	Chemical Bonding and Structure
	Crantiant Tollaring with Streets
	Too L. I.
	Ionic bonding It is the electrostatic attraction between 2 oppositely
	It is the electrostatic altraction between a oppositely
	charge ions.
	Nall 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
1	Metals loses electrons and forms a ration Mg -> Mg2+ + 2e-
1.	Mg -> Mg + Le
	6/ // 0/ 0
	Non-metals gains electrons and forms an anion 2e + 0 - 02-
	$(e + 0 \rightarrow 0)$
	hydroxide OH CO32-
	NO ₃ HCO ₃ -
	HSO ₄ CH ₃ COO PO ₄ 3-
-	H504 P043
1,-1,7	
	7 -1-1-11- (-1 -1 -1 -1 1
	These electrostatic forces are strong, so it is difficult to break apart the lattice structure.
	Greak apart the lattice structure.
	T = 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	Ionic compounds high melting and boiling points due to strong electrostatic forces between appositely charged ions
	Strong electrostatic forces between oppositely charged ions
	1/ latelel - 100 / latelet land in for stand
	Volatility - very low volatility because of strong electrostatic forces.
	electiostatic tolices.
	Classia I to plate all a chila
	Electrical conductivity - conducts electricity in molten state as fions are free to move (not in solid state)
	as ' cons are tree to move (not in solid state)
	C11:1:1 - 1 -C1 1112 - 1 - D-1
	Solubility in water - OFTEN SOLUBLE in water. Diearing of
	Solubility in water - often soluble in water. Breaking of hydrogen bond often pay back energy for required to break apart the ionic structure.
	break apart we conce structure.

No. of the last	
And Conference of the Conferen	
The course of th	
1	Electrical conductivity in ionic solutions - Figueous solutions of
	Electrical conductivity in ionic solutions - Figueous solutions of ionic substances and uct electricity- (ions can move freely)
1	a still the contract of the sound of the second of the sec
1	Solubility in non-polar solvents
1	Tonic substances are not soluble in non-polar solvents as a lot of energy is required to break apart the ionic lattice.
	a lot of energy is required to break apart the ionic lattice.
=	Covalent bonding
	Single covalent bonds - covalent bonding occurs when otoms share electrons, and a covalent bond is athe electrostatic
-	share electrons, and a covalent bond is a the electrostatic
	attraction between a shared pair of electrons and the
	nuclei of the atoms that are bonded.
	250 treats assaurage = -
	Lewis structure - all the valence electrons are shown
	F:F: or IF-F! or :F-F:
	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
	3
	A double bond results from the sharing of two pairs of electrons, and a triple bond arises from sharing of 3 pairs of electrons.
	of electrons, and a triple bond arises from sharing of
	3 pairs of electrons.
N.	
14)	Covalent bond is the electrostatic interaction between the positively charged nuclei of both atoms and the shared pair of electrons.
()	the positively charged nuclei of both atoms and the
ACTIVE ST	Shared pair of electrons. Isp of out a shirt
	Si ala tand & da bla tad V di day / 1
	single bond < double bond < triple bond
	Electronegativity - higher electronegative more closer the
	Electronegativity - higher electronegative more closer the electrons in the bond. Eg:- 8th

Atoms with similar electronegativities windonds. Atoms with widely different electronic form conic bonds. The difference in electronic taken as a guide to how conic or bond between two atoms is likely to Difference more than 1.7 forms con - Coordinate coverlent bonds C=0 Resonance structures	tronegativities will onegativity can be how covalent the be.
bond between two atoms is likely to	6e.
	ric bonds.
the sale of the sa	
- Resonance structures When a command me have men the	-//
structure they are known as resonance st	one possible
	- 10
Drawing lewis structure	3 1 11
Add up the total number of valence ele	ections of all the
- Divide by two to get the total number pairs - Asrange that each atom has 4 lines.	of valence election
	21.100
	*

- Valence shell electron pair repulsion theory (VSEPR) Bairs of electrons (electron domains) in the valence (outer) shell of an atom repel Bach other and will therefore take up positions in space to minimise these repulsion to be as fair as possible. Order of repulsion (one-lane pair > lone pair - bonding pair > bonding bonding pair Total electron Bonding lone Basic Shape Actual Shape Eq domains Pairs pairs 2 2 2 0 linear linear (180°) Co., NCH, NO, 2 3 3 0 trigonal planar trigonal planar(120° BF, SO, NO, 3 3 1 trigonal planar textrahedral (100°) SSN, OS, NO, 4 4 4 3 1 tetrahedral textrahedral (100°) Co., NH, SN, RI, RI, RI, RI, RI, RI, RI, RI, RI, RI		
Pairs of electrons (electron domains) in the valence (outer) shell of an atom repel Bach other and will therefore take up positions in space to minimise these Repulsion—to be as far as possible. aroler of repulsion lone—lone pair > lane pair—bording pair > bording—bording pair Total electron Bording lone Basic Shape Actual Shape Eq domains Pairs 2 2 0 linear linear (180°) (02, NCH, NO, 13 3 0 trigonal planar trigonal planarlize RF, So, NO, 3 3 0 trigonal planar trigonal planarlize RF, So, NO, 3 2 literahedral trigonal pyramidal NH3, RIS, Hot 4 3 1 tetrahedral trigonal pyramidal NH3, RIS, Hot 4 2 2 tetrahedral trigonal pyramidal NH3, RIS, Hot 5 5 0 trigonal (90°, 12°, 20°, 20°, 20°, 20°, 20°, 20°, 20°, 2		Valence shell selector as his the (16500)
of an atom repel each other and will therefore take up positions in space to minimise these repulsion—to be as fair as possible. arder of repulsion (one—lone pair > lone pair > bonding—bonding pair Total electron—bonding—lone—Basic Shape—fictual Shape—Eq domains—Pairs—pairs— 2 2 2 0 linear—linear (180°) (02, NCH, NO2, 1) 3 3 0 trigonal planar trigonal planar/les (185, 50, NO3, 3) 2 1 trigonal planar bent V-shaped (1915) (1915	1	repulsion theory (VSEPR)
of an atom repel each other and will therefore take up positions in space to minimise these repulsion—to be as fair as possible. arder of repulsion (one—lone pair > lone pair > bonding—bonding pair Total electron—bonding—lone—Basic Shape—fictual Shape—Eq domains—Pairs—pairs— 2 2 2 0 linear—linear (180°) (02, NCH, NO2, 1) 3 3 0 trigonal planar trigonal planar/les (185, 50, NO3, 3) 2 1 trigonal planar bent V-shaped (1915) (1915	,1	Pairs of electrons (electron domains) in the valence (outer) shell
positions in space to minimise these repulsion - to be as face as possible. order of repulsion lone-lone paix > lone pair - bording pair > bording-bording pair Total electron Bording lone Basic Shape Actual Shape Eg domains Pairs pairs 2 2 2 0 linear linear (180°) Co2, NCH, NO2, 1 3 3 0 trigonal planar trigonal planar/les BF, 50, NO3 3 2 listrigonal planar bent V-shaped (1915) CC14, NH, 50, 2 4 3 1 tetrahedral tetrahedral (1915) CC14, NH, 50, 2 4 3 1 tetrahedral trigonal pryramidal NH3, RI3, H30 1 4 2 2 tetrahedral bent, V-shaped (100°) SF, NEOZE, 5 5 0 trigonal (90°, 120°, 120°, 120°, 120°) SF, NEOZE, 5 5 1 bipyramidal see-saw (100°) SF, NEOZE, 5 5 2 3 2 linear (180°) In, XEF, 6 6 0 cotahedral square pyramidal SF, XEF, 5 6 5 1 octahedral square pyramidal SF, XEF, 5 6 5 1 octahedral square pyramidal SF, XEF, 5 6 5 1 octahedral square pyramidal SF, XEF, 5 6 5 1 octahedral square pyramidal SF, XEF, 5 6 5 1 octahedral square pyramidal SF, XEF, 5 6 5 1 octahedral square pyramidal SF, XEF, 5 7 Square planar pyramidal planar pyramidal pyramida		of an atom repel each other and will therefore take up
as possible. order of repulsion lone-lone paix > lone pair - bonding pair > bonding-bonding pair Total electron Bonding lone Basic Shape Actual Shape Eg domains Bairs pairs 2 2 0 linear linear (180°) (Coz, NCH, Noz+ 3 3 0 trigonal planar trigonal planar(120°) BE, soy, Noz- 3 2 1 trigonal planar beat, V-shaped (177°) Soz, Oz, Noz- 4 4 0 tetrahedral tetrahedral (1095°) (Chy, NH+, sox+ 4 3 1 tetrahedral trigonal prominidal NH3, R12, H, sox+ 4 2 2 tetrahedral trigonal prominidal NH3, R12, H, sox+ 5 5 0 trigonal (90°, 120°, motingonal bipyramidal PF, xeOzEz- 5 4 1 bipyramidal see-saw (100°) SF+, xeOzEz- 5 3 2 T-shape RrEz, xeofz- 5 2 3 linear (180°) Iz, xeEz- 6 6 0 ortahedral square pyramidal SFz, xeEz- 6 6 0 ortahedral square pyramidal SFz, xeEz- 8 square planar XeEz, SFz- Rolar Molecules electronegativity difference creating electron lying more towards one atom is ralled a polar bond. These molecule have a averall dipole moment.		positions in space to minimise these repulsion - to be as far
love-lone pair > lone pair - bording pair > bording-bording pair Total electron Bording lone Basic Shape Actual Shape Eg alomains Pairs pairs 2 2 2 0 linear linear (180°) (co2, NCH, NO2, 1 3 3 0 trigonal planar trigonal planar/lie BE, 502, NO3 3 1 trigonal planar bent, V-shaped (107) SO3, O3, NO3 4 4 3 1 tetrahedral trigonal puramidal NH3, R13, Hot 4 2 2 tetrahedral trigonal puramidal NH3, R13, Hot 5 5 0 trigonal (20°, 12		as possible.
Total electron Booding lone Basic Shape Actual Shape Eg domains Bairs pairs 2 2 0 linear linear (180°) (Co2, NCH, NO2 [†] 3 3 0 trigonal planar trigonal planar/lise BF, So3, NO3 3 2 lintrigonal planar bent, V-shaped (177) SO2, O2, NO7 4 4 3 letrahedral tetrahedral (1095) (C1, NH [†] , S3, NH [†] , S3, NH [†] 4 2 2 tetrahedral trigonal pyramidal NH3, RU3, H30 [†] 4 2 2 tetrahedral trigonal pyramidal NH3, RU3, H30 [†] 5 5 0 trigonal (90°, 120°, not trigonal pyramidal PF5, XeO3E, 5 3 2 T-shape RrF3, XeO5E, 5 3 2 T-shape RrF3, XeO5E, 5 1 octahedral square pyramidal SF5, XeO5E, 6 6 0 octahedral square pyramidal SF5, XeO5E, 6 5 loctahedral square pyramidal SF5, XeO5E, 6 6 0 octahedral square pyramidal SF5, XeO5E, 6 7 Square pyramidal SF5, XeO5E, 6 8 Square pyramidal SF5, XeO5E, 6 9 Square pyramidal SF5, XeO5E, 7 Square pyramidal SF5, XeO5E, 8 Square pyramidal SF5, XeO5		order of repulsion
2 2 0 linear linear (180°) (C2, NCH, NC2, † 3 3 0 trigonal planar trigonal planar/l20 BF, S0, NO3 3 2 linear planar trigonal planar/l20 BF, S0, NO3 4 0 tetrahedral bent V-shaped (1097) S0, O2, NO5 4 3 1 tetrahedral trigonal promidal NH3, RI3, H30 the second bent V-shaped (1097) H20, C15, I, I to the shedral bent V-shaped (1097) H20, C15, I, I to trigonal (90°, 120°,		lone-lone pair > lone pair - bonding pair > bonding-bonding pair
2 2 0 linear linear (180°) (C2, NCH, NC2, † 3 3 0 trigonal planar trigonal planar/l20 BF, S0, NO3 3 2 linear planar trigonal planar/l20 BF, S0, NO3 4 0 tetrahedral bent V-shaped (1097) S0, O2, NO5 4 3 1 tetrahedral trigonal promidal NH3, RI3, H30 the second bent V-shaped (1097) H20, C15, I, I to the shedral bent V-shaped (1097) H20, C15, I, I to trigonal (90°, 120°,	Total el	ection Bonding Lone Basic Shape Actual Shape - Eg
3 3 0 trigonal planar trigonal planar(120° BFz, Soz, NOz 3 2 1 trigonal planar bent, V-shaped(10°) Soz, Oz, NOz 4 4 4 0 tetrahedral tetrahedral (1095°) CCL, NH+, Soz 4 3 1 tetrahedral trigonal programidal NHz, RIz, Hzot 4 2 2 tetrahedral trigonal programidal PFz, XeOzFz 5 5 0 trigonal (90°, 12	domai	some lePairs of pairs only and it have seen as
3 3 0 trigonal planar trigonal planar(120° BFz, Soz, NOz 3 2 1 trigonal planar bent, V-shaped(10°) Soz, Oz, NOz 4 4 4 0 tetrahedral tetrahedral (1095°) CCL, NH+, Soz 4 3 1 tetrahedral trigonal programidal NHz, RIz, Hzot 4 2 2 tetrahedral trigonal programidal PFz, XeOzFz 5 5 0 trigonal (90°, 12		
3 2 Intrigonal planar bent, V-shaped (177) SO2, O2, NO2 4 4 4 3 1 tetrahedral tetrahedral (109.5) CCL, NHT, SO2 4 2 2 tetrahedral trigonal pyramidal NH3, RI3, H3, O1 4 2 2 tetrahedral bent, V-shaped (1075) H2O (1055), I3 † 5 0 trigonal (90°, 120°, 100°, 100°, 100°, 100°) SF4, XeO2F2 5 3 2 T-shape RrF2, XeO2F2 5 3 2 T-shape RrF2, XeO2F2 5 2 3 linear (180°) I3, XeF2 6 0 ortahedral square pyramidal SF5, XeF2 6 4 2 Square planar XeF4, SF4 Polar Molecules electron lying more towards one atom is called a polar bond. These molecule have a averall dipole moment.	2	
4 4 3 1 tetrahedral tetrahedral (1095) CCL, NHT, 502 4 3 1 tetrahedral trigonal pyramidal NH3, RCL3, H50† 4 2 2 tetrahedral bent, V-shaped (1075) H70, GFT, IT, † 5 5 0 trigonal (90°, 120		
4 3 1 tetahedral trigonal pyramidal NH3, Pr13, H20t 4 2 2 tetrahedral bent, V-shaped (1015) H20, ars.; I2t 5 5 6 0 trigonal (90, 120, 12tigonal bipyramidal PF5, XeOzF2 5 3 2 T-shape RrF3, XeOzF2 5 2 3 linear (180°) I2, XeF2 6 6 0 octahedral (90, 180°) SF6, PF5 6 4 2 square pyramidal SF5, XeF5 6 4 2 square planar XeF6, SF6 Polar Molecules electronegativity difference creating electron lying more towards one atom is called a polar bond. These molecule have a averall dipole moment.		tetropal planar pent, V-shaped (1785) och Nut 6 24
the 2 letrahedral bent, V-shaped (102°) It; It is supering and legislated a polar bounds one atom is ralled a polar bond. These molecule have a averall dipole moment.	4	3 Letahedral translations (107°)
by ymmidal see-saw (102°) SF4, KeOzF2 5 3 2 T-shape RrF3, XeOF2 5 2 3 linear (180°) Iz, XeF2 6 6 0 octahedral (90,180°) SF6, PF6 6 5 1 octahedral square pyramidal SF6, XeF5 6 4 2 square planar XeF4, SF4 Polar Molecules electronegativity difference creating electron lying more towards one atom is called a polar bond. These molecule have a averall dipole moment.	4	2 2 tetrahedral bent V-shaped (107.5°) H20, CIET, I2+
by ymmidal see-saw (102°) SF4, KeOzF2 5 3 2 T-shape RrF3, XeOF2 5 2 3 linear (180°) Iz, XeF2 6 6 0 octahedral (90,180°) SF6, PF6 6 5 1 octahedral square pyramidal SF6, XeF5 6 4 2 square planar XeF4, SF4 Polar Molecules electronegativity difference creating electron lying more towards one atom is called a polar bond. These molecule have a averall dipole moment.	5.5	5 drigonal (90°, 120°, 1
5 3 2 T-shape BrFz, XeOFz 5 2 3 linear (180°) Iz, XeFz 6 6 0 octahedral (90°,180°) SFz, PFz 6 5 1 octahedral square pyramidal SFz, XeFz 6 4 2 square planar XeFz, SFz Polar Molecules electronegativity difference creating electron lying more towards one atom is called a polar bond. These molecule have a overall dipole moment.	52 m	bypyramidal see-saw (102°) SF4, XeOzFz
S 2 3 linear (180°) Iz, XeFz 6 0 octahedral (90°,180°) SF, PF 6 1 octahedral square pyramidal SF, XeFz 6 4 2 square planar XeF, SF, Polar Molecules electronegativity difference creating electron lying more towards one atom is ralled a polar bond. These molecule have a overall dipole moment.	5	3 2 T-shape BrFz, XeOF
Polar Molecules electronegativity difference creating electron lying more towards one atom is called a polar bond. These molecule have a averall dipole moment.	- 5	2 3 linear (180°), Iz, XeF2
Polar Molecules electronegativity difference creating electron lying more towards one atom is called a polar bond. These molecule have a overall dipole moment.	60	
Polar Molecules electronegativity difference creating electron lying more towards one atom is called a polar bond. These molecule have a overall dipole moment.	1.6	
electronegativity difference creating electron lying more towards one atom is called a polar bond. These molecule have a averall dipole moment.		Demer panar 1 12 1, 5 Fy
electronegativity difference creating electron lying more towards one atom is called a polar bond. These molecule have a averall dipole moment.		Polar Molecules
		electronegativity difference creating electron lying more towards
		one atom is called a polar bond. These molecule have a
		averall dipolet momenting an and individuality

Although individual bonds may be polar, a molecule may be non-polar overall if, because of the symmetry of the molecule, the dipole moments of the individual bonds cancel out.
molecule, the dipole moments of the individual bonds
cancel out.
2 1 C. 12 4 Startuses
Allotropes of carbon
a const confidence
atom is joined to four others)
- Graphite has a gaint covalent structure, but it also has
a layer structure landon forces between layers which
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
delocalised between the layers it is a good conductor.
the same of the sa
Jeway and a distribution of the control of the cont
Each silicon atom is bonded to tour oxygen atoms to tetrahedral array. Each oxygen to two silicon atoms.
Intermolecular forces Van der Waal's forces is the collective name given to
11 land between maleriles and includes with
dipole - dipole interaction and dipole - induced dipole
interactions.
Intermolecular forces are forces within a molecule.
the state of the s
Intramoleticular forces are forces within a molecule

) 	$\tilde{\mathbf{p}}$
-	London forces are temporary dipole - induced dipole
1	interaction. Electrons will not be symmetrically distributed
	about the nucleus. This results a ktemporary dipole in the
	aton, and induce an opposite dipole in a neighbouring atom.
	This creates an attractive force.
	testively thought notal ina surrounded to see
	London forces get stronger as the relative molecular mass
•	incleases.
	Metris an methodo detila harava colitorada
	Polar molecules - because of their polarity of the molecules,
No.	there are also intermolecular forces created known as
e Nas	permanent dipole - permanent dipole which is usually just
	dipole - dipole attractions
	14 line of the hydrone 15 de minus soldet son de las
11 57 10 51 0 5	Hydrogen bonding - hydrogen bonding occurs between molecules when a very electronegative atom (N,O,F) is joined to a
1	
218	(N,O,F who possesses a lone pair of electron.
	(14)0, F who possess at the first of the
(0.01	Melting or boiling marked and or many in my
V-	Only intermolecular forces are broken when covalent
	Melting or boiling Only intermolecular forces are broken when covalent molecular substance are melted or boiled - covalent bonds
	are not broken.
	a constant of the second of th
00	Condon < permanent dipole-dipole < hydrogen bonding.
(
100	Generally a substance will disolve in a solvent it the
	Generally a substance will disable in a solvent if the intermolecular forces in the solute and solvent are similar.
14.	tone to garage grades a bound from your
	of hand to all the state of the state of
1	side of all the inter- when a constitution

- Metallic bonding

Delocalised electrons as electrons doesn't belong to any
one metal atom but, rather, are able to move throughout Positively charged metal ions surrounded by sea of delocalised electrons. Metals are malleable / ductile because of non-directionals of the bonding. The metals can lealso be good conductors as free electrons (delocalised electrons). Further when the two layers stide over each other, the bonding in the resulting structure is exactly the same. Formal charge is the charge that an atom in a molecule usuald to have if we assume that the electrons in a covalent bond are equally shared between atoms that are FC = (number of valence electrons in the uncombined atom)
-1 (number of bording electrons) - (number of non-borded

2 electrons) Sigma and Pi bonds
Sigma bonds results from the axial (head-on) overlap
of atomic orbitals. The electron distribution in a sigma
bond lies mostly along the axis joining the two nuclein A pi bond is formed by the sideways overlap of parallel p orbitals. The electron density in the pi bond lies above and below the intermonuclear axis.

a single land consists of a sigma bond a double band consists of a sigma and a pi band a triple band consists of a sigma and a pi band. Delocalisation is the staring of a pair of electrons between three or more atoms. Bezene has a pi delocalised ring of electrons that extends all around the righting of carbon atoms. Higher energy is required to break Oz band than
Higher energy is required to break 02 bond than Oz as Oz has bond order of 2 and Oz has 1.5. Single bond 1 double bond 2 triple bond 3 Depletion of ozone by CFG. CCLZFZ UV CCLFZ + Cl. Oz -> 0.+Oz
$ \begin{array}{cccc} \cdot & Cl + O_3 & \longrightarrow & ClO_0 + O_2 \\ ClO_0 + O_0 & \longrightarrow & O_2 + Cl_0 \\ & \cdot & ClO_1 & \longrightarrow & ClO_2 \end{array} $
$\frac{(40^{\circ} + 0^{\circ} -) O_2 + Ct^{\circ}}{O_3 + 0^{\circ} -) 2O_2}$ $\frac{N_2G + 0 -) 2NO}{NO_2 + 0 -) NO_2 + O_2}$ $\frac{NO_2 + 0 -) NO_2 + O_2}{NO_2 + 0 -) O_2 + 0 NO_2}$
$O_3 + O \cdot \longrightarrow 2O_2$

	Homolytic fission - the covalent bond breaks so that one electron goes back to each atom making up the bond. Free radicals are atoms or groups of atoms with unraised
	Free radicals are atoms or groups of atoms with unpaired electrons.
) - ()	Hybridisation is the mixing of atomic orbitals in a particular atom to produce a new set of orbitals (the same number originally) that have characteristics of the original orbitals and are better arranged in space for covalent bonding.
2.5	to the state of the sector of the sector
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	2 had allahar
	Deplation of some by CEC.
	- (1) (+ 1) (+ 1) (+ 1) (+ 1)
and the second	
da: 11	- CHO - O - 1 - CHI

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