VMC Vidyamandir Classes SINCE 1986

IIT JEE | MEDICAL | FOUNDATION

Introduction to organic chemistry

IOC

Topics included:

(1) Nomenclature

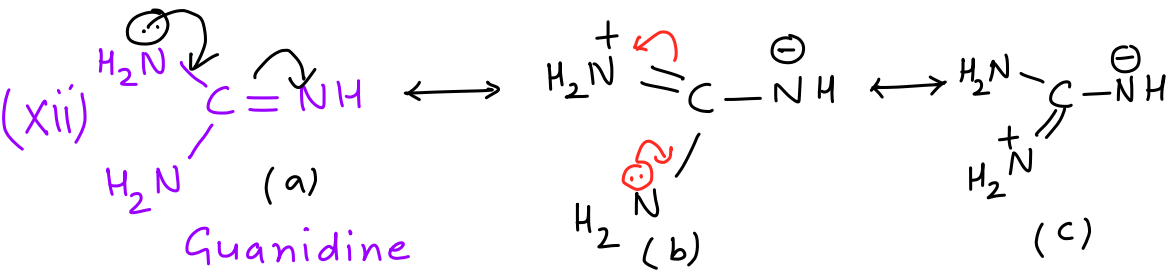
(2) GOC-I (Electronic displacement effects)

(3) GOC- II (Stability of intermediates)

(3) GOC-III (Acidity & Basicity)

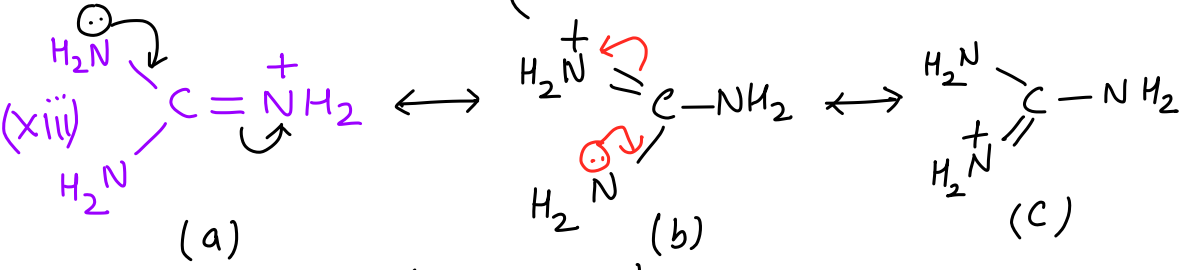
(4) Isomerism

(xii)



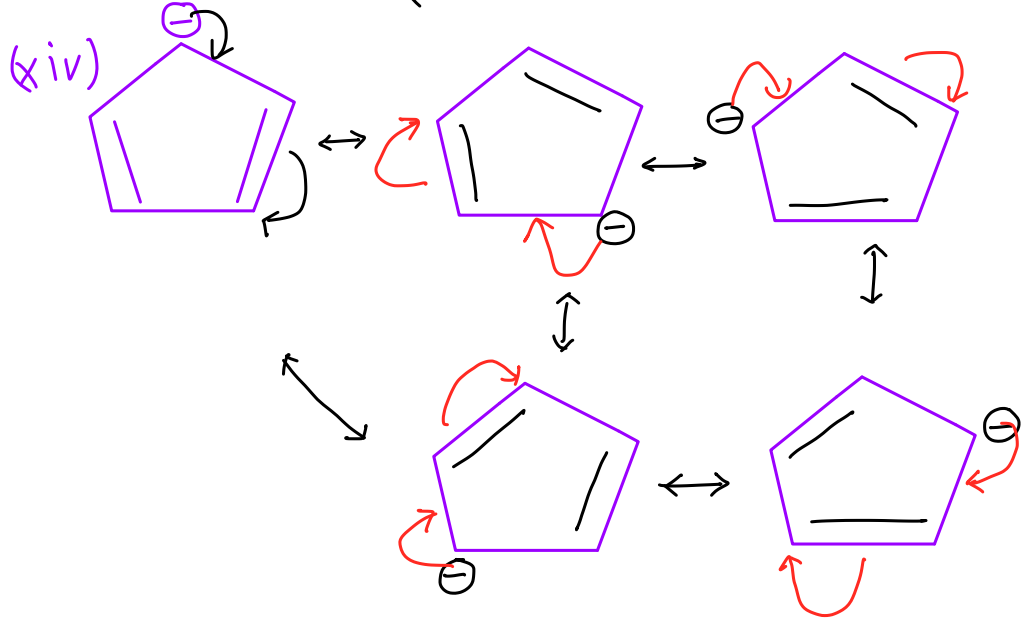
(a > b = c)

(xiii)



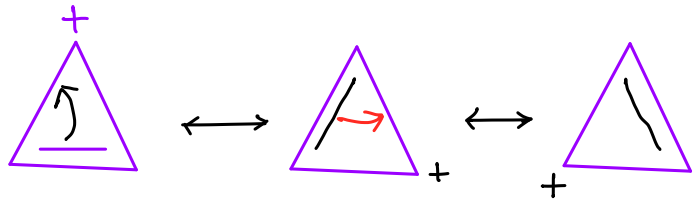
(a = b = c)

(xiv)

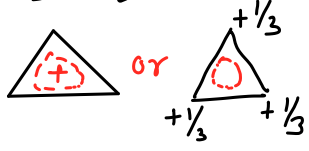


5 eq. R.S.

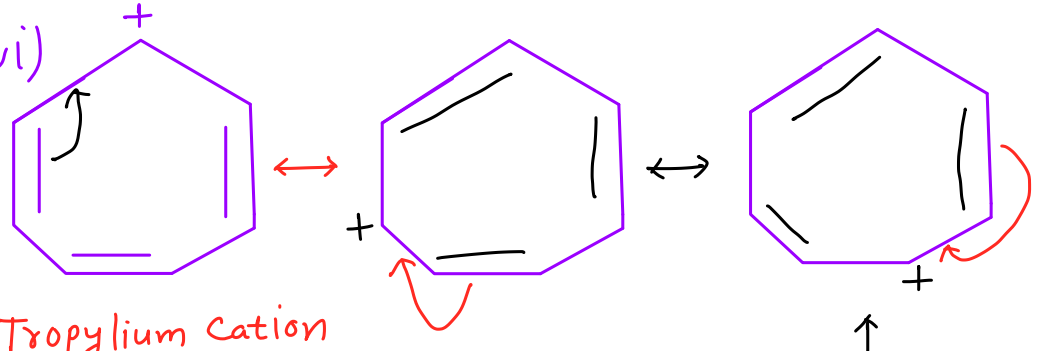
(xv)



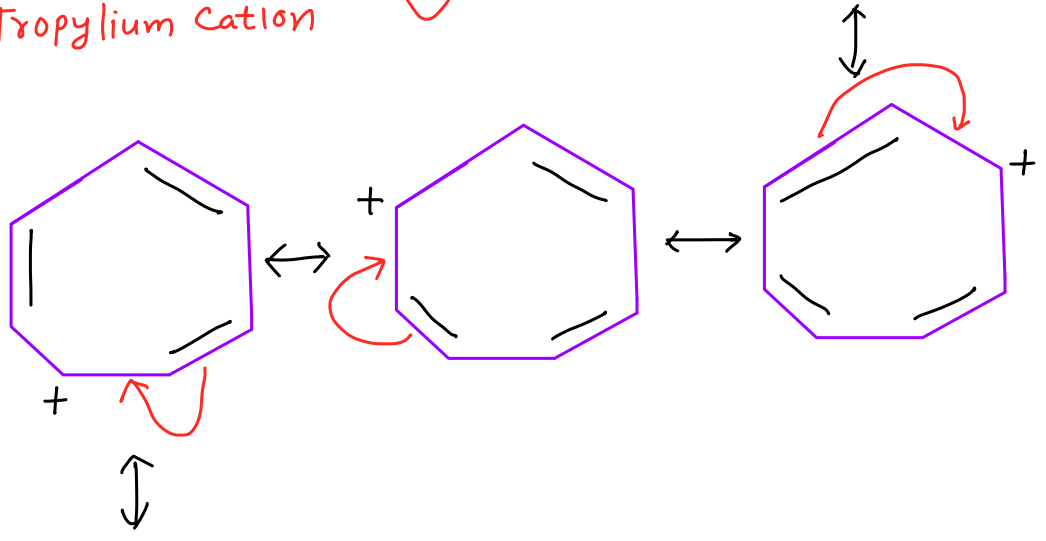
3 eq. R.S.

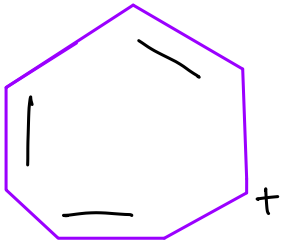


(xvi)

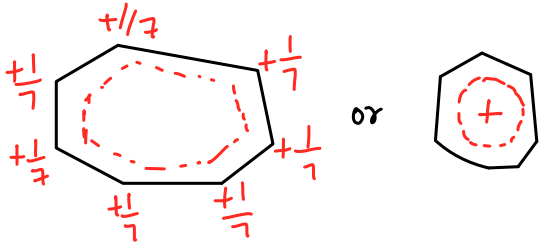


Tropylium cation

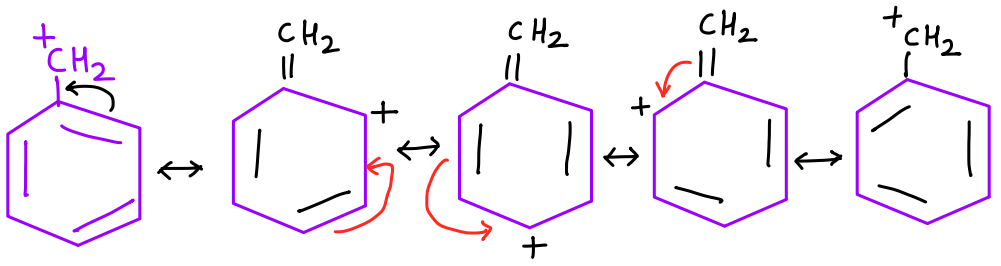




7 eq. R.S.



(xvii)



benzyl carbocation

(a) (b) (c) (d) (e)

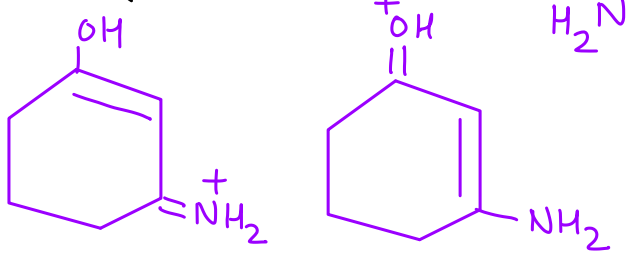
$$(a = e) > (b = c = d)$$

Q. write the order of stab. of R.S. ?

① $R-\overset{+}{C}=O$ $\quad$ $R-C\equiv\overset{+}{O}$ $\quad$ $b > a$

② $H_2N-\overset{+}{C}H-OH$ (a) $\quad$ $H_2\overset{+}{N}=CH-OH$ (b) $\quad$ $H_2N-CH=\overset{+}{O}H$ (c) $\quad$ $b > c > a$

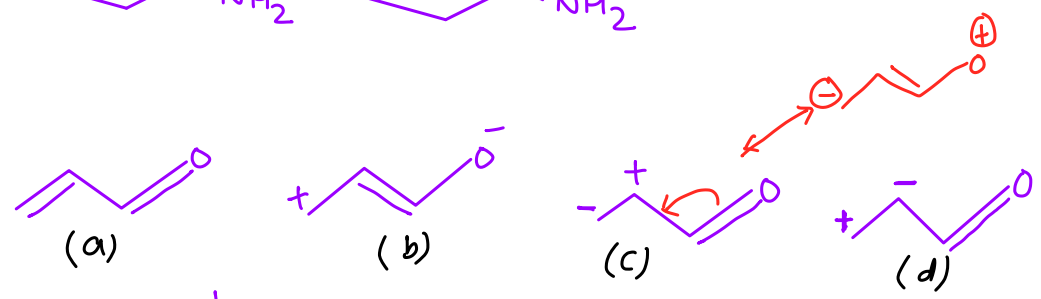
③



$a > b$

Imp.

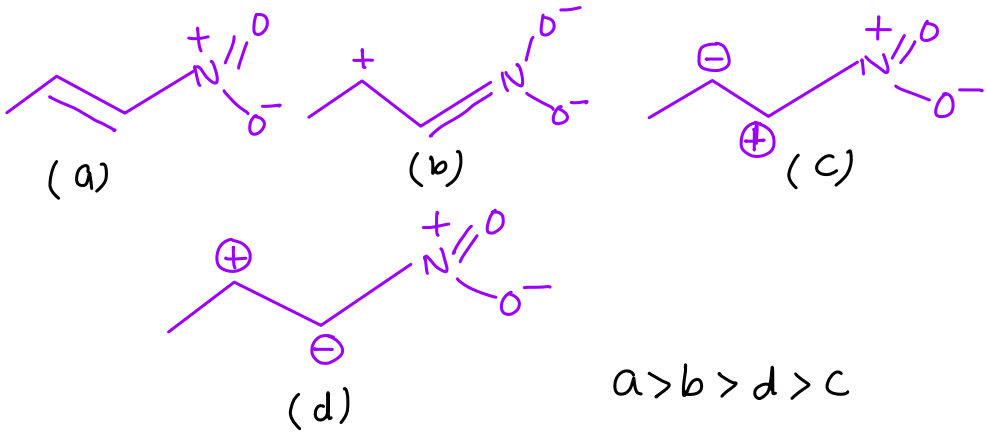
④



(a) (b) (c) (d) (e)

$$a > b > d > c > e$$

(5)



(a) (b) (c) (d)

a > b > d > c

(6) $CH_2=CH-CH=CH-OCH_3$

$\overset{\ominus}{C}H_2-CH=CH-CH=\overset{+}{O}-CH_3$

$CH_2=CH-\overset{\ominus}{C}H-\overset{\oplus}{C}H-\ddot{O}-CH_3$

a > e > b > c > d

$CH_2=CH-\overset{\oplus}{C}H-\overset{\ominus}{C}H-\ddot{O}-CH_3$

$CH_2=CH-\overset{\ominus}{C}H-CH=\overset{\oplus}{O}-CH_3$

(7) $\overset{\ominus}{C}H_2-C\equiv N$ $\quad CH_2=C=\overset{\ominus}{N}$ $\quad b > a$

(8) $H_2N-CH=CH-BH_2$ $\quad H_2\overset{+}{N}=CH-CH=\overset{\ominus}{B}H_2$

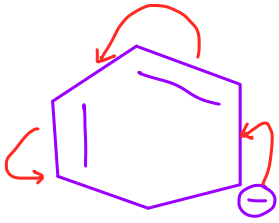
b > a

(9) $CH_2=\overset{+}{N}=\overset{-}{N}$ (a) $\overset{-}{C}H_2-\overset{+}{N}\equiv N$ (b)

$\overset{+}{C}H_2-N=\overset{-}{N}$ (c) $\overset{-}{C}H_2-N=\overset{+}{N}$ (d)

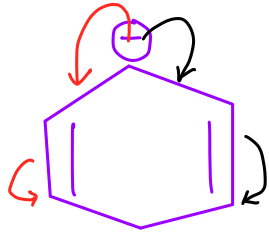
a > b > c > d

(10)



(Extended conj.)

(Conjugation in one direction)



(cross conjugation)

(Conjugation in more than one direction)

a > b

Extended conj. > cross conjugation

Aromaticity → It is the phenomenon by which stab. of molecule increases.

Organic Comp.

Aromatic (Dia.)	Antiaromatic (Para.)	Non Aromatic
→ Cyclic	→ Cyclic	→ Cyclic
→ Planar	→ Planar	→ Non Planar

→ cyclic conjugation

→ obey huckel's rule

(close loop of delocalisable $(4n+2)\ \pi\ e^-$)

i.e. $2\pi, 6\pi, 10\pi, 14\ \pi e^-$ etc.

→ cyclic conj.

→ obey huckel's rule

(close loop of delocalisable $4n\ \pi\ e^-$)

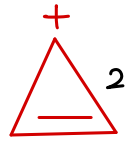
i.e. $4\ \pi, 8\ \pi, 12\ \pi, 16\ \pi\ e^-$ etc.

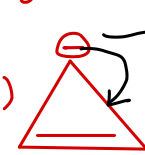
→ chr. like normal alkene or alkyne

* Anti aromatic comp. are not stable at room temp.

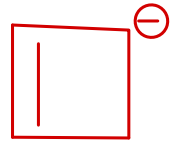
Q. Identify aromatic, non aromatic and anti aromatic among the following :-

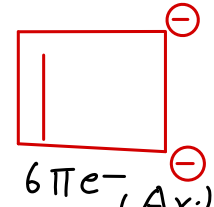
(1)  (NA)

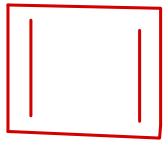
(2)  $2\pi e^-$ (Ar.)

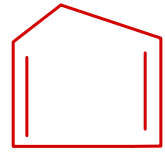
(3)  $4\ \pi e^-$ (AA)

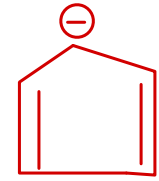
(4)  (NA)

(5)  (NA)

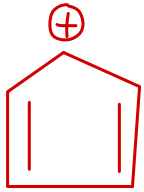
(6)  $6\ \pi e^-$ (Ar.)

(7)  $4\pi\ e^-$ (AA)

(8)  (NA)

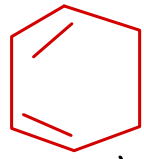
(9)  $6\ \pi e^-$ (Ar.)

(16)



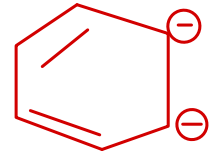
$4\pi e^-$
(AA)

(11)



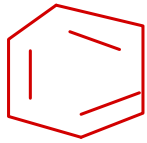
(NA)

(12)



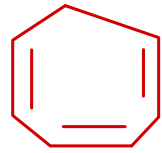
$8\pi e^-$
(AA)

(13)



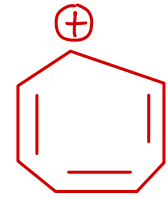
(Ar.)

(14)



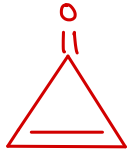
(NA)

(15)



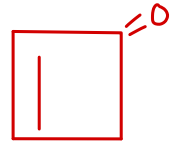
$(6\pi e^-)$
(Ar.)

(16)



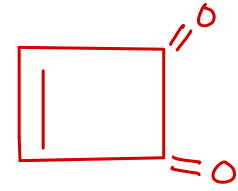
$2\pi e^-$
(Ar.)

(17)



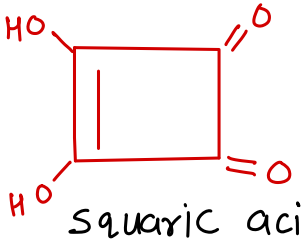
(NA)

(18)



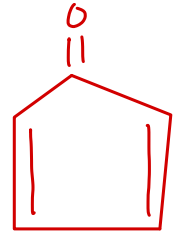
$2\pi e^-$
(Ar.)

(19)



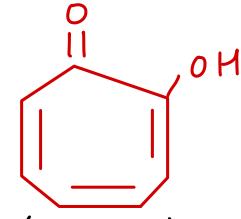
squaric acid
$2\pi e^-$ (Ar.)

(20)



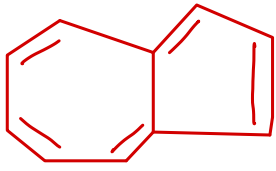
$4\pi e^-$
(AA)

(21)



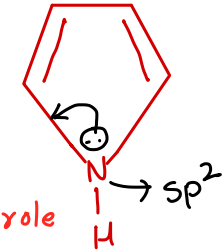
(Tropolone)
(Ar.) $6\pi e^-$

(22)



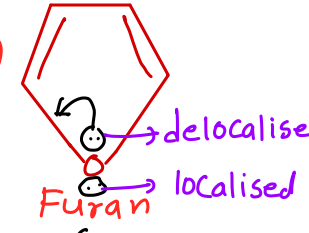
Azulene
$10\pi e^-$ (Ar.)

(23)

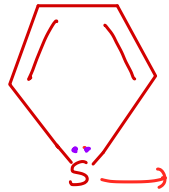


Pyrrole
$6\pi e^-$
(Ar.)

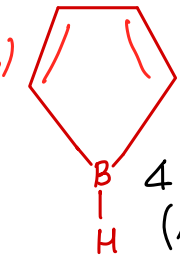
(24)



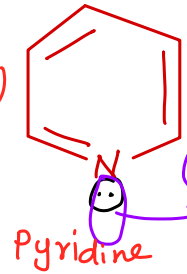
Furan
$6\pi e^-$
(Ar.)

(25) 

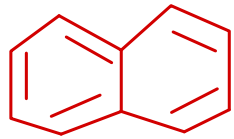
6π e⁻ (Ar.)
Thiophene

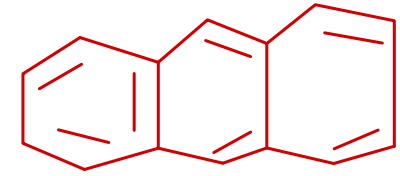
(26) 

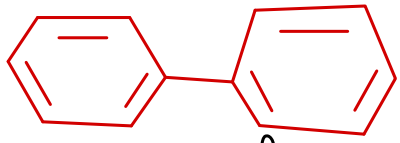
4π e⁻ (AA)

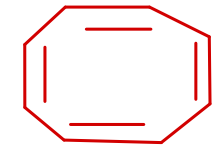
(27) 

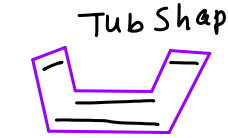
6π e⁻ (Ar.)
(localised)
Pyridine

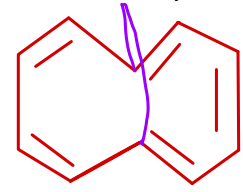
(28) 
10π e⁻ (Ar.)
Naphthalene

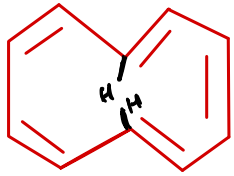
(29) 
14 π e⁻ (Ar.)
Anthracene

(30) 
Close loop of 6π e⁻ (Ar.)

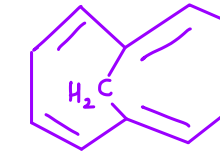
Imp (31) 
Cyclo octa tetraene (COT)


Tub Shape (Non planar) (Non ar.)

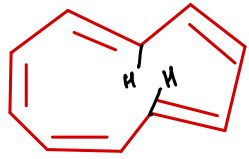


(32) 

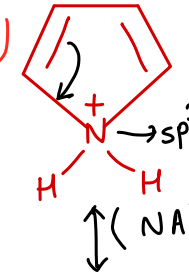
(Trans annular strain due to vanderwaal repulsion b/ω H-atoms)
Non planar ⇒ Non Ar.

(33)
or 

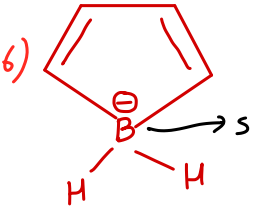
planar
10 π e⁻ (Ar.)

(34) 

Planar
10π e⁻ (Ar.)

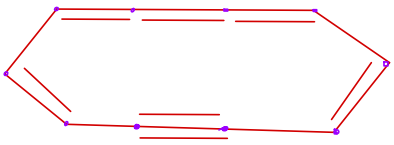
(35) 

↕ (NA)

(36) 

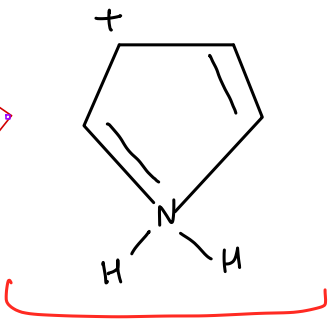
(NA)

(37)



$10\pi e^-$

(Ar.)

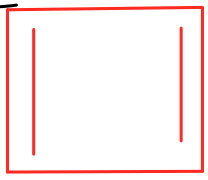


Not Possible

Annulenes → completely conjugated monocyclic Polyenes are called annulens. They are represented by [x] annulene.

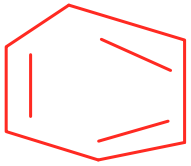
x → No. of πe^-s.

EX.



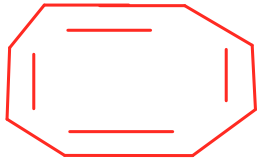
[4] annulene

(AA)



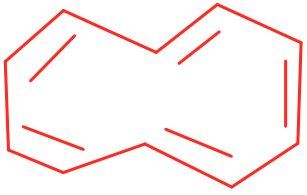
[6] annulene

(Ar.)



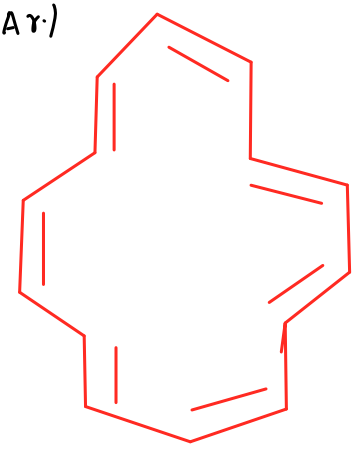
[8] annulenes

(NA)



[10] annulene

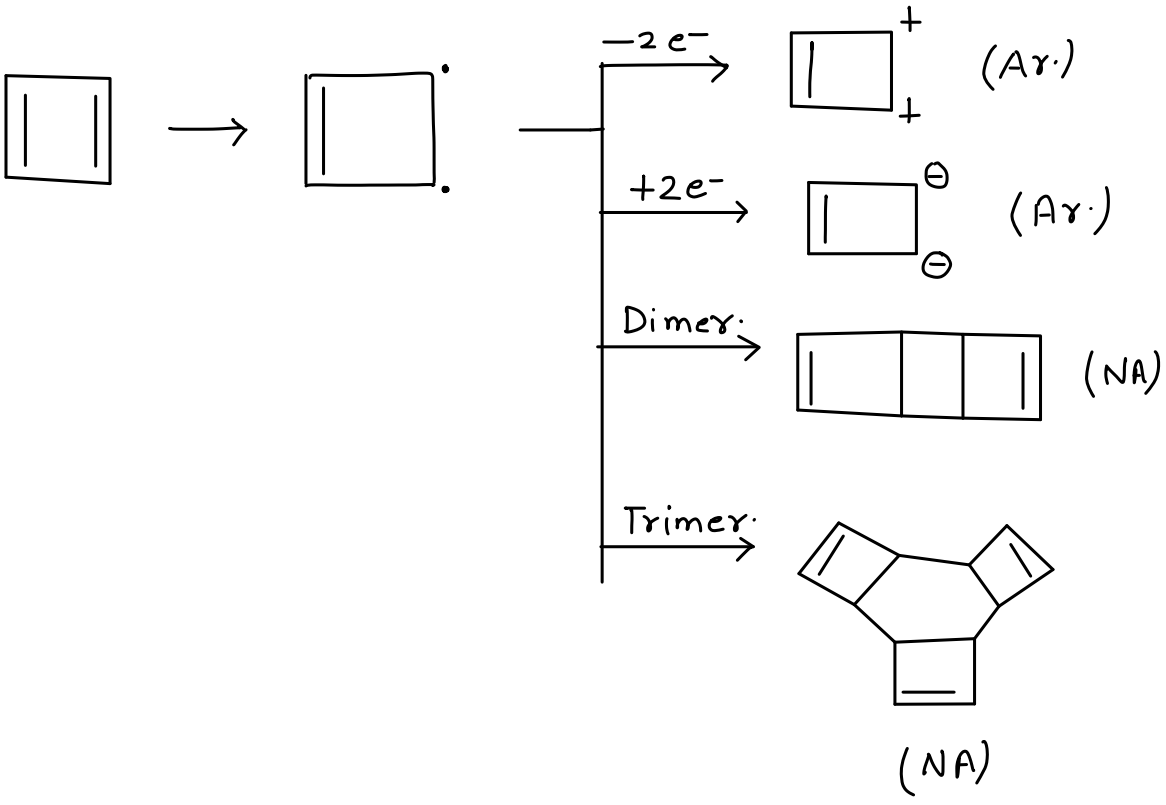
(NA)



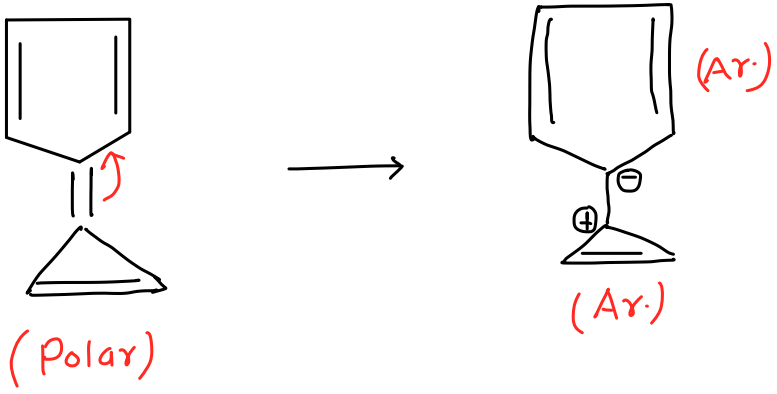
[14] annulene

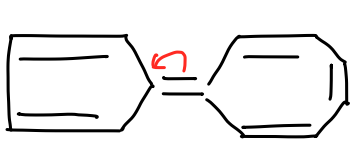
(Ar.)

Antiaromatic compounds doesn't exist in pure form.

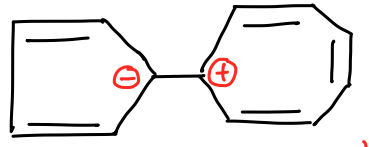


Dipole moment →

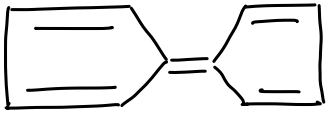




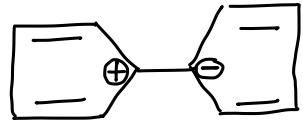
(Polar)



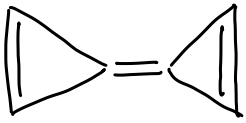
(Ar.) (Ar.)



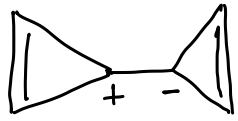
(Non Polar)



(AA) (Ar.)

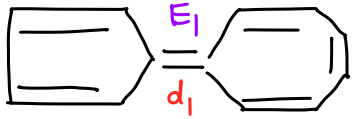


(Non Polar)

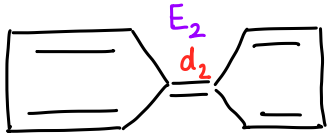


(Ar.) (AA)

Q.



(i)



(ii)

order of μ ?

$\mu_1 > \mu_2$

order of B.L. ?

$d_1 > d_2$

Rotational energy barrier ?

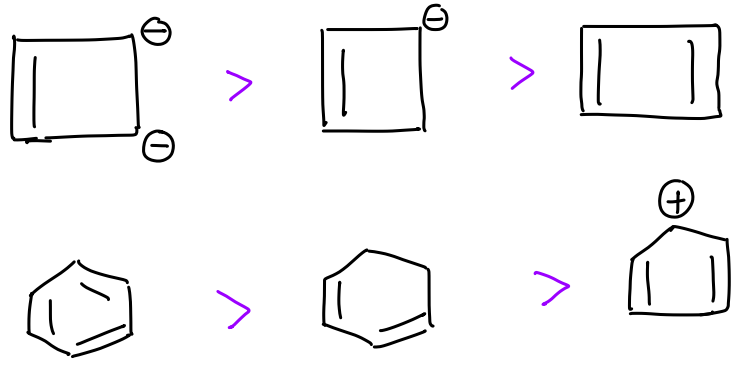
(ii) > (i)

$E_2 > E_1$

comparison of Resonance energy ⟶

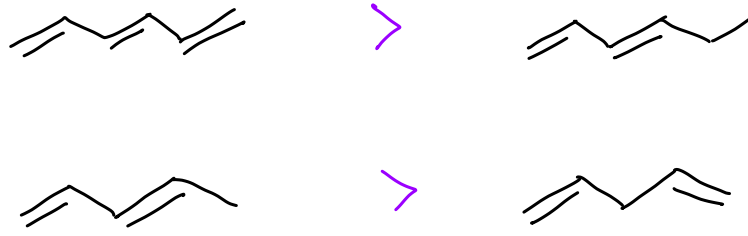
(1) Aromatic > Non Ar. > Anti Ar.

Ex.



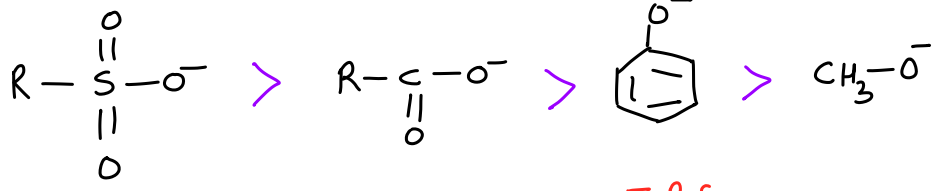
(2) Large conjugation > small conjugation

Ex.



(3) Equivalent R.S. > Non eq. R.S.

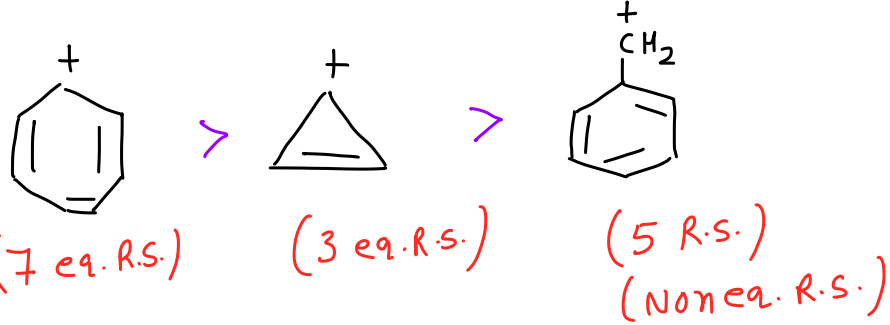
Ex.

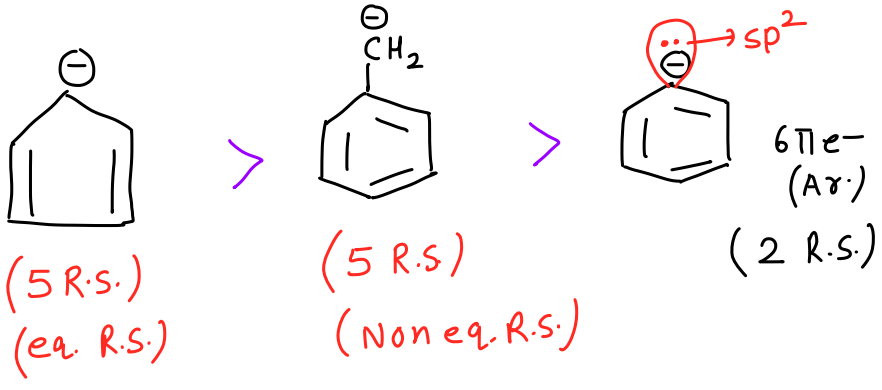


3 R.S. (eq. R.S.)

2 R.S. (eq. R.S.)

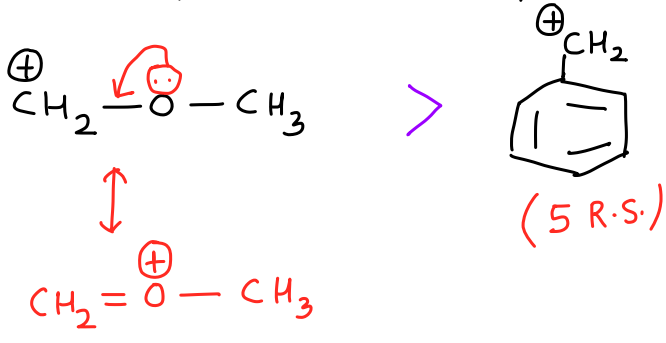
5 R.S. (Non eq. R.S.)





(4) octet complete > Incomplete octet

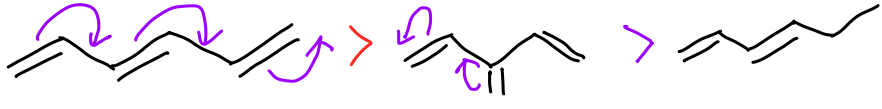
Ex.

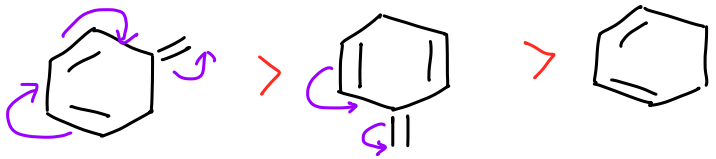


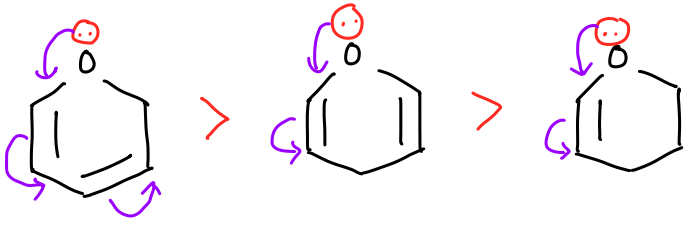
(5) Extended conjugation > cross conjugation

(If delocalisable π e⁻s are same)

Ex.

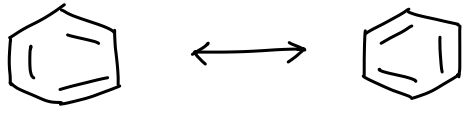




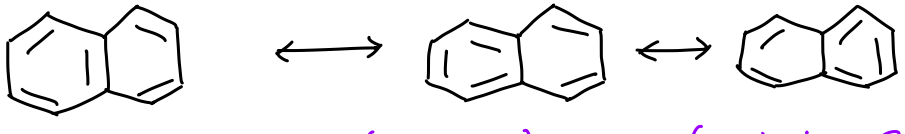


Q. Compare R.E. of benzene, Naphthalene, Anthracene and Phenanthrene

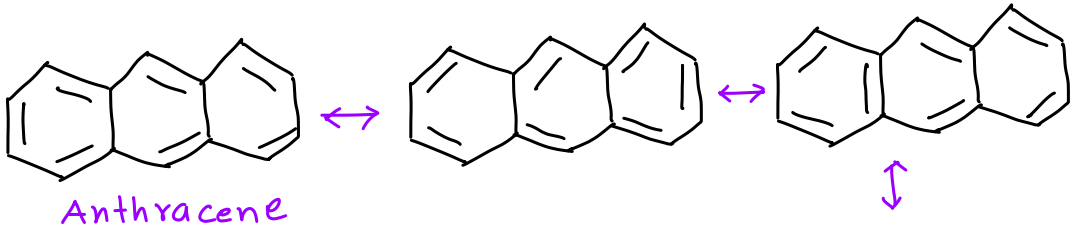
Soln:-



(2 R.S.)
(a = b)

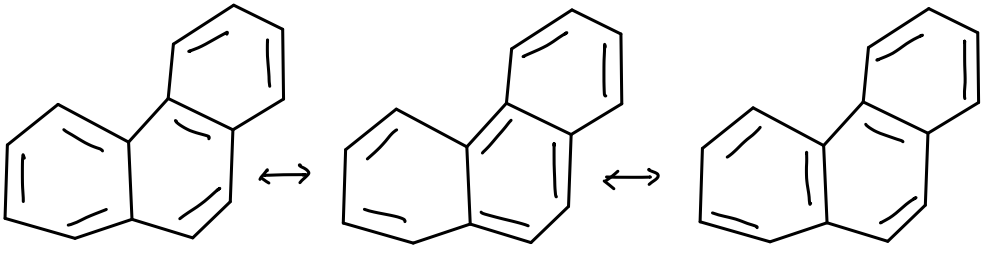


Naphthalene (3 R.S.) (a > b = c)

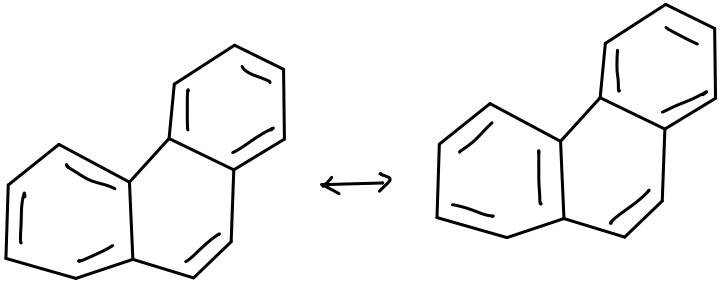


Anthracene
(4 R.S.)

(c) = (d) > (a) = (b)



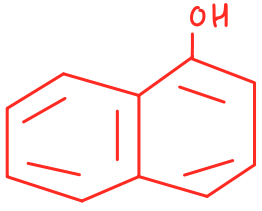
Phenanthrene
(5 R.S.)



$c > a = d > e > b$

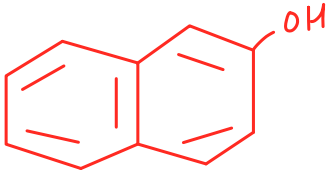
R.E. → benzene < Naphthalene < Anthracene < Phenanthrene

Q.



α-Naphthol

NaOH → (A)

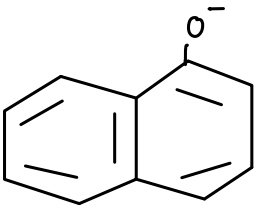


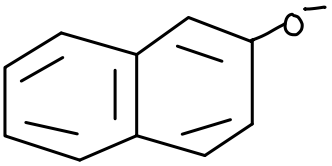
β-Naphthol

NaOH → (B)

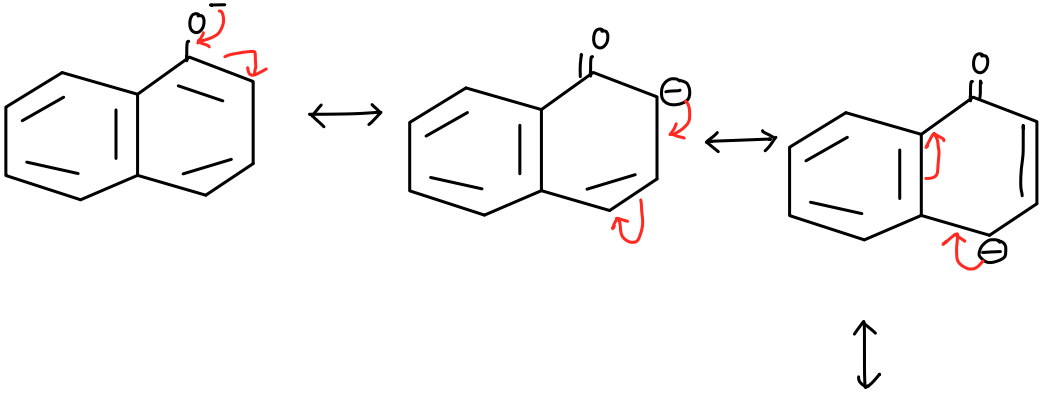
Compare R.E. of A and B ?

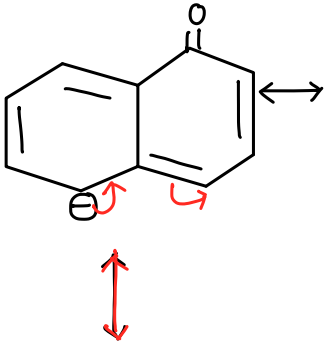
Soln

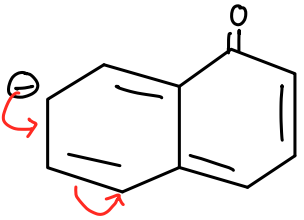
A =  (10 R.S.)

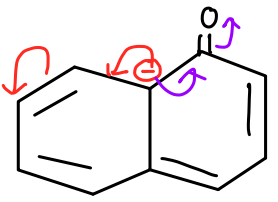
B =  (9 R.S.)

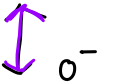
R.E. $\Rightarrow$ A > B

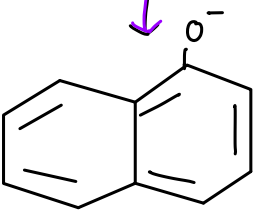
A = 

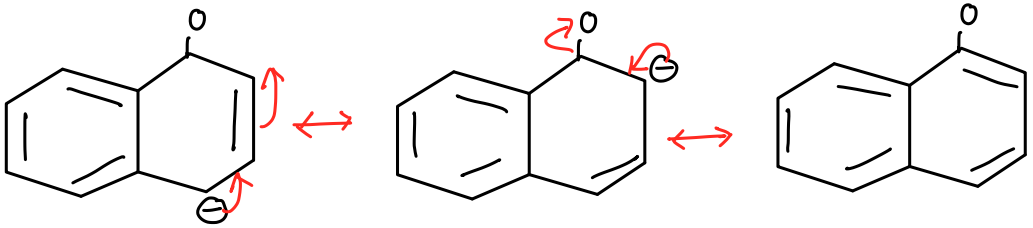












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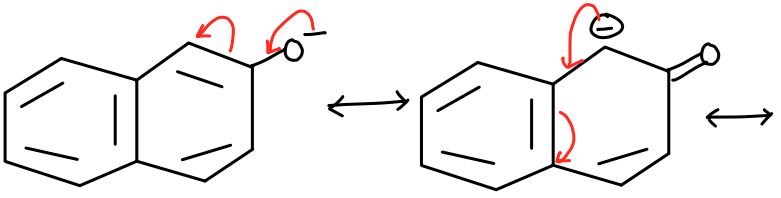
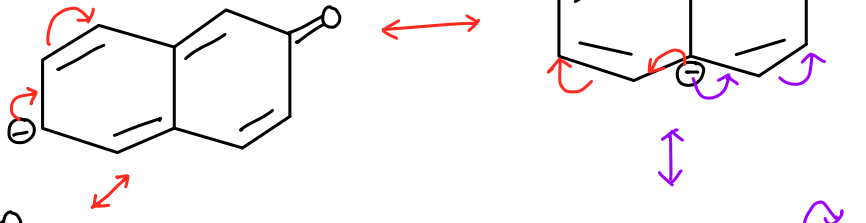
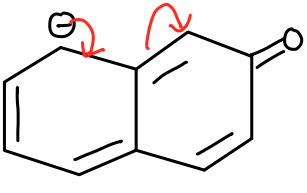
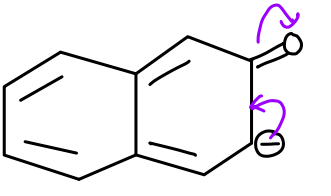
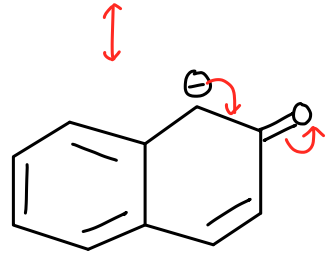
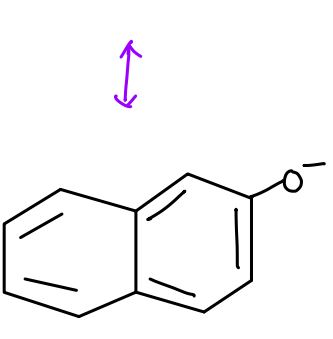


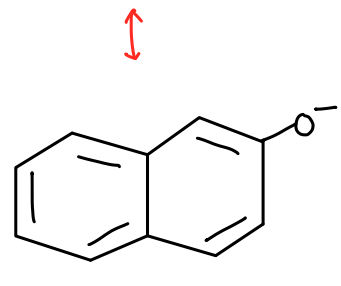




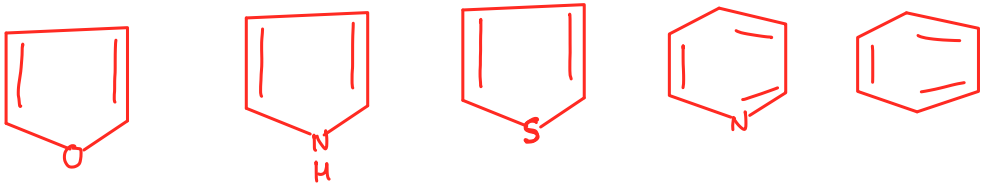








Q. Compare R.E. of



Homework

DTS- 1-11
Q.29,54-60,80,92-95,98,99,114,124,133,136,138

JEE MAIN
Q.7,8,25,48,54,56,69

JEE advanced
Q.5,10,15,18,20,25,32,40,45,49,55,59,74,79