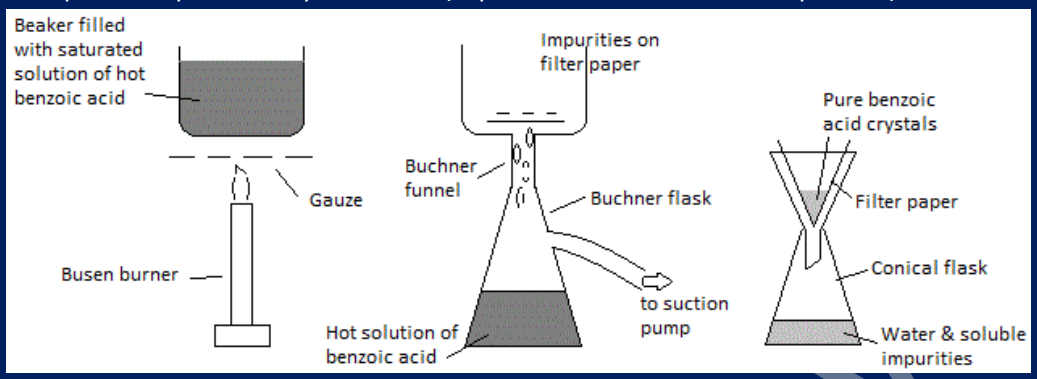
Experiment: Recrystalisation and Melting Point of Benzoic Acid

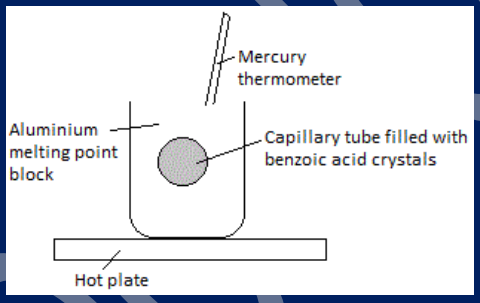
A) Find pure sample → recrystalisation (separated solid from solid impurities)



{1-P11}

1) Measure 1g benzoic acid and place in beaker. Add 10 cm^3 of water and add (minimum amount of water)
2) Place over B.B. and stir until dissolved
3) Heat Büchner funnel by holding by stem and immersing it in boiling water (prevents crystalisation of benzoic acid while filtering)
4) Set up Büchner flask and funnel, and place filter papers in funnel. Turn on water to operate suction pump.
5) Pour solution through filter paper and collect filtrate in flask.
6) Allow crystals to recrystalise

B) Melting Point → temperatures between C° when melting begins and C° when entire solid has liquefied (melting point of impure is lower and wider than pure substance)



1) Seal end of capillary tube by holding over Bunsen B and rotating
2) Place benzoic crystal in tube, and place tube in meting point block on hot plate
3) Place thermometer in block and record melting point
   → when turns colourless = (120°C)

* Low melting point → covalent molecule crystals

% purified e.g.) 2.4g + 2.1g pure $\frac{2.1}{2.4} \text{x } 100 = 87.5\%$

* Important to use minimum water → saturated solution.
* Use of benzoic acid → food preserve

Bond Pair: Shared electron pairs that form covalent bonds

Double covalent bond → two pairs shared. Triple covalent bond: three pairs shared.

Ionic: Hard/brittle, high melting and boiling points, solid at room temp, 3D crystal lattice, conduct electricity in molten state or dissolved in water.

Covalent: Soft, low melting and boiling points, liquids or gases at room temp, molecules, do not conduct electricity.

Valency of an element: number of bonds each atom of the element forms when it reacts (normally how many electrons lost/gained)

Variable Valencies: Transition metals. (little difference between 3d and 4s sublevel)

→ different possible no. of electrons __ → different charge

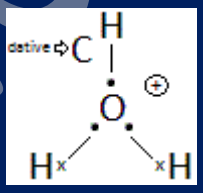
$FeCl_2/FeCl_3 \rightarrow$ iron (II) chloride, iron (III) chloride
$Cu_2O/CuO \rightarrow$ copper (II) oxide, copper (I) oxide

Transition metals: Form at least one ion with partially filled sublevel.
→ Variable valency, form coloured compounds, catalysts except zinc and scandium

Nobel gases → stable and unreactive → uses helium (not flammable) and argon (bulbs)

Sigma Bonding (σ): head on overlapping of orbitals in covalent bond (first)

Pi Bonding (π): Sideways overlapping of orbitals in covalent bond (second and rest)

Dative bond: 

Polar / Non Polar Covalent Bonding: H_2, O_2, N_2, Cl_2 – one type of atom.
→ Nuclei attract shared electrons in bond → non polar / pure covalent.
Polar covalent → unequal sharing of electrons → some slightly positive δ+/negative δ

Demonstration: If polar, flow of liquid will be attracted to charged polythene rod (rub rod with cloth and place near stream) → bend towards rod.

Polar: water / glucose Non-Polar: cooking oil / petrol

Electronegativity: relative attraction of an atom for shared pair of electrons in a covalent bond.

Use differences to predict bonding types

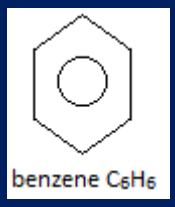
Why bubbled through acidified copper sulfate solution?

➔ Cannot obtain in pure state, so bubble through to remove gases contaminated with

Aliphatic compound: organic compound that consists of open chains of carbon atoms and closed chain compounds that resemble them in chemical properties

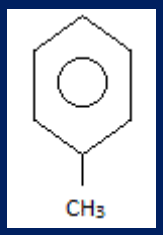
Aromatic compounds → compounds that contain benzene ring structure in their molecules

Benzene: discovered by Michael Faraday



➔ unsaturated but unreactive
➔ Alternating double bonds as there are six valence electrons belonging to whole molecule instead of three double bonds = extra stability / unreactive
➔ Highly toxic and carcinogenic

Methylbenzene C_7H_8



Ethylbenzene C_8H_{10}

- Liquid at room temp
- Insoluble in water
- Dissolves in organic solvents

<u>Oil Refining</u>

Crude oil → seperated into number of useful mixtures by fractional distillation (heating oil and separating fractions on basis of boiling points)

Real - Refining gas
People - Petroleum
Never - Naphtha
Kick - Kerosene
Dogs - Diesel
Like - Lubricating
Foot - Fuel
Balls - Bitumen