Introduction of GOC, Bond Breaking, Types of Effect and Inductive Effect

Course on General Organic Chemistry for Class XI

SURENDRA K MISHRA • Lesson 1 • Aug 3, 2021

(171) Ethanenitrile

(172) 2-Methyl Butanedinitrile

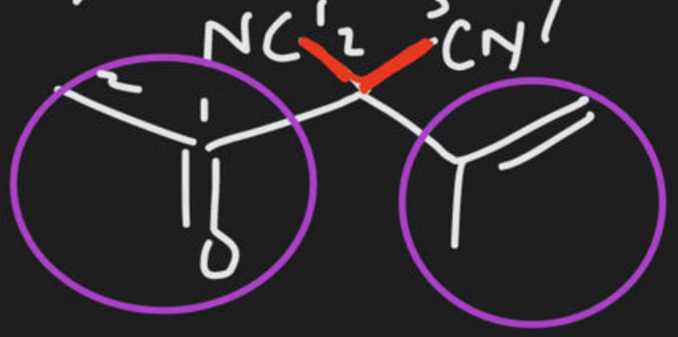
(173) ——

(174) 2-(Cyclohex-3-enyl) Ethanenitrile

(175) Cyclohex-3-ene Carbonitrile

(176) 5-Amino-4-Hydroxy-2-oxo pentanenitrile

(177)

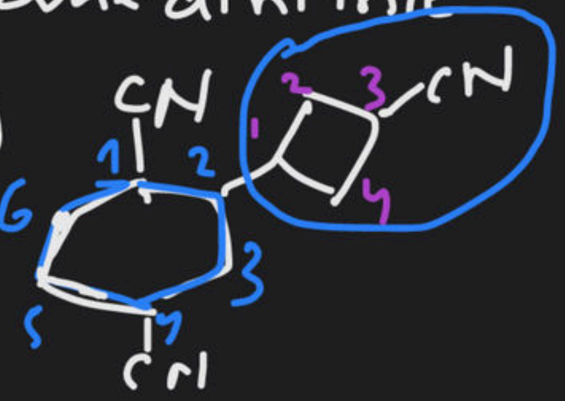


2-(1-Methyl Ethenyl)-2-(1-oxo Ethyl) Propanedinitrile

(178) Prop-2-ene nitrile

(179) 2-methylidine Propanedinitrile

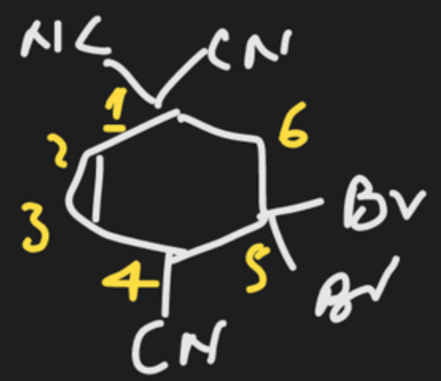
(180)



2-(3-Cyno Cyclo Butyl) Cyclohexane-1,4-di Carbo nitrile

(181) 4-Amino-3-methyl Benzene Carbonitrile

Benzonitrile

(182) 

5,5-Dibromo Cyclohex-2-ene-1,1,4 Tri Carbonitrile.

(183) Methanal

(184) Ethanal

(185) Ethandial

(186) 3-Phenyl Prop-2-enal

(187) But-2-enal

(188) 2-Hydroxy Benzene Carbaldehyde

Benzaldehyde

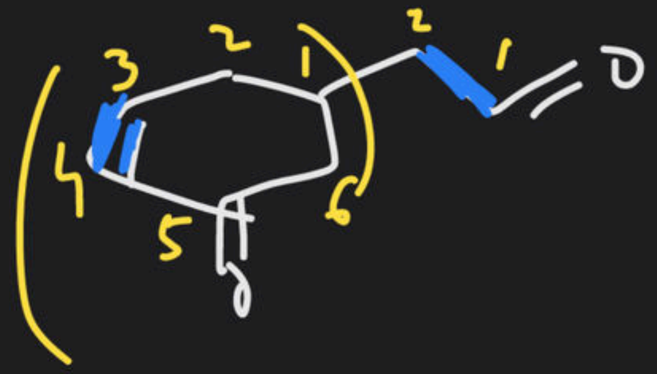
(189) ———

(190) 2-methyl Propandial

(191) Benzaldehyde

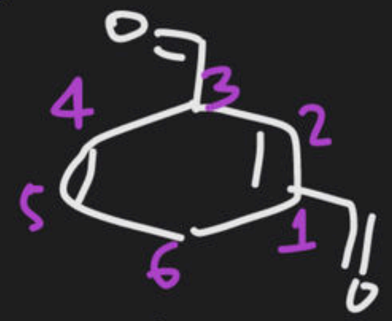
(192) 3-(2-methyl phenyl) Propanal

(193)

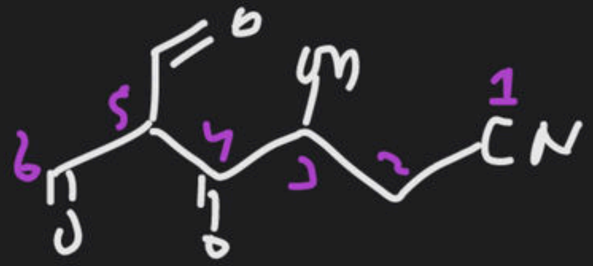


2-(5-oxo Cyclohex-3-enyl) ethanal.

(194)



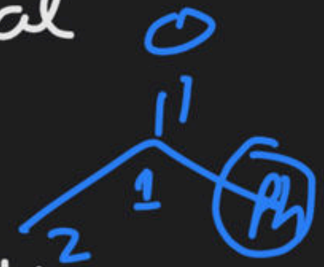
(195)



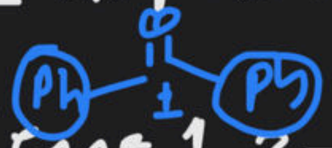
(196) 2-Ethenyl-2-ethyl Propandial

(197) Propanone

(198) 1-phenyl Ethanone



(199) 1,1 diphenyl methanone

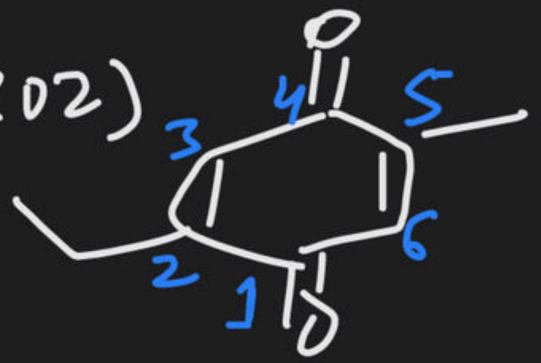


Cyclohexa-1,4-diene 1,3-dicarbaldehyde

5-formyl-3-hydroxy 4,6-dioxo Hexanenitrile

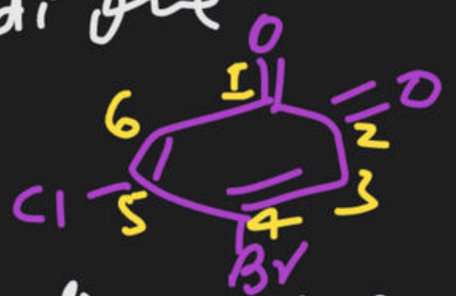
(200) Butane-2,3-dione

(201) Hexane,2,3,4 Trione

(202) 

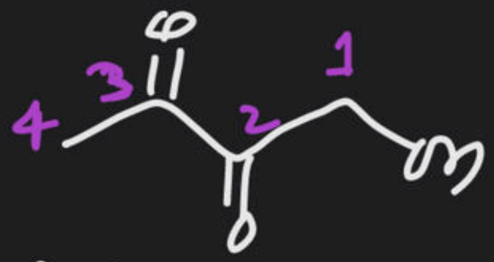
2-Ethyl-5-Methyl Cyclohexa-2,5-dien-1,4-dione

(203) Cyclohexa-2,5-dien-1,4-dione



(204) 4-Bromo-5-chloro Cyclohexa-3,5-dien-1,2-dione

(205) 1-Hydroxy Butan-2,3-dione



(206) 5-Hydroxy Pent-3-en-2-one

(207) Methanol

(208) Ethanol

(209) Ethan-1,2 diol

(210) Propan-1,2,3-Triol.

Copy directions: 211 – 250

BB (51-75) (chapter 10)

Sheet Ex-I

GOC

General Organic chemistry

(1) Bond Breaking / Bond cleavage / Bond fission
(2) Introduction of Reaction intermidiate
(3) Electronic displacement in Covalent Bond
(4) Temporary effect
(5) Permanent effect
(6) Induction / Inductive effect
(7) Orbital Energy diagram.

(8) Resonance.

(9) Resonance effect/mesomeric effect

(10) Resonance Energy

(11) Resonating Str. drawing & stability

(12) Hyperconjugation

(13) Hyperconjugation effect

(14) Aromatic, Non Aromatic & Anti Aromatic

(15) Intermidiate Stability

(16) Acid strength.

(17) Basic Strength

(18) Separation of Binary mixture

(19) Solubility

(20) Bayer's strain Ayle theory

(21) Heat of Hydrogenation (ΔH)

(22) Heat of Combustion (ΔH°c)

(23) SIR effect (Steric inhibition of Resonance)

(24) Solvation effect ~~(SEP)~~

(25) Sigma Resonance ~~(Dancing Resonance)~~

(26)

(27) Bond length

(28) Bond strength

(29) Bond Energy.

(30) Bond Rotational Energy Barriers.

(#)

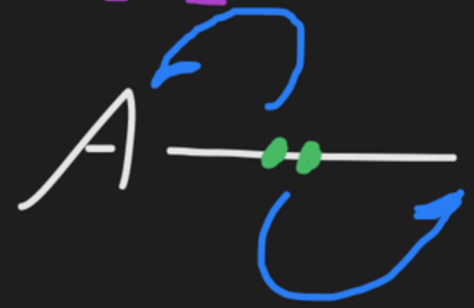
Let us Consider a Organic Reaction

⇒ Each Organic Reaction involves bond formation (BF) & Bond breaking (BB) phenomenon.

Bond Breaking There are two methods of Bond Breaking during any Reaction.

(1) Homolytic Bond Fission

In such kind of Bond Breaking Bonding e⁻s equally distributed b/w Bonding atoms so that Electrically neutral Reaction intermidiates Free Radicals are obtained.

Ex: 

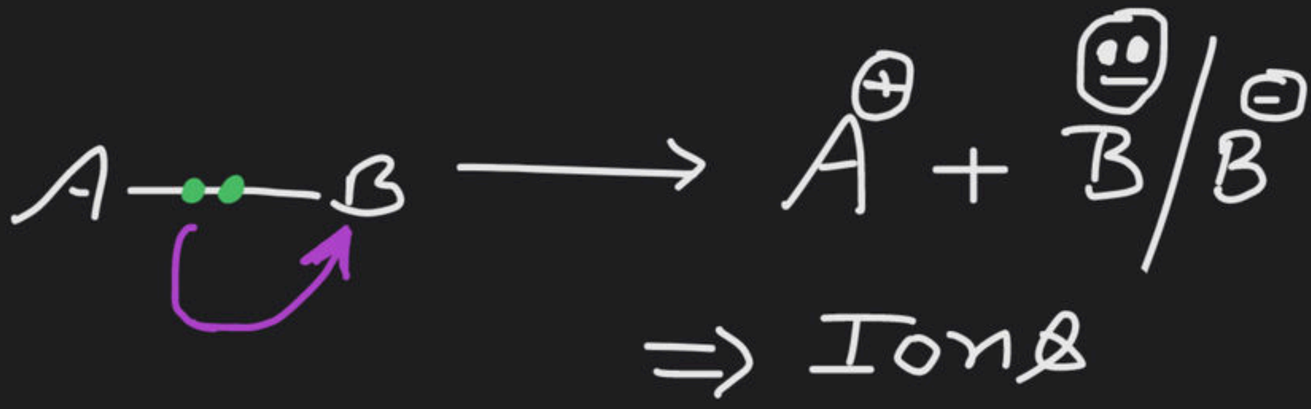
$\longrightarrow A^{\cdot} + B^{\cdot}$ (No Cond on E_A & E_B)

$\Rightarrow$ Electrically Neutral

$\Rightarrow$ Free Radical

(2) Hetrolytic Bond fission

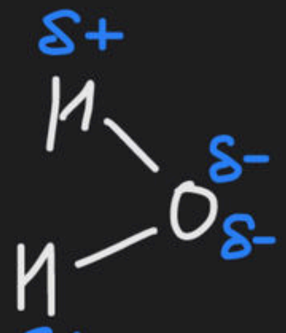
In such kind of Bond breaking Bonding electrons shift towards more electronegative atom so that ions are obtained as a Reaction Intermidiate

Ex: 

$(E_B > E_A)$

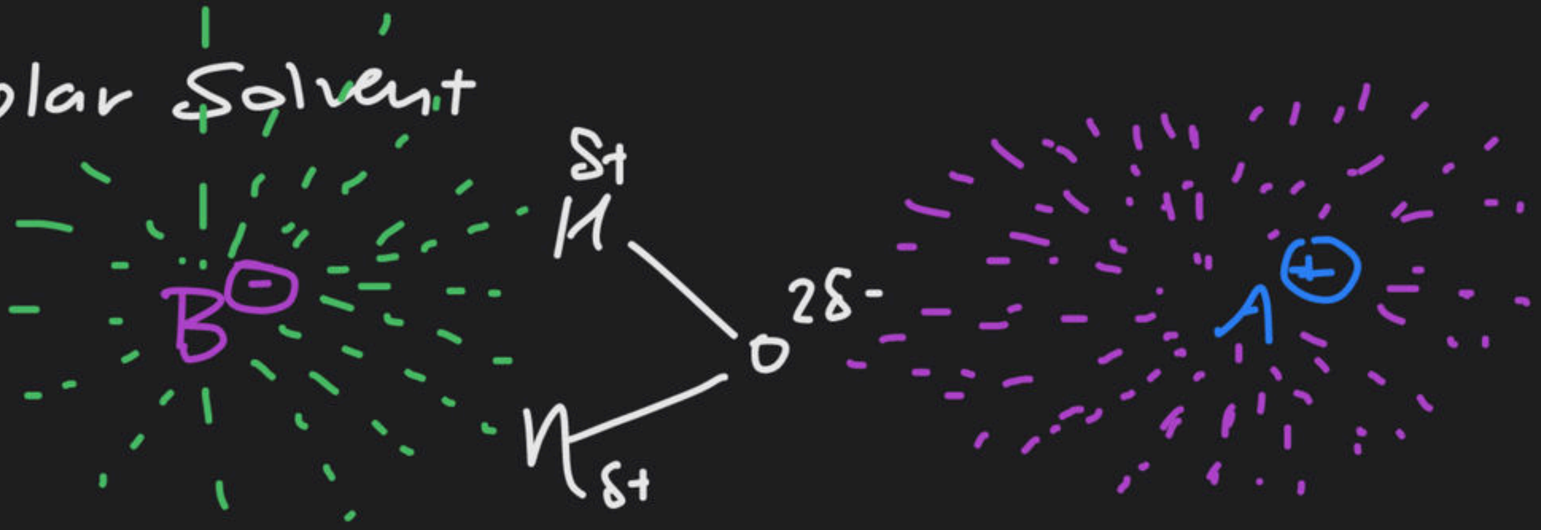
$\Rightarrow$ Ionic

Note

(i) 

Contains dipole moment hence is a

$(\mu \neq 0)$ Polar Solvent

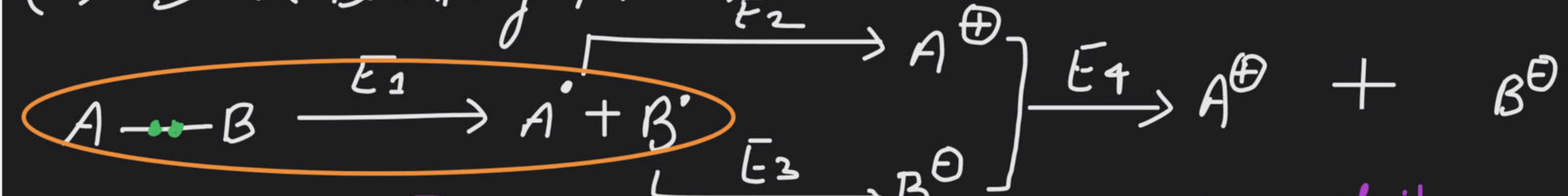


(ii) Heterolytic Bond fission takes place in Polar Solvent

(iii) Homolytic Bond fission usually carried out in non polar solvent or in gas phase.

(iv) No Condition on E_A & E_B for Homolytic Fission.

(v) Bond Breaking pathway



E_1 ⇒ Bond Energy

E_2 ⇒ Ionisation Energy

E_3 ⇒ Electron affinity

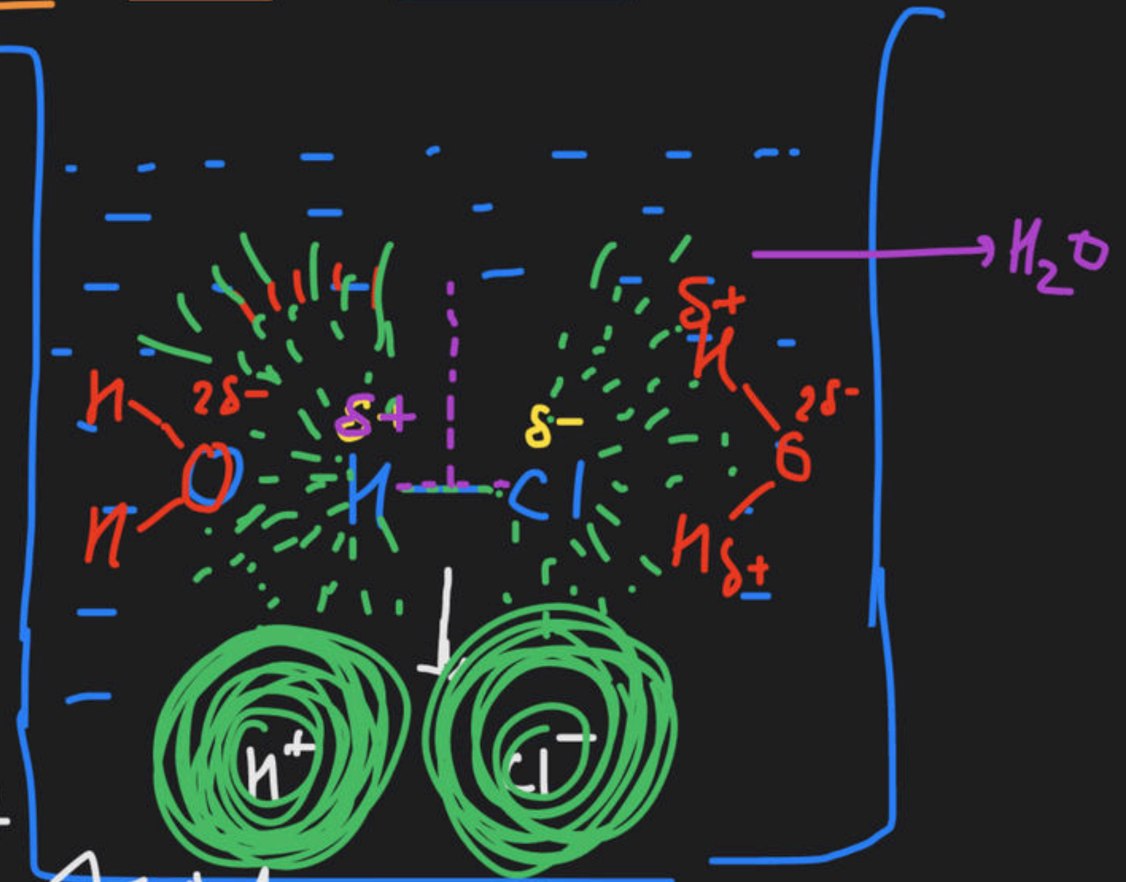
E_4 ⇒ lattice Energy

(vi) **Bond Energy**

⇒ Minimum amount of Energy required to break a Bond

Ex: H–Cl in H_2O is a Acid.

($\mu \neq 0$)



Ex: H-Cl in CCl_4 is not Acid

($\mu = 0$)