2018

M.Sc.

1st Semester Examination

CHEMISTRY

PAPER—CEM-102

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*)

Group—A

Answer any *four* questions : 4×2

1. What is Olefin Metathesis reaction ? What is Grubbs catalyst ?

2. What is 'biomimetic control' in chemical transformation ?

3. What is "biogenetic isoprene rule"?

4. What is Barton reaction? Explain schematically with mechanism.

5. What is multicomponent reaction? Write its significance.

6. What is phase transfer catalyst? Give in example and explain its mechanism.

7. What is Grob Fragmentation?

8. Plant based chemicals can be termed as *Renewable Chemicals*. Explain.

Group—B

Answer any *four* questions : 4×4

9. Explain the formation of the following from squalene epoxide by applying the "biogenetic isoprene rule" with at least three examples each (answer any two) :

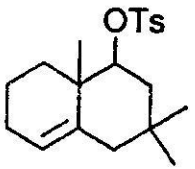
   (i) monocyclic triterpenoids

   (ii) bicyclic triterpenoids

   (iii) tricyclic triterpenoids

10. Predict the products (with plausible mechanism) (any *two*) :

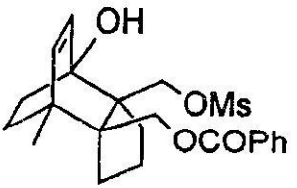
(a)



B_2H_6

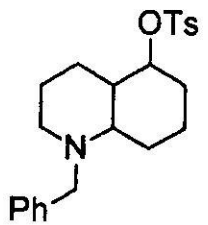
OH^-

(b)



$^tBuO^-K^+$

(c)

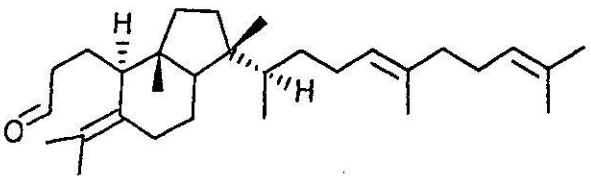


solvolysis in the

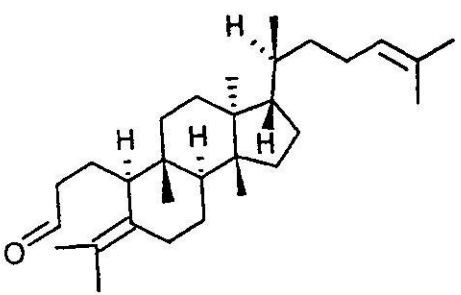
presence of $NaBH_4$

11. Synthesize the following from squalene by applying biogenetic isoprene rule and Grob fragmentation :

(i)

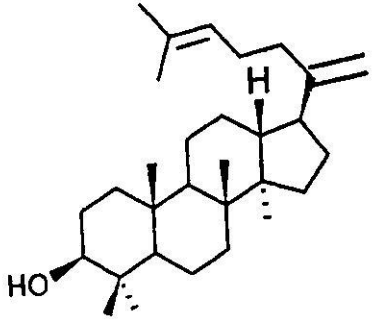


(ii)

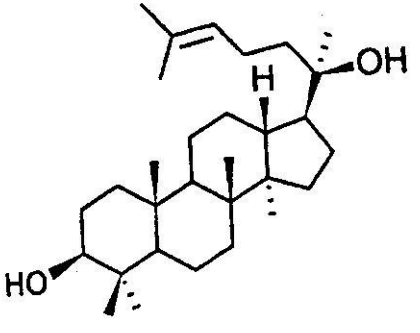


12. Synthesize the following 6-6-6-5 tetracyclic triterpenoids from squalene by applying biogenetic isoprene rule (answer any *two*) :

(a)

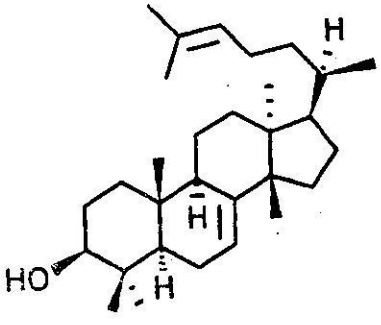


(b)



b

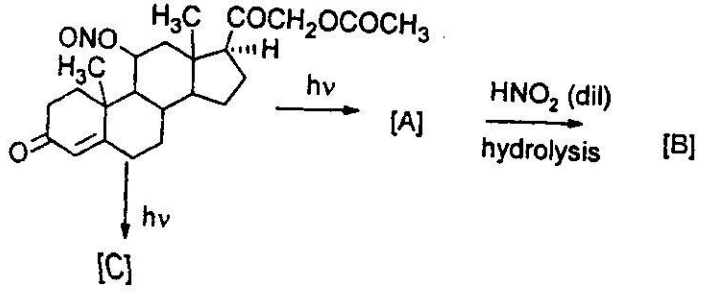
(c)

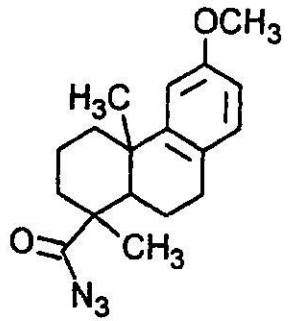


c

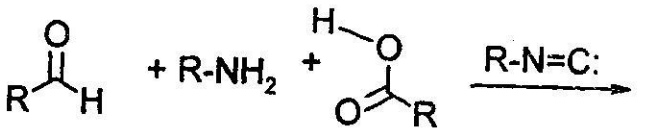
13. Carry out the following transformations with plausible mechanism.

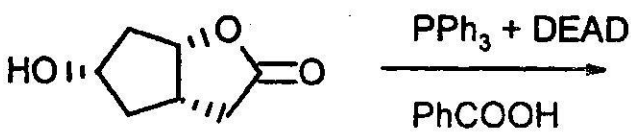
(i)

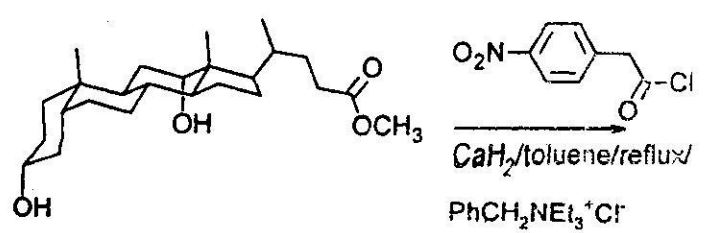


(ii) 

14. Predict the products with plausible mechanism (any *two*) :

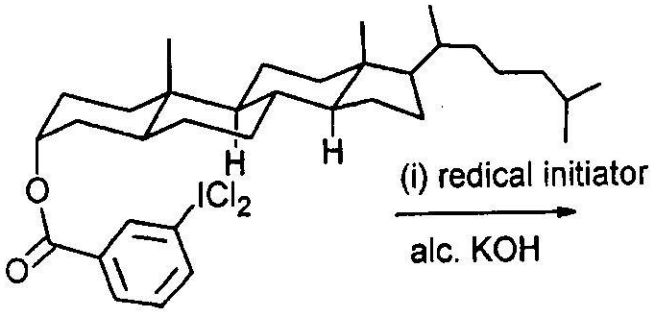
(i) 

(ii) 

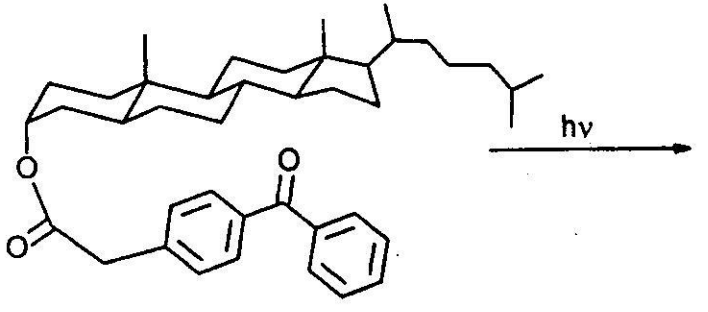
(iii) 

15. Predict the products with plausible mechanism :

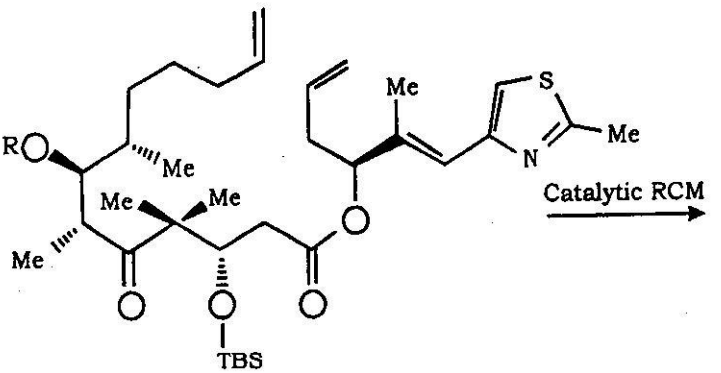
(i)



(ii)



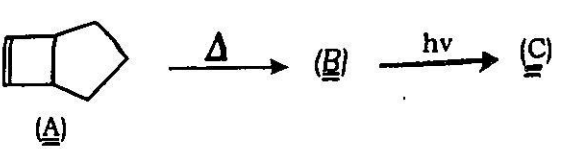
16. What is ring closing metathesis (RCM) reaction ? Predict the product with plausible mechanism.



Group—C

Answer any *two* questions : 2×8

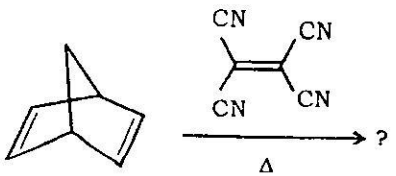
17. (a) The following compound (*A*) under thermal (*A*) reaction to yield compound (*B*), which is contrary to Woodward-Hofman Rule, but compound (*B*) on photochemical irradiation (*hν*) produces compound (*C*) where the reverse reaction is not followed, as shown : 2×2+2×2



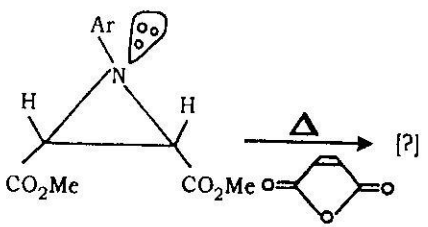
Identify the compound $(\underline{\underline{B}})$ and $(\underline{\underline{C}})$ explain the reason behind this observation with justification.

(b) Predict the products of the following reactions indication *F.O.I.* (any *two*)

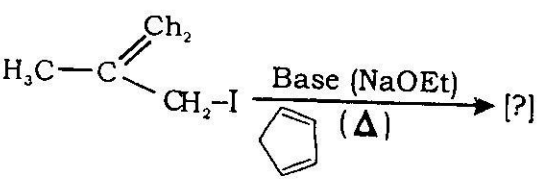
(i)



(ii)



(iii)



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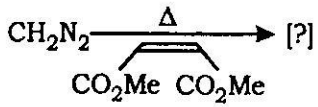
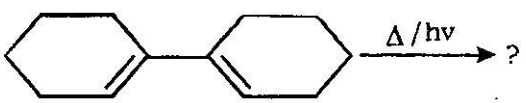
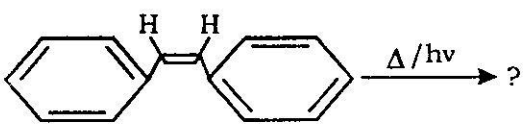
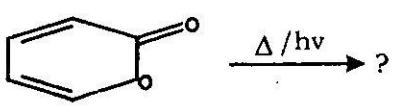
(iv) 

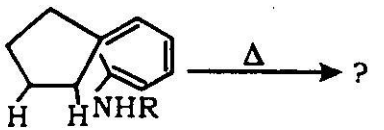
18. (a) The following compounds under both thermal (Δ) and photochemical (*hν*) reaction but the reaction process through only one path to produce the preferred product. Explain the formation of the product in each case and rationalise indicating Frontier-Orbital interactions (*F.O.I.*) (any *two*) :

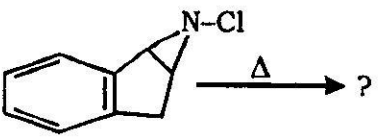
(i) 

(ii) 

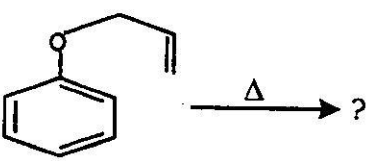
(iii) 

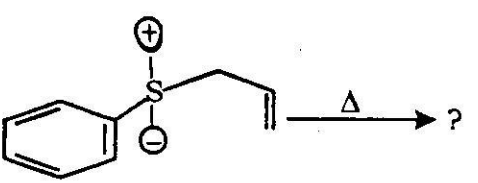
(b) Predict the product/s of the following reaction indicating *F.O.I.* (any *one*) : 2×3+2

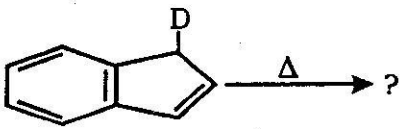
(i) 

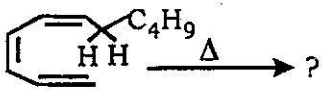
(ii) 

19. What is (*i,g*) sigmatropic shift ? Illustrate with examples and hence predict the product of the following reactions (attempt any *three*) : 2+3×2

(i) 

(ii) 

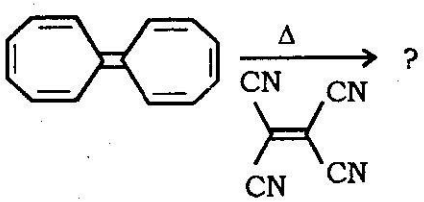
(iii) 

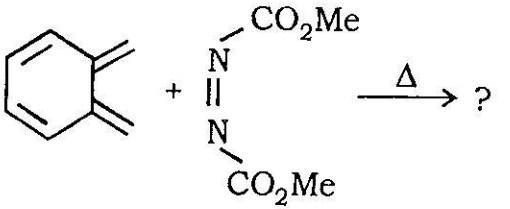
(iv) 

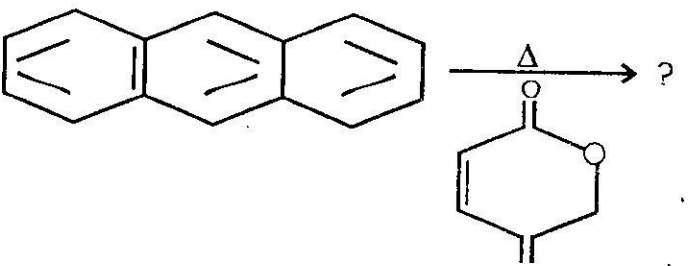
20. (a) Draw the correlation diagram of the following interconversion under thermal condition : 4+2×2

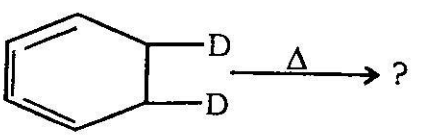
And indicate the symmetry allowed path under this condition.

(b) Predict the product/s of the following reaction with *F.O.I.* (attempt any *two*) : 2×4

(i) 

(ii) 

(iii) 

(iv) 

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