Cheatography

Chemistry - Chapter 11:Organic Compound Properties Cheat Sheet
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Organic Reactions

Substitution Reactions

Alkanes:

↻ Alkane + Halogen → Haloalkane

Haloalkanes:

↻ Haloalkane + NaOH → Alcohol

↻ Haloalkane + NH_3 → Amine

Addition Reactions

Alkenes:

↻ Alkene + Hydrogen -Metal Catalyst→ Alkane

↻ Alkene + H_2O -H_3PO_4 Catalyst→ Alcohol

↻ Alkene + Hydrogen Halide → Haloalkane

↻ Alkene + Halogen → Dihaloalkane

Hydrolysis Reactions

Esters:

↻ Ester + H_2O → Carboxylic Acid + Alcohol

Oxidation Reactions

Alcohols:

↻ Primary Alcohol + Inorganic Oxidant → Aldehyde (Low Temp) or Carboxylic Acid (High Temp)

↻ Secondary Alcohol + Inorganic Oxidant → Ketone

↻ Tertiary alcohols can't undergo oxidation

Aldehydes:

↻ Aldehyde + Inorganic Oxidant → Carboxylic Acid

Condensation Reactions

Carboxylic Acids:

↻ Esterification: Carboxylic Acid + Alcohol → Ester + H_2O

↻ Carboxylic Acid + NH_3 → Primary Amide + H_2O

↻ Carboxylic Acid + Primary Amine → Secondary Amide + H_2O

Important Oxidants to Remember

↻ Potassium Dichromate ($K_2Cr_2O_7$)

↻ Potassium Permanganate ($KMnO_4$)

Organic Compound Physical Properties

Alkanes

↻ Low BP due to dispersion forces & 1x bonds

↻ Straight chains compress more closely → higher BP & dispersion forces

↻ Non-polar → insoluble in H_2O

Alkenes & Alkynes

↻ Low BP

↻ Non-polar → insoluble in H_2O

Haloalkanes

↻ Weak dispersion forces, but allows stronger dipole-dipole attractions

↻ Higher BP than alkanes

↻ Low solubility due to insignificant dipole-dipole interactions

Alcohols, Carboxylic Acids, Amines & Amides

↻ All have functional groups that form H-bonds (strongest intermolecular force)

↻ High BP due to H-bonds

↻ Highest-lowest BP for alcohol types: primary, secondary, tertiary

↻ Soluble

Aldehydes, Ketones & Esters

↻ Held by dipole-dipole attractions

↻ Low BP due to no H-bonding with each other

↻ Soluble in H_2O due to H-bonding

Physical Properties

↻ Boiling Point → increases with size

↻ Solubility → decreases with size

↻ **Viscosity:** A fluid's resistance to flow. Increases by chain length and/or greater intermolecular force attractions

↻ **Flashpoint:** The lowest temp that a substance in vapour form combusts/ignites. Works hand-in-hand with BP, but is always lower than BP

Percentage Yield Formula

% Yield = (AY÷TY) x 100

Actual Yield (AY)	Theoretical Yield (TY)
↻ Actual amount made	↻ Estimated amount made by stoichiometry
↻ Usually given in question	

Calculating The Overall % Yield

↻ If A→B has ■% yield and the following reaction is B→C with ★%, and ..., then overall yield = (■%) x (★%) x ..., x 100

Atom Economy

Atom Economy = (M_r of wanted product ÷ M_r of **ALL** reactants) x 100

↻ Measure of how many atoms in reactants end up in wanted product → aim to maximise atom economy

↻ An indication of greeness (minimised waste & more products)

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