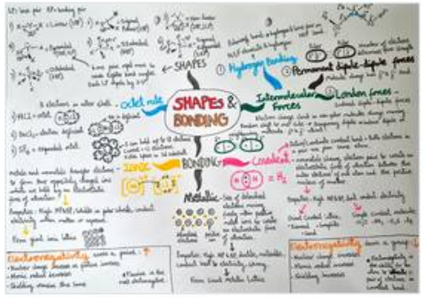
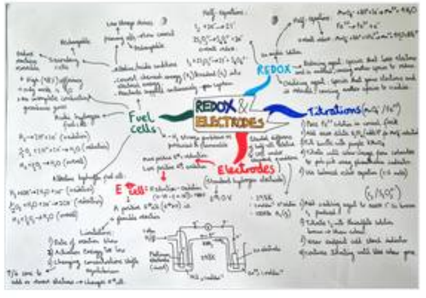
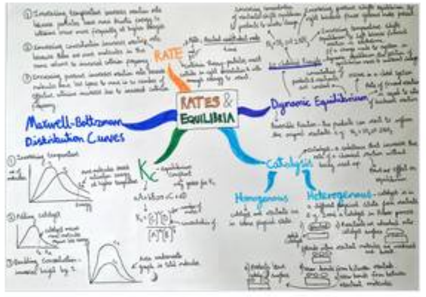
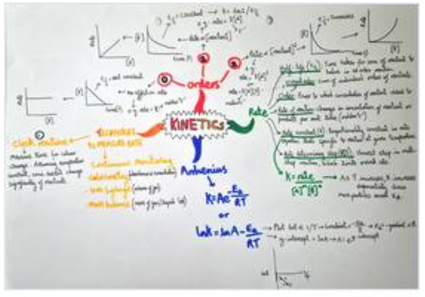
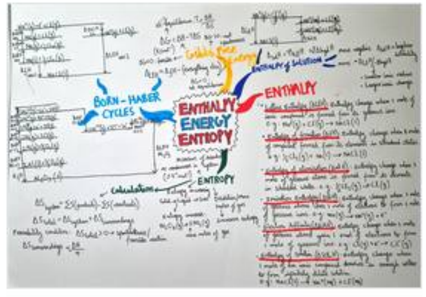
24 mindmaps in this pack

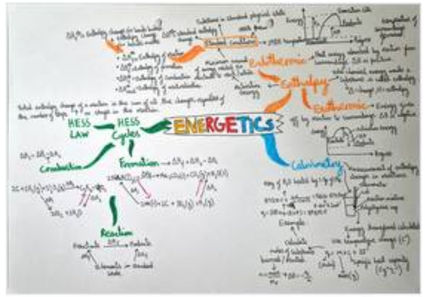


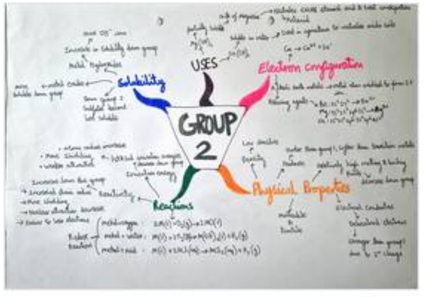


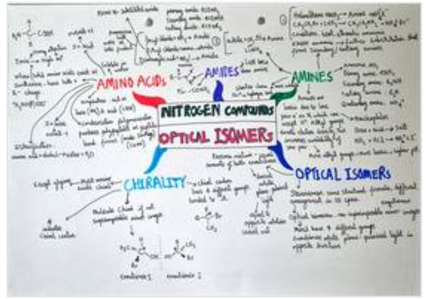


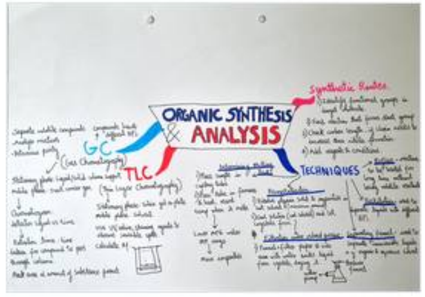


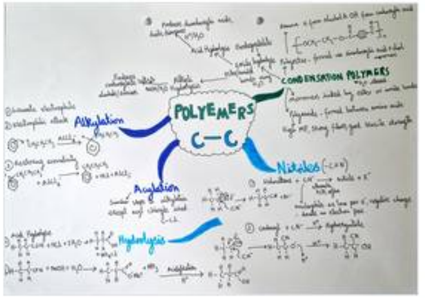


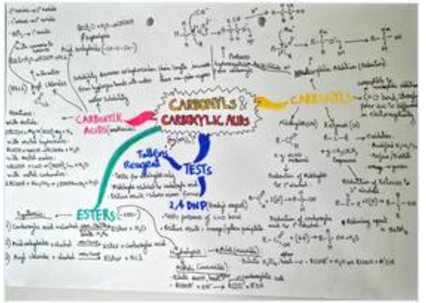


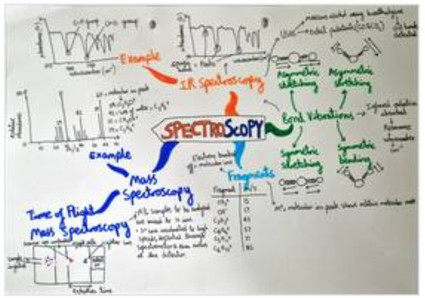


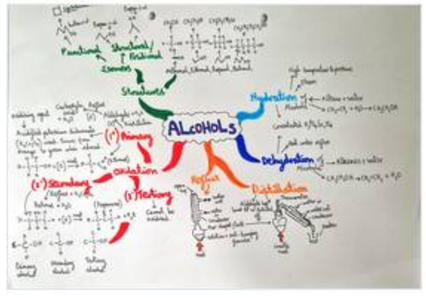


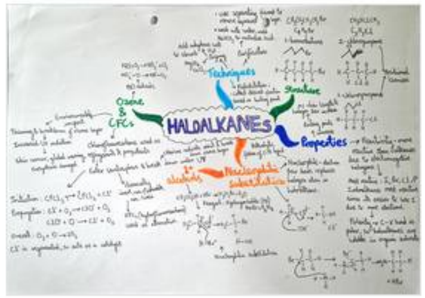


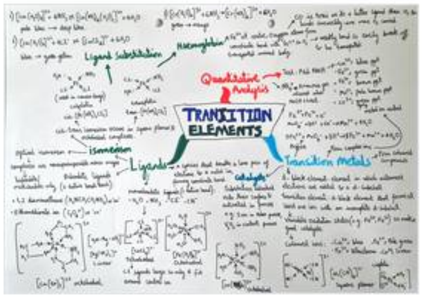












SHAPES & BONDING

LP = lone pair BP = bonding pair

1) X—Y—X = Linear (2BP) 180°

2) = Trigonal Planar (3BP) 120°

3) = Non-linear (2BP, 2LP) 104.5°

4) = Pyramidal (3BP, 1LP) 107°

5) = Tetrahedral (4BP) 109.5°

6) = Trigonal Bipyramidal (5BP) 120° 90°

7) = Octahedral (6BP) 90°

Lone pairs repel more so cause tighter bond angles. Each LP repels by 2-5°.

← SHAPES

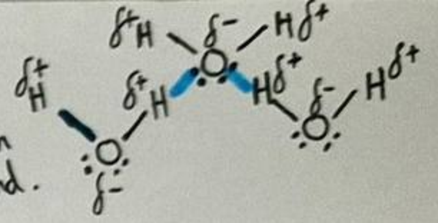
Intermolecular Forces

① **Hydrogen Bonding**

Polarised bond → hydrogen & lone pair on N,O,F elements & hydrogen

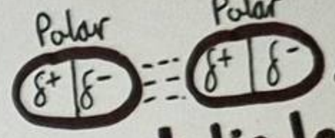
↑

N,O,F elements & hydrogen



② **Permanent dipole-dipole forces**

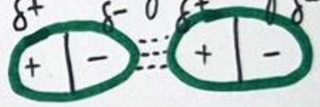
Molecule always has δ+ & δ− end.



Number of electrons determines force strength.

③ **London forces** – Induced dipole-dipole forces.

Electron charge cloud in non-polar molecules always moving. Random shift to one side → temporary dipole → induce dipole on neighbouring molecule. δ+ & δ− attract!



octet rule

8 electrons in outer shell –

1) HCl = octet

2) $BeCl_2$ = electron deficient

Be is deficient

3) SF_6 = expanded octet

S can hold up to 18 electrons. Current = 12 electrons. Extra space in 3d subshell

IONIC BONDING

metals and nonmetals transfer electrons to form two oppositely charged ions which are held by an electrostatic force of attraction.

↓

Properties: High MP&BP, Soluble in polar solvents, conduct electricity when molten or aqueous.

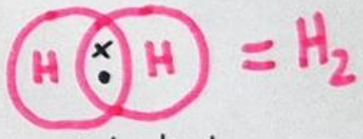
↓

Form giant ionic lattice

Covalent BONDING

Dative/Coordinate covalent bond – Both electrons in a pair are from same atom.

– nonmetals sharing electron pairs to create an electrostatic force of attraction between the outer electrons of one atom and the positive nucleus of another.



$= H_2$

↓

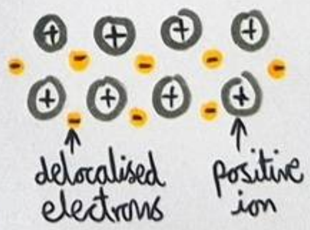
Properties: High MP & BP, don't conduct electricity

↙ Giant Covalent Lattice:
- Diamond
- Graphite
- Sand

↘ Simple Covalent molecule:
- H_2O
- NH_3
- H_2S
- S_8

Metallic

– Sea of delocalised electrons moving freely within positive metal ions to create an electrostatic force of attraction.



↓

Properties: High MP & BP, ductile, malleable, conduct heat & electricity, strong.

↓

Form Giant Metallic Lattice

Electronegativity across a period: ↑

- Nuclear charge increases as protons increase
- Atomic radius decreases
- Shielding remains the same

*Flourine is the most electronegative.

Electronegativity down a group: ↓

- Nuclear charge increases
- Atomic radius increases
- Shielding increases

*Electronegativity is the ability for an atom to attract a pair of electrons in covalent bond.

ALKENES

Addition Reactions

Halogenation
- Electrophilic addition
- Alkene + halogen → dihalogenoalkane
- Bromine water added to alkene is test for alkenes.
- Turns from orange-brown to colourless

Hydrogenation
- Alkene + hydrogen → Alkane
- Nickel catalyst, high temperature & pressure

Hydration
- Requires intermediate where H^+ & HSO_4^- ions added to C=C
- Alkene + water → Alcohol
- Steam, 300°C, 60 atm & acid (H_3PO_4) catalyst

Markownikoff's Rule
- Electrophiles
- Carbocations are positively charged carbon atoms with only 3 covalent bonds.
- Primary carbocation (least stable)
- Secondary carbocation
- Tertiary carbocation (most stable)
- (R) alkyl groups push electron density towards carbocation making it more stable, so more alkyl groups more stability.
- In electrophilic addition reactions of hydrogen halide, the halogen bonds to most stable carbocation. ↓ Favours formation of major product.

Polymers

Addition
- Polymerisation
- many monomers with C=C bond form long chain called polymer.
- Monomer: Ethene
- Polymer: Poly(ethene)
- ↑ Repeating units
- Co-polymerisation – two or more monomers in repeating pattern.

Thermosetting polymers:
- Polymers that don't soften or melt when heated due to strong covalent cross-links → rigid & heat resistant.

Thermosoftening polymers:
- Polymers that soften when heated & can be reshaped, due to weak intermolecular forces.

Electrophilic Addition
- Addition of electrophile to C=C

Stereoisomers
- C=C double bond must be present
- Same structural formula but different arrangement of atoms in space.
- 2 groups on opposite sides: E (trans)
- 2 groups on same side: Z (cis)

C_nH_{2n}
- General formula
- CH_2, C_2H_4, C_3H_6, C_4H_8, C_5H_{10}.

Ethene / Propene
- Displayed
- Skeletal
- C_2H_4 ← Molecular formula → C_3H_6

Cracking
- Process that breaks down larger hydrocarbons into smaller, more useful hydrocarbons.
- → Fractionating column ↓ separates hydrocarbons by BP then catalytic or steam cracking.

Elimination
- → Alcohols turned into alkenes via elimination of water (dehydration). ↓
- Concentrated acid catalyst (H_3PO_4)
- High temperatures
- Produces an alkene & water
- e.g: $C_2H_5OH \rightarrow C_2H_4 + H_2O$