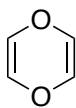


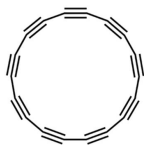
Tutorial 1

1. Classify the following compounds as aromatic/antiaromatic/non-aromatic based on Huckel's rule.

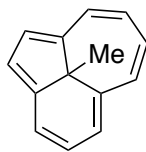
a.



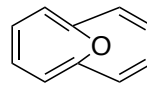
b.



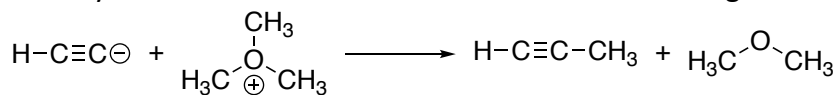
c.



d.



2. Identify the orbital interactions involved in the following reaction.

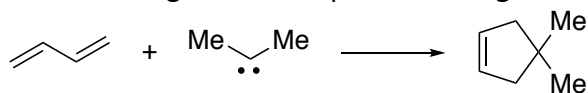


3. Is 'twistane' shown below chiral? Identify and pictorially show all the symmetry elements (if present).

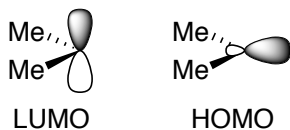


TWISTANE

4. The reaction given below passes through a five-membered transition state (TS).

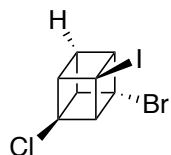


- a. Draw the HOMO-LUMO of diene involved.
b. Show **both possible** combinations of orbital interactions between diene and carbene (HOMO and LUMO given below) responsible for the product formation.
(2 marks)

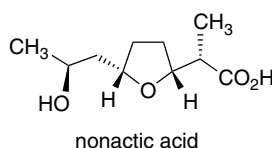
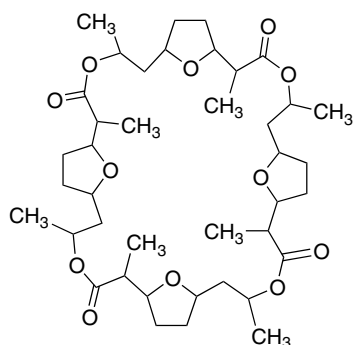


(Note: It is an example of cheletropic reaction, which you need not know or remember for solving this question!).

5. The molecule given below is a substituted cubane. Identify: a. Total number of stereoisomers that exist; b. Total number of pair of enantiomers.



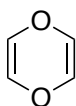
6. Shown below is the structure of nonactin without any specification of stereochemistry. It was found to be optically inactive. When completely hydrolyzed, it yields racemic nonactic acid. Draw the **stereochemical structure** of nonactin from this information using appropriate wedges at the chiral centres. (*Take home problem)



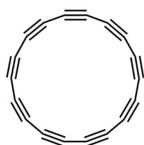
Tutorial 1 (Solution)

1. Classify the following compounds as aromatic/antiaromatic/non-aromatic based on Huckel's rule.

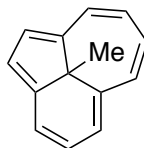
a.



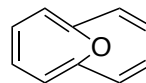
b.



c.



d.



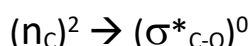
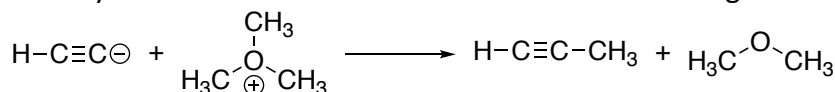
a. non-aromatic

b. aromatic (An sp-hybridized molecular carbon allotrope reported in 'Science' on 15 Aug 2019!)

c. antiaromatic

d. aromatic

2. Identify the orbital interactions involved in the following reaction.

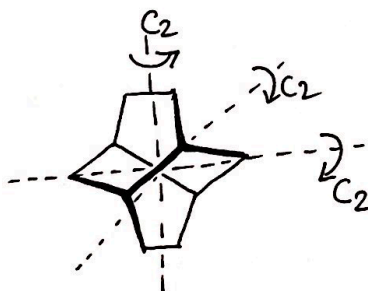


3. Is 'twistane' shown below chiral? Identify and pictorially show all the symmetry elements (if present).



TWISTANE

⑧



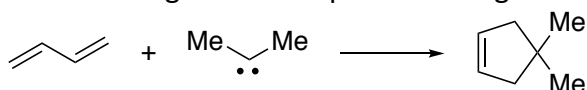
(a) chiral (1/2 mark)

(b) - 3 C₂ axes as shown above (1 1/2 marks)
(diagram is must)

Partial credit: just writing 3 C₂ but not shown in the diagram (1/2 mark)

: identifying one/two C₂ and shown in the diagram (1 mark)

4. The reaction given below passes through a five-membered transition state (TS).



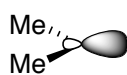
a. Draw the HOMO-LUMO of diene involved.

b. Show **both possible** combinations of orbital interactions between diene and carbene (HOMO and LUMO given below) responsible for the product formation.

(2 marks)



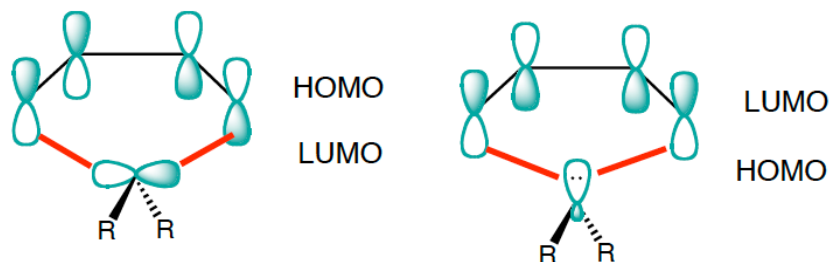
LUMO



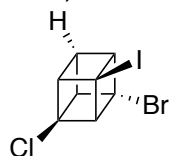
HOMO

(Note: It is an example of cheletropic reaction, which you need not know or remember for solving this question!).

a. HOMO-LUMO of diene

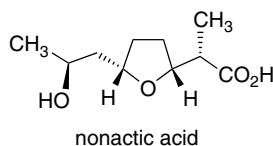
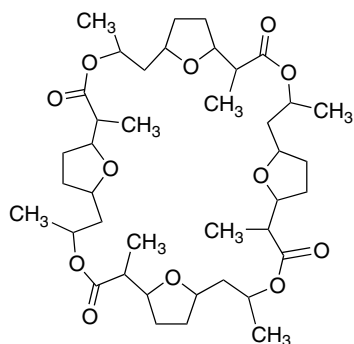


5. The molecule given below is a substituted cubane. Identify: a. Total number of stereoisomers that exist; b. Total number of pair of enantiomers.



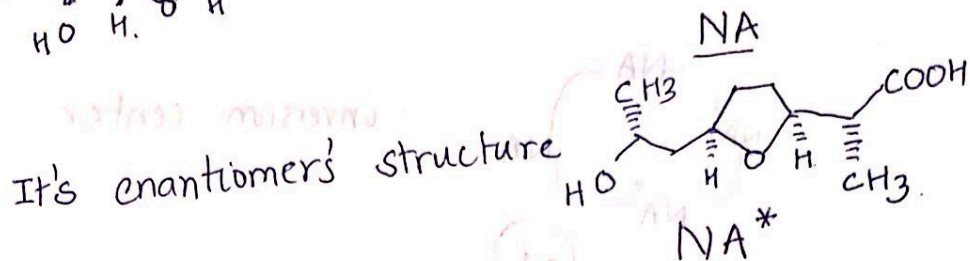
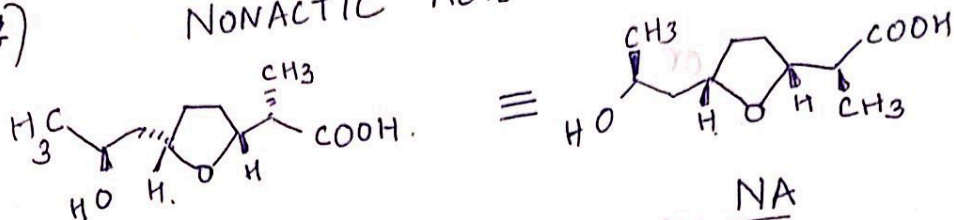
- a. Two
b. One

6. Shown below is the structure of nonactin without any specification of stereochemistry. It was found to be optically inactive. When completely hydrolyzed, it yields racemic nonactic acid. Draw the **stereochemical structure** of nonactin from this information using appropriate wedges at the chiral centres. (*Take home problem)



Q.7)

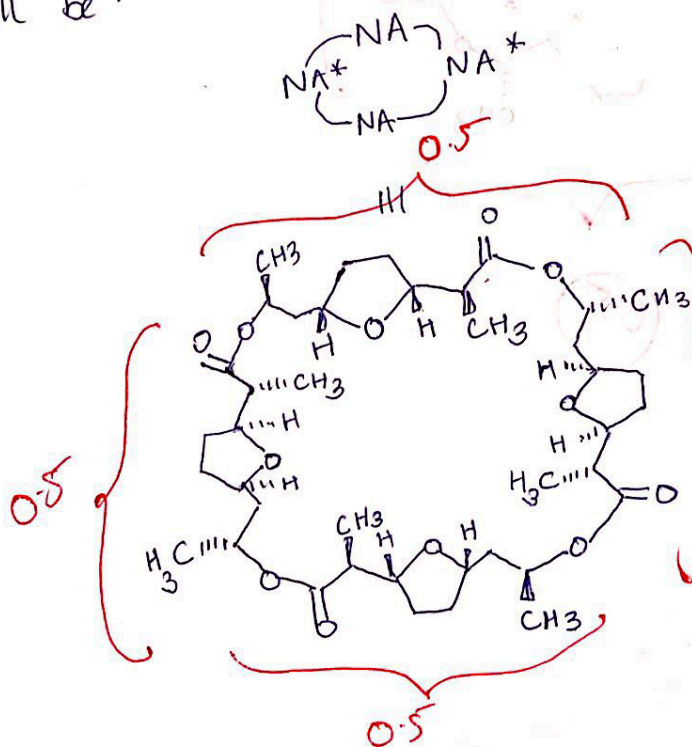
NONACTIC ACID



On hydrolysis since nonactin yields a racemic mixture, the structure has 2 molecules of NA and 2 molecules of NA^* .

As nonactin is optically inactive the structure will be.

Concept of molecule and its enantiomer placed.



0.5 Achiral as it has an S_4 .

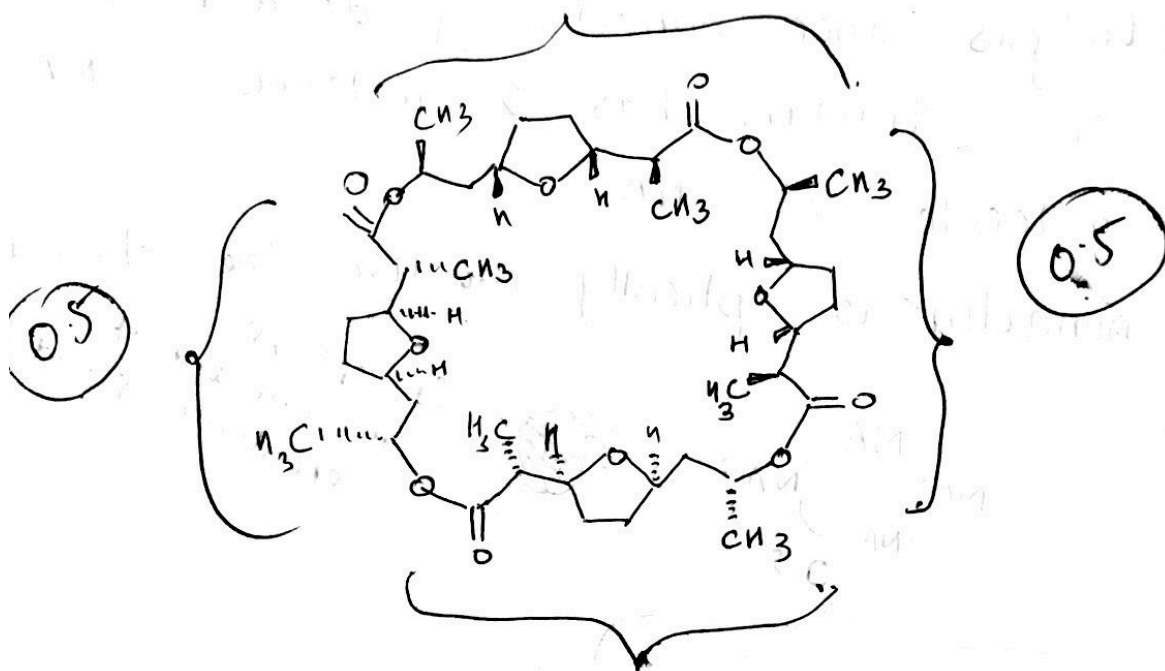
Correct dash and wedge. Check absolute configuration of molecule & enantiomer.

or



inversion center

0.5



0.5

0.5