TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF PURE & APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN APPLIED CHEMISTRY (BTAC)

ACH4403: ORGANIC SYNTHESIS

ORDINARY EXAMINATION

SERIES: DECEMBER 2024

TIME: 2HOURS

DATE: 20**Dec2024**

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE**Question(s).Attemptquestion ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

QUESTION ONE

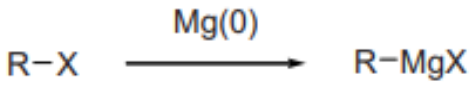
a) Define the following terms as used in organic synthesis.

i. Divergent synthesis **(2 marks)**

ii. Combinatorial synthesis **(2 marks)**

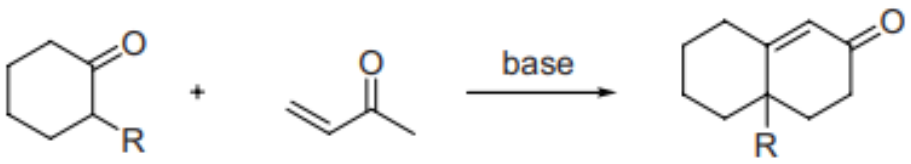
iii. Retrosynthetic analysis **(2 marks)**

b) Provide the plausible single electron transfer reaction mechanism for the formation of the Grignard reagent. **(6 marks)**



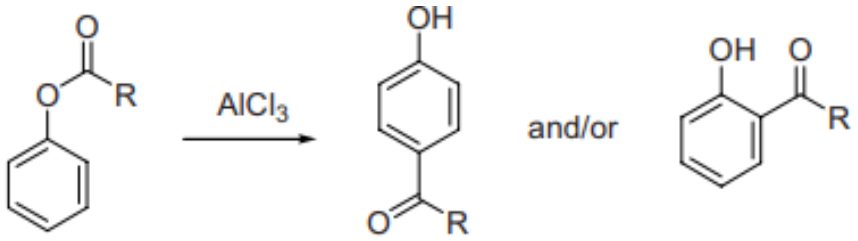
c) **Provide the reaction mechanism of the Negishi Cross coupling reaction of organozinc compounds with various halides.** **(8 marks)**

d) **Robinson annulation reaction involves Michael addition reaction of cyclohexanone to methyl vinyl ketones yielding α-β- unsaturated ketones. Provide the complete mechanism indicating all the steps involved in the reaction below.** **(10 marks)**

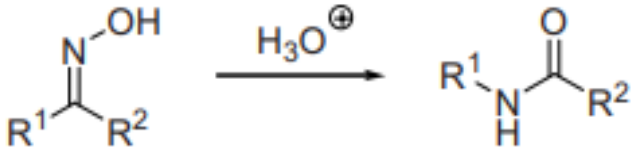


QUESTION TWO

a) **Provide the reaction mechanism for the Lewis acid catalyzed rearrangement of phenol esters provides 2 or 4 ketophenols in Fries rearrangement reaction.** **(10 marks)**



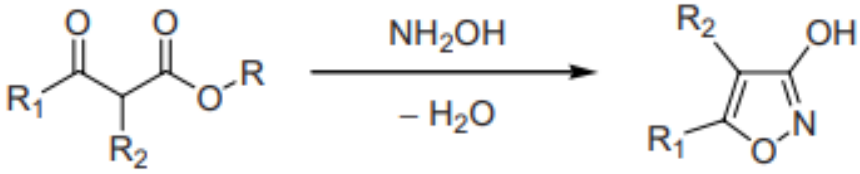
b) **Provide the reaction mechanism Beckmann rearrangement of acid mediated isomerization of oxime to amides in protic solvent.** **(10 marks)**



QUESTION THREE

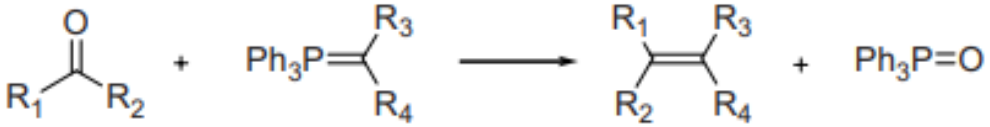
a) Provide the plausible mechanism for the anionic Oxy – Cope rearrangement reaction given below. (10 marks)

b) Provide the plausible mechanism for the cyclization of β- keto esters with hydroxylamnine (10 marks)

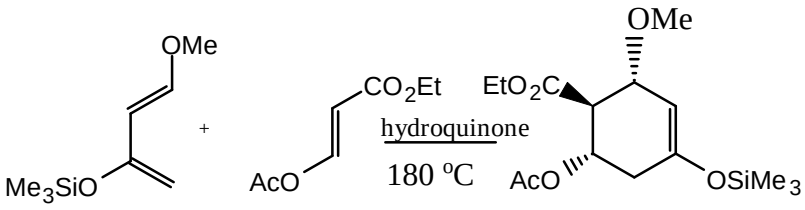


QUESTION FOUR

a) Provide the reaction mechanism for the Wittig reaction for the olefination of carbonyls using phosphorous ylides. (10 marks)

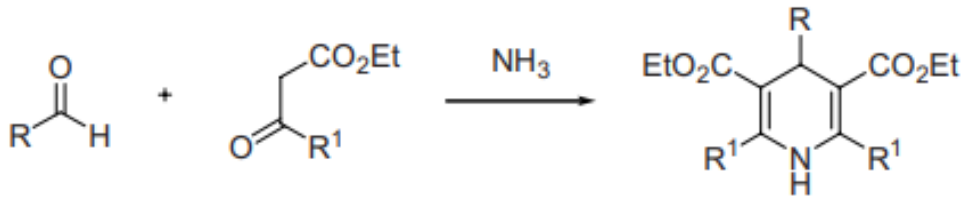


b) Provide the reaction mechanism for the following transformation identifying diene, dienophile, electron withdrawing group, and electron donating group. (10 marks)



QUESTION FIVE

a) **1,4 dihydropyridines are popular reducing agents in organo catalysis. Provide the reaction mechanism for the Hantzsch dihydropyridines synthesis. (10 marks)**



b) **Dieckmann cyclization is used to provide the cyclization compounds. Provide the reaction mechanism for the following transformation. (10 marks)**