Question Bank

Chemistry Department

Theoretical Organic Chemistry

2nd Stage

Second Semester

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(Alcohols and phenols) /// (aldehydes and ketones)

Q1//How can you distinguish between the following (only by one chemical test)?

Example: 2-pentanone, 3-pentanone

Q2// 2-pentanone will give a positive iodoform test. 3-Pentanone will negative results.

I. Acetone and acetaldehyde

Tollens test

II. Primary, secondary and tertiary alcohols

Lucas test

III. Ethanol and methanol

Iodoform test

IV. Benzaldehyde and butanal

Bendicts test

V. phenol and cyclohexane

Ferric chlorid test

2) (Acetone, propanal, benzladehyde)

Q3// A. Tollens' Test. Which compound(s) gave a positive test? Why?

Q4// B. Benedict's Test. Which compound(s) gave a positive test? Why?

Q5// Write chemical equations (not necessarily balanced) for the reaction of propanal with

a. Tollens' reagent

b. Benedict's reagent

Q6// What results would be expected if the following tests were carried out on **4-hydroxy-3-methoxybenzaldehyde** (Explain your answers.)

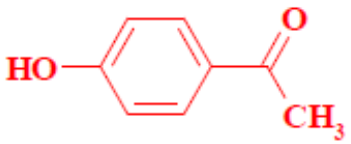
a. H2O solubility : **Insoluble in water**

b. Tollens' test**: (+Ve) silver mirror will form**

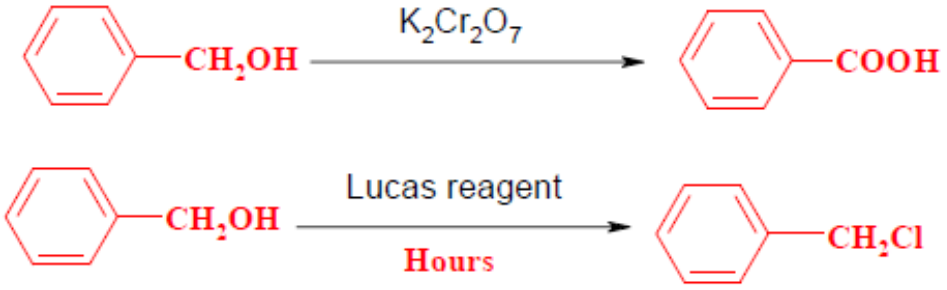
c. Benedict's test: **(-Ve)**

Q7//

5) An unknown sample produces a precipitate upon reaction with 2,4-dinitrophenylhydrazine reagent, color change with ferric chloride reagent, and a yellow precipitate when mixed with iodine and base.
Draw the structure of a compound that would give this result.

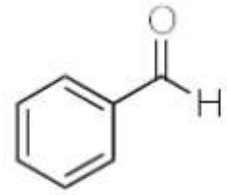


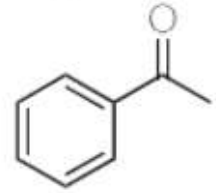
6) What results would you expect to observe when benzyl alcohol, C6H5CH2OH, is treated with (i) acidic sodium dichromate, and (ii) Lucas reagent?

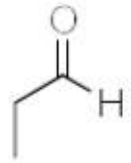


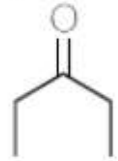
Q8// Choose the Correct answer:

1. Which is the most likely compound to give 2,4-DNP test (bright yellow color), Tollens' test (no silver mirror), iodoform test (yellow precipitate)?

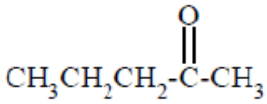
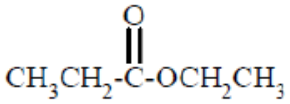
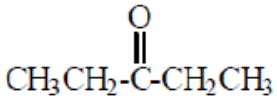
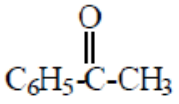
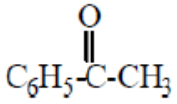
a. 

b. 

c. 

d. 

Q9// Identify which of the following would give poaitive iodoform test.

1. 	**4.** 
2. 	**5.** 
3. 	

Answer: 1 and 3

Q10 and 11//

3. Which of the following is a suitable reagent that will quickly distinguish between pentanal and 3-pentanone?

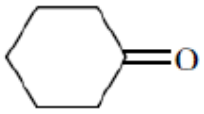
a. Na metal
b. NH2OH
c. 2,4-DNP
d. $Ag(NH_3)_2^+ OH^-$

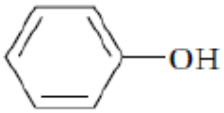
4. A compound forms a 2,4-dinitrophenylhydrazine derivative, gives a positive iodoform test and a negative result with the Tollens'. This compound is most likely:

a. $CH_3CH_2\overset{\overset{O}{\|}}{C}CH(CH_3)_2$

b. $CH_3\overset{\overset{O}{\|}}{C}H$

c. $CH_3CH_2\overset{\overset{O}{\|}}{C}CH_3$

d. 

e. 

Answer: c

Here is a summary table of all the reactions:

Reaction	Chemical	Positive result (seen)	Negative result (seen)	Groups that give positive result	Groups that give negative result
Potassium dichromate Oxidation	$K_2Cr_2O_7$	Orange to green, blue or blue/green	Remains orange	1° and 2° alcohols, aldehydes	Ketones, 3° alcohol
Lucas test (to distinguish alcohols)	$ZnCl_2$ and HCl	Clear to cloudy	Remains clear	Secondary alcohol- slow Tertiary alcohol-fast	Primary alcohol, Aldehydes, ketones
2,4-dinitrophenyl-hydrazine test (aldeydes, ketones from alcohols)	2,4-dinitrophenyl-hydrazine	Form yellow/ orange solid	No solid formed	Aldehydes, Ketones	All alcohols
Fehling's Test (aldehydes from ketones)	$Cu(OH)_2$ and OH^-	Blue to something else (red, green yellow)	Remains blue	Aldehydes	Ketones All alcohols

Q12// Esterification of alcohols and phenols:

1. In the esterification reactions to produce fragrant esters, the catalyst used was?

a. HNO3 **b. H2SO4**

c. NaHCO3 d. NaOH

Q13// What is the name of ester prepared from butyl alcohol and propanoic acid?

a. propyl butanoate **b. butyl propanoate**

c. butyl propyl ether d. ethyl acetate

Q14// 9.0 g of benzoic acid (MW = 122) reacts with 18 g of methanol (MW = 32) in the presence of an acid to give 7.0 g of methyl benzoate (MW = 136). What is the percent yield?

a. 69.8 % b. 45.7 % c. 51.6 % d. 77.8 % e. 86.7 %

3. 9.0 g of benzoic acid (MW = 122) reacts with 18 g of methanol (MW = 32) in the presence of
an acid to give 7.0 g of methyl benzoate (MW = 136). What is the percent yield?

a. 69.8 % b. 45.7 % c. 51.6 % d. 77.8 % e. 86.7 %

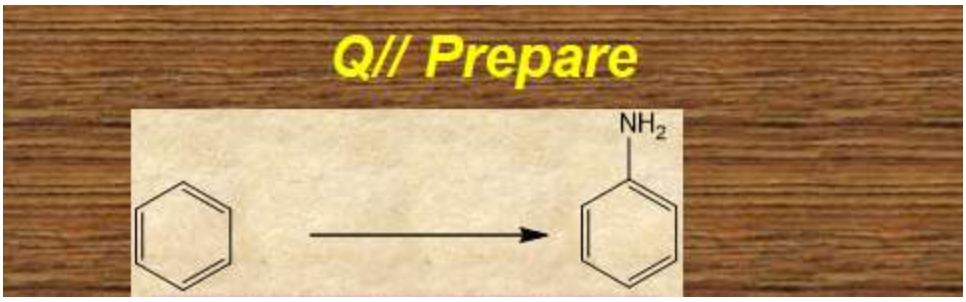
In the esterification of benzoic acid with methanol, which of the following statements is ***true***?

1.	The excess methanol increases the yield of the ester.
2.	The H_2SO_4 catalyzes the reaction.
3.	Adding H_2O will increase the yield of the ester.

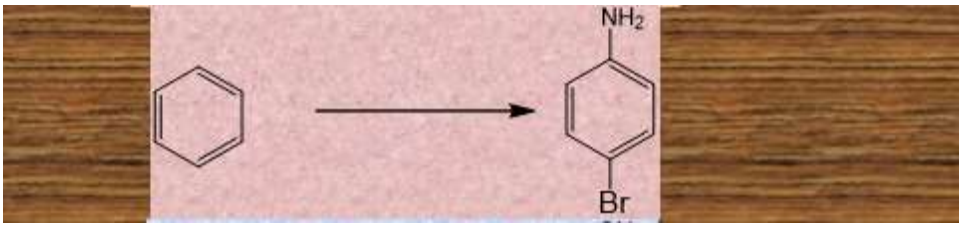
a. 1 only
b. 1 and 3
c. 2 and 3
d. 1 and 2
e. 1, 2 and 3

Answer: d

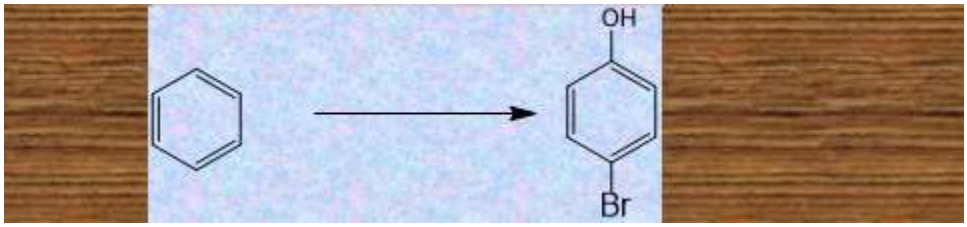
Q15/ Prepare Aniline from Benzene?



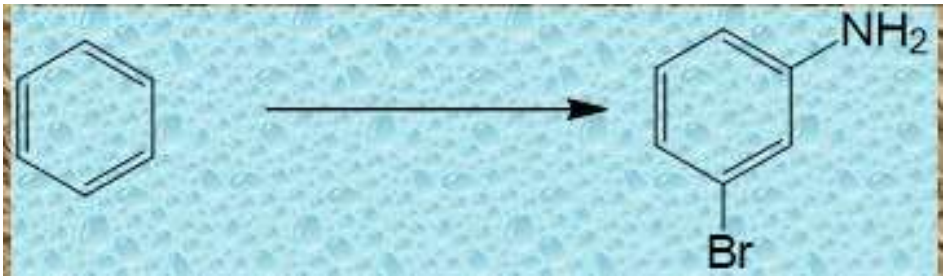
Q16/ Prepare p-bromoaniline from Benzene?



Q17/ Prepare p-bromophenol from Benzene?

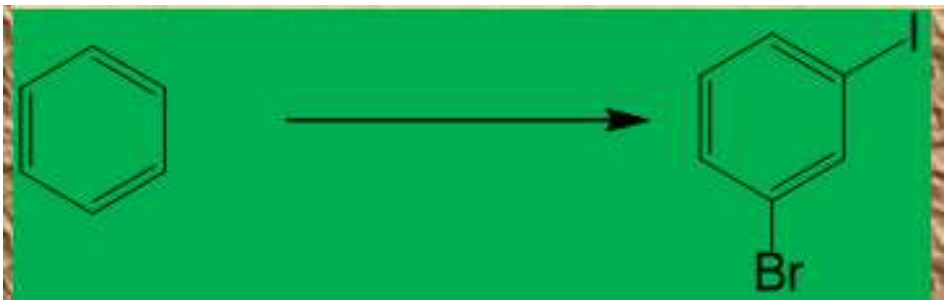


Q18/ Prepare p-bromoaniline from Benzene?



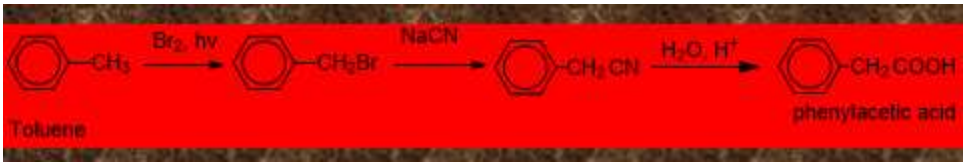
Q19/ Prepare Iodobenzene from Benzene?

Q20/ Prepare p-bromoiodobenzene from Benzene?

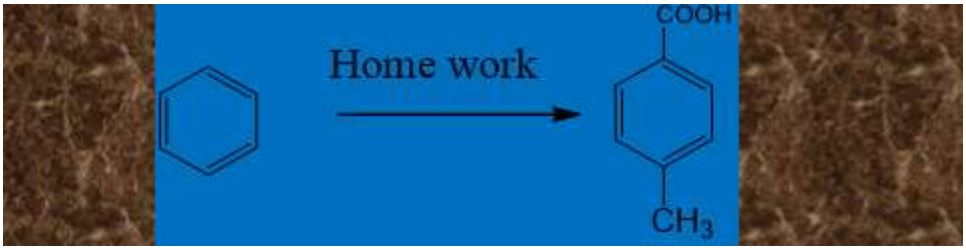


Q21/ Prepare o-methylaniline from Benzene?

Q22/ Prepare phenylacetic acid from Toluene?



Q23/ Prepare p-methylcarboxylic acid from Benzene?



Q// Prepare cis-2-butene from acetylene

Good Luck