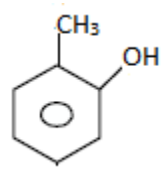
National Open University Of Nigeria
Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway, Jabi - Abuja
Faculty of Science

October/November 2016 Examination

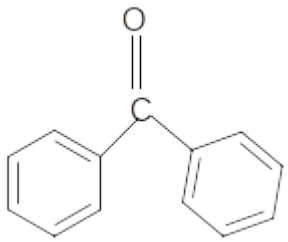
Course Code: CHM305
Course Title: **ORGANIC CHEMISTRY III**
Credit Unit: 3
Time: 2 ½ HOURS
Instruction: **Answer Question One and any other Four Questions. Each Question Carries 14 Marks**

1a) Give the names of the following compounds

I



Ii



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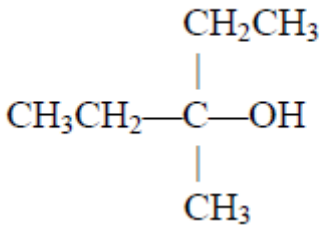

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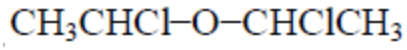

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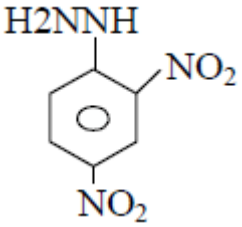
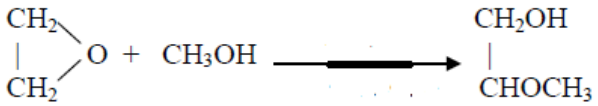
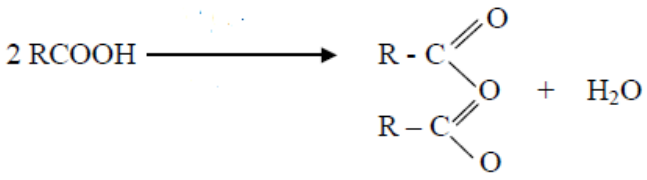


1b) write the reaction condition of the below reactions

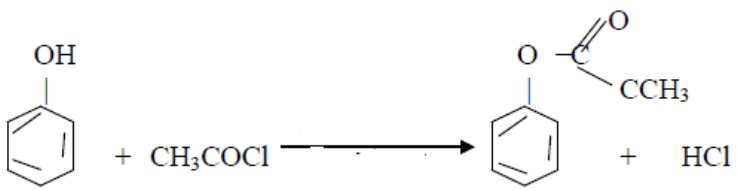
I)



ii)



Iii



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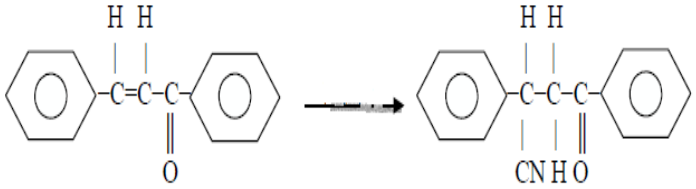

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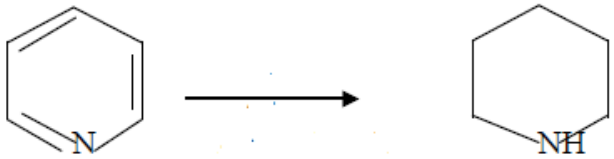

2a) With the aid of chemical structures, summarize the nucleophilic reaction of pyridine.

2b) Briefly discuss the aromatic character exhibited by Pridine.

3) The compound $H_2C(COOC_2H_5)_2$ is an important synthetic reagent,

a) Name the compound
b) Explain its methods of preparation
c) State its physical properties.

4) Answer the following questions with respect to dicarboxylic acid.

i) They contain _____ carboxyl groups.

ii) Saturated dicarboxylic acids have the general formular _____ and may be equal or greater

than _____.

iii) In naming dicarboxylic acids using IUPAC system, the suffix _____ is added to the name of

the parent alkane.

iv) In the common system, the position of the substituents is indicated by _____ while in the

IUPAC system, it is indicated by _____.

v) Dicarboxylic acids show _____ isomerism.

vi) The general methods of preparation of dicarboxylic acids are (a) - (i), List.

vii) All dicarboxylic acids are _____ solids.

viii) Solubility in water _____ as molecular mass _____.

ix) Melting points of the acids with even number of carbon atoms are _____ than those with odd

number of carbon atoms.

x) The acid strength of dicarboxylic acids _____ with _____ in molecular weight.

xi) Dicarboxylic acids dissociates in two step. Using a named dicarboxylic acid, show the two steps.

5a) Answer the following questions with respect to carbonyl compounds.

i. α,β – Unsaturated carbonyl compounds are _____ and _____ which are conjugated with a double bond.
ii. At the carbon-carbon double bond, an unsaturated ester or unsaturated ketone undergoes
_____ addition of acid and _____.
iii. Carbonyl compounds undergo the _____ substitution typical of esters or the ketone.
iv. The carbonyl group of α,β – unsaturated aldehydes and ketones consists of a nucleophilic _____ and an electrophilic _____, they also have another electrophilic carbon- the ____-carbon.
v. α,β – unsaturated compounds can be prepared from _____ condensation, and the _____ condensation.
vi. The carbon – carbon double bond normally serve as a source of _____ for the electrophilic reagent.
vii. An electron- releasing substituents _____ the transition state leading to the initial carbocation while an electron withdrawing groups _____ the transition state.
viii. Strong electron withdrawing groups_____a carbon-carbon double bond toward electrophilic addition but _____ the carbon-carbon double bond towards electron-rich reagent.
ix. α,β – unsaturated ketones , _____, ester and _____ are susceptible to nucleophilic attack.
x. Normal _____ addition to aldehydes or ketones is called _____ addition while when it involves _____ addition to the β – carbon, it is a _____

addition.

xi. α,β-unsaturated carbonyl compounds are converted to _____ carbonyl compounds when they react with aqueous sodium cyanide.

xii. Ammonia and some derivatives of ammonia like amines, hydroxylamine, phenyl hydrazine, etc ,add to α,β-unsaturated carbonyl compounds to yield _____ compounds.

xiii. Michael addition is a special _____ addition to α,β-unsaturated carbonyl compounds.

xiv. Ammonia and primary and secondary amines are powerful catalysts for the Michael addition.

6a) In chemistry, six-membered heterocyclic compounds are formed when _____ occurs.
6b) Giving names and structures, list the heterocyclics according to their subgroups.
6c) Discuss the preparation of pyridine.

7. Discuss two synthetic applications of acetoacetic esters especially in the synthesis of carboxylic acid