2017

M.Sc.

1st Semester Examination

CHEMISTRY

PAPER—CEM-101

Subject Code—24

Full Marks : 40

Time : 2 Hours

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

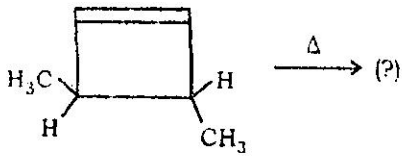
(*Organic Chemistry*)

Answer any *five* questions
taking *two* questions from each group.

Group—A

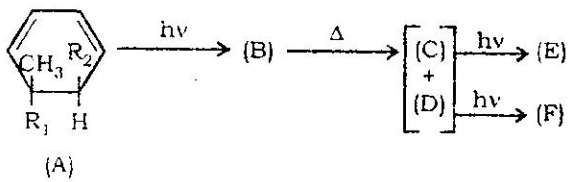
1. (a) How pericyclic reaction differ with other types of chemical reactions and also indicate the characteristic features of pericyclic reactions.

(b) Write the pathways through which the following ring opening reaction occurs



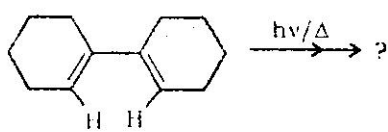
and indicate the preferred product.

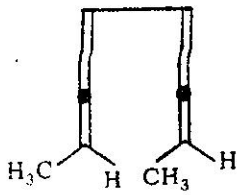
(c) Complete the following transformation indicating frontier orbital interaction (F.O.I) :

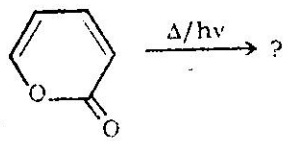


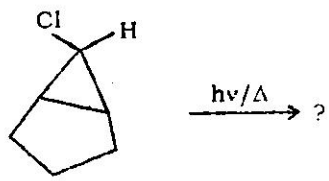
2+2+4

2. Predict the product(s) of the following reactions indicating F.O.I (attempt any four). Indicate what pathway the reaction yields the observed product.

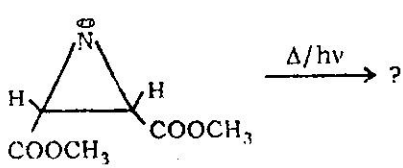
(i) 

(ii) 

(iii) 

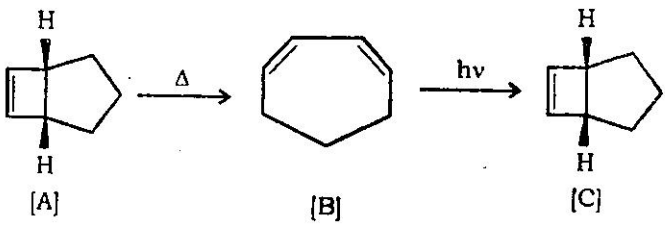
(iv) 

endo/exo —
6 - chloro (3, 1, 0)
hexane

(v) 

4×2

3. (a) What is principle of microscopic reversibility ? The following reactant (A) does not absort radication ($h\nu$) but gives (B) on thermal reaction. B absorbs ($h\nu$) to give (C) but the reverse reaction is not allowed



[A] [B] [C]

Indicate what step does not follow the Woodward Hoffmann Rule and why ? How the principle of microscopic reversibity is not maintained in the above reaction sequence.

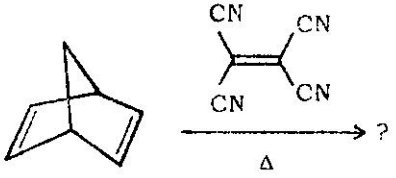
(b) Draw correlation diagram for the following interconversion under thermal condition :

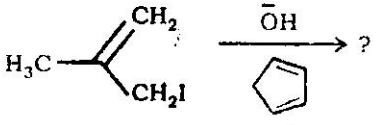
Butadiene Cyclobutene

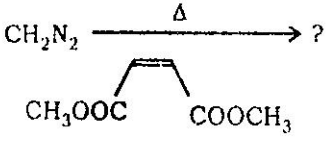
4+4

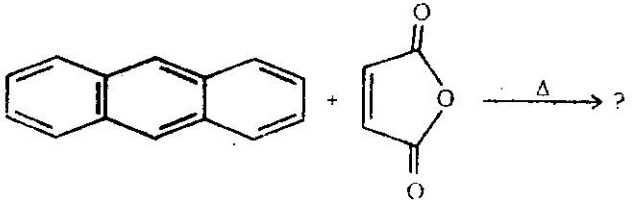
4. (a) What is supra and (antarafacial) cycloaddition ? Explain with example. Write Woodward-Hoffmann Selection Rules for cycloaddition reaction.

(b) Predict the **product**/s of the following reaction indicating Frontier Orbital interaction in each case :
(attempt any *two*)

(i) 

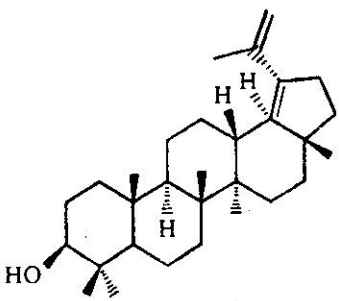
(ii) 

(iii) 

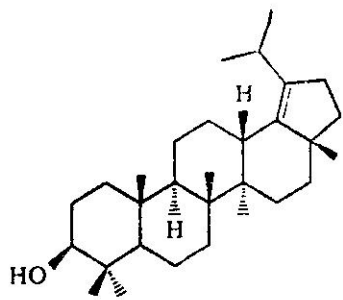
(iv) 

2+2+2×2

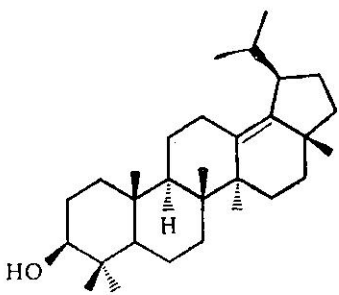
5. Synthesize the following 6-6-6-6-5 pentacyclic triterpenoids from squalene following biogenetic isoprene rule :



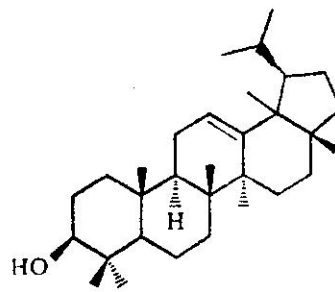
lupeol



18-lupene-3-ol



13(18)-lupene-3-ol



neolupenol

2×4

Group—B

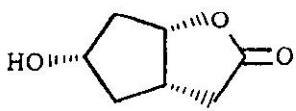
6. (a) What is Multi Component Reaction ?

(b) Give an example of Passerini reaction with plausible mechanism.

(c) What is Olefin Metathesis reaction ? Give an example.

2+3+3

7. (a) Predict the products in the following transformations (with plausible mechanism) :

(i) 

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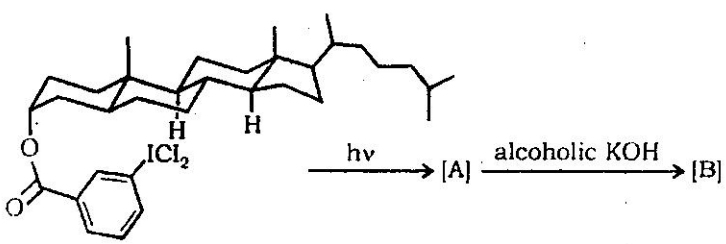
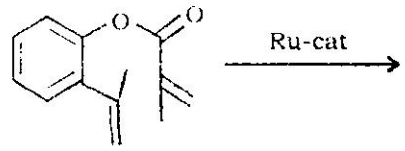
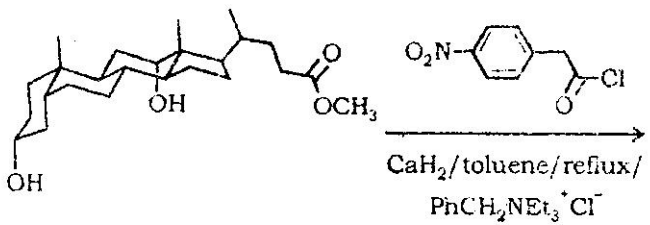


(iii) 

(iv) 

2×4

8. (a) What is a phase transfer catalyst ? Give an example.

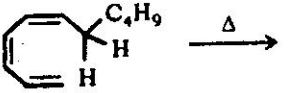
(b) What is the mechanism of phase transfer catalyst ?

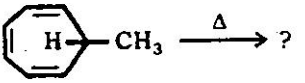
(c) What is remote functionalization ? Give an example.

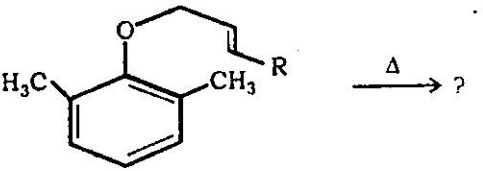
2+3+3

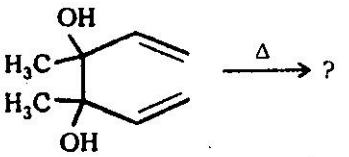
9. (a) What is (i, j) sigmatropic reaction. Explain with example. 2

(b) Predict the product of the following reaction indicating frontier orbital interactions (attempt any *three*) :

(i) 

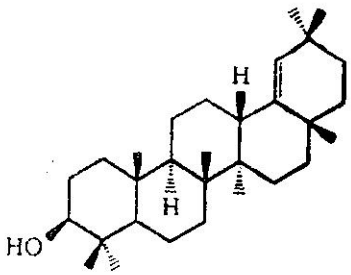
(ii) 

(iii) 

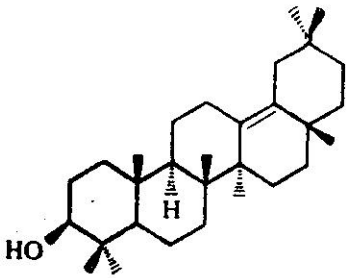
(iv) 

2×3

10. Synthesize the following **6-6-6-6-6 pentacyclic triterpenoids** from squalene following **biogenetic isoprene rule** :



1



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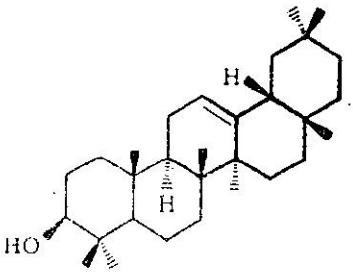

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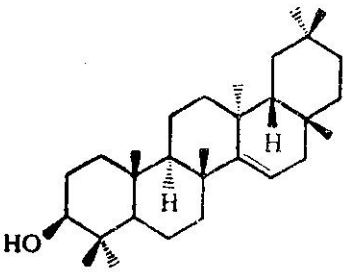

4

2×4