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Obafemi Awolowo University, Ile-Ife, Nigeria
Department of Chemistry

B.Sc. (Chemistry) Degree Rain Semester Examination 2011/2012 Academic Session
CHM 306: Aromatic and Heterocyclic Chemistry

Date: January 2013

Time Allowed: 2 hours

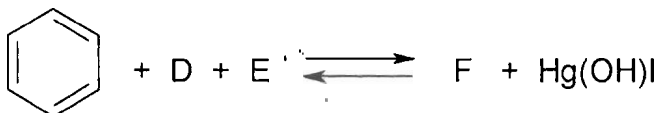
Instruction: Attempt ALL questions

- 1a. Write the mechanism for Friedel-Craft alkylation for the synthesis of a typical alkylbenzene.
b. Diagrammatically explain why the C-X bond in an arylhalide is stronger than that of an alkylhalide.
c. Provide the structures of the following compounds; (i) 1,4-dimethyl-2-vinylbenzene (ii) dichlorodiphenyltrichloroethane (iii) adrenalin.
d. (i) Heating benzene with formalin and hydrochloric acid will yield benzylchloride, write a balanced equation with appropriate conditions for the reaction.
(ii) What is Wurtz reaction? Give an example of this reaction.
e. Provide the lettered compounds/reagents (A – E) in the chemical equations below:

(i)

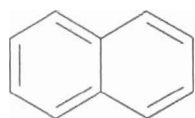


(ii)

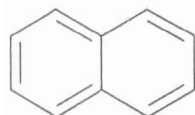


- 2a. (i) What is Dow process? Give a typical reaction of Dow process.
(ii) Outline the synthesis of phenylbenzoate from phenol.
b. (i) How would you produce 2-methyl-4-hydroxyacetophenone from m-cresol?
(ii) Write a balanced equation for the production of aspirin.
c. (i) Write the mechanism for the synthesis of 5,8,9,10-tetrahydro-1,4-naphthoquinone from p-benzoquinone.
(ii) Provide the products of the following reactions

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Cr_2O_3 at $25\text{ }^\circ\text{C}$



$\text{O}_2, \text{V}_2\text{O}_5$ at $460 - 480\text{ }^\circ\text{C}$



d. Outline the synthesis of naphthalene from succinic anhydride.

3a. Give the product of the reaction of heptan-3,5-dione with hydrazine. Illustrate the mechanism of the reaction.

b. If you are required to prepare 2-ethylindole starting with butan-2-one and using the Fischer Indole method, what other reagent(s) would you need? Illustrate the mechanism of the reaction.

c. Give simple equation(s) to show how you would experimentally verify the following chemical information? (i) 2-hydroxyindole exists mainly as the amide. (ii) 3-hydroxyindole exists as carbonyl tautomer that has appreciable enol content (iii) The 3-keto group in isatin behaves like a typical carbonyl.

d. Give equation to represent the reaction between aniline and the product of self condensation of ethanal in an acidic medium. Illustrate the mechanism of the reaction