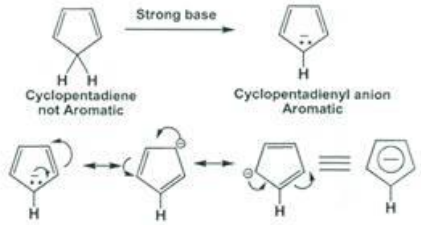
1 2 3 4

a) 1>2>3>4 **b)** 4>3>2>1 **c)** 2>1>3>4 **d)** 2>3>1>4

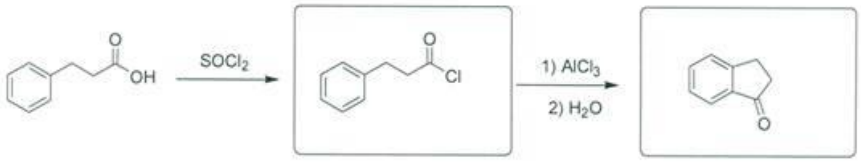
1

IV) Cyclopentadiene has acidic characters. True or false and why? (1.5 marks)

True, as it loss a proton when treated with strong base to give cyclopentadienyl anion which is stabilized by resonance and aromaticity

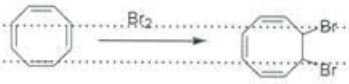


V) **Complete the following equation (one mark)**



VI) **COT** is (aromatic-antiaromatic-nonaromatic) compound and this can be evidenced chemically as follows (with equation). (1.5 marks).

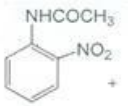
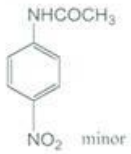
It is not planar (tub-like shape)



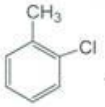
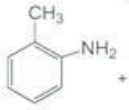
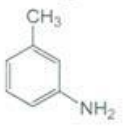
reacts by addition not substitution with decolourization of bromine colour.

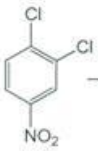
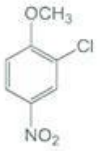
Part II

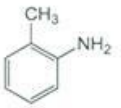
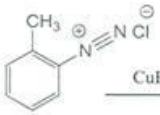
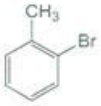
I) Complete the following equations: (3 marks)

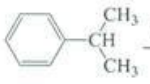
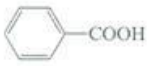
1) Acetanilide $\xrightarrow{CH_3COONO_2}$  +  minor

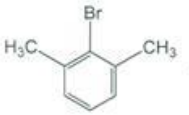
major

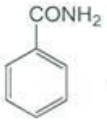
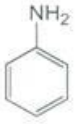
2)  $\xrightarrow[\text{liq. } NH_3]{NaNH_2}$  + 

3)  $\xrightarrow{CH_3ONa/CH_3OH}$ 

4)  $\xrightarrow[0\text{-}5\ ^\circ C]{NaNO_2/HCl}$  $\xrightarrow{CuBr}$ 

5)  $\xrightarrow[2)\ H_3O^{\oplus}]{KMnO_4/\overset{\ominus}{O}H}$ 

6)  $\xrightarrow[\text{liq. } NH_3]{KNH_2}$ No reaction

7)  $\xrightarrow{Br_2/NaOH}$ 

II) Mark true (√) or false (X) on the following statements and give the correct answer (3 marks)

i. Oxidation of tert-butylbenzene with $KMnO_4/OH$ gives no reaction (X)

ii. NO_2 group is strongly activating substituent in nucleophilic aromatic substitution (√)

iii. Sulphonic acids are more acidic than carboxylic acids (X)

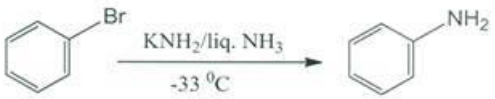
iv. Aromatic ring halogenation of arenes occurs in the presence of Lewis acid (√)

v. Activated SN^2 aromatic involves the formation of Meisenheimer intermediate (X)

vi. When o-chlorotoluene reacts with $NaNH_2/NH_3$, it gives o-toluidine and m-toluidine (X)

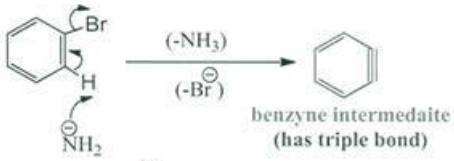
vii. Reaction of aniline with Br_2 in absence of Lewis acid gives 2,4,6-tribromoaniline (√)

III) Complete and write mechanism of the following reaction: (1.5 marks)



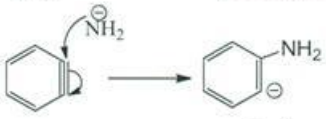
Reaction mechanism

1) Base-promoted dehydrohalogenation of bromobenzene (-HBr) to give benzyne intermedaite



benzyne intermedaite
(has triple bond)

2) Addition of $\overset{\ominus}{Nu}$ to one carbon of C≡C to give carbanion



carbanion

3) Completion of addition by abstracts H^+ from NH_3