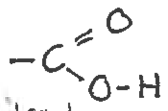
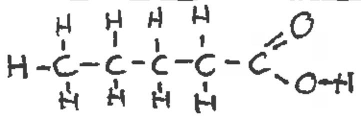
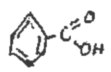
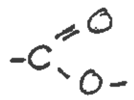
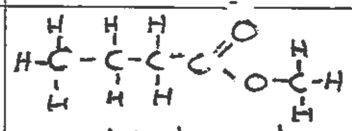
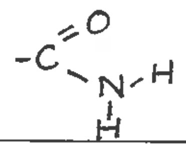
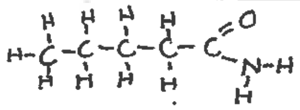
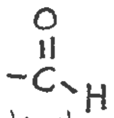
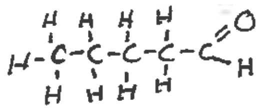
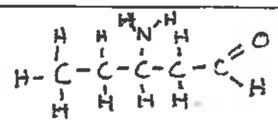
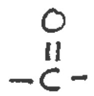
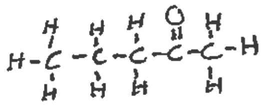
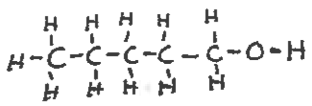
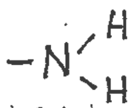
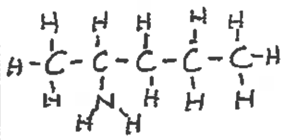
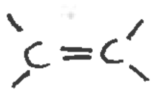
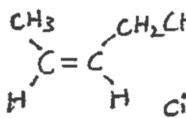
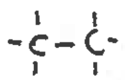
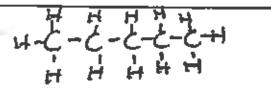
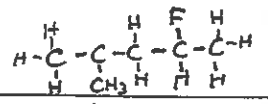
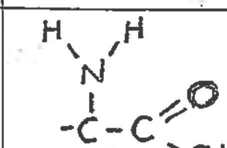
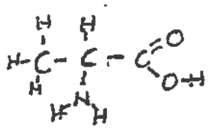
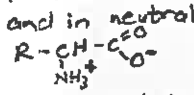
Status

Organic Chemistry Review Sheet

Compound	Formula	Example with Name	Other Information	Intermolecular Forces and Physical Properties	Chemical Reactions
Carboxylic Acid oic acid	−COOH  carboxyl	 Pentanoic acid $CH_3CH_2CH_2CH_2COOH$	 = benzoic acid Carboxylic acids are weak acids.	Dispersion Dipole-dipole Hydrogen bonding	• React with alcohol to produce an ester + H_2O • React with reactive metal to produce salt + $H_{2(g)}$ • React with base to produce salt + H_2O. • React with metal carbonate to produce salt + H_2O + CO
Ester oate	−COO−  carboxylate	 Methyl butanoate $CH_3CH_2CH_2COOCH_3$	• Fruity odours • Produced from condensation reaction of alcohol + carboxylic acid. *	Dispersion Dipole-dipole	React with a hydroxide to produce a carboxylate ion and an alcohol.
Amide	−CONH₂ 	 Pentanamide $CH_3CH_2CH_2CH_2CONH_2$		Dispersion Dipole-dipole Hydrogen-bonding	
Aldehyde al	−CHO  carbonyl	 Pentanal $CH_3CH_2CH_2CH_2CHO$	 3-aminopentanal	Dispersion Dipole-dipole	Aldehydes oxidise to produce carboxylic acids
Ketone one	−CO−  carbonyl	 Pentan-2-one $CH_3CH_2CH_2COCH_3$		Dispersion Dipole-dipole	
Alcohol ol	−OH −O−H hydroxyl but called hydroxy when attached	 Pentan-1-ol $CH_3(CH_2)_4OH$	Get primary (1°), secondary (2°) and tertiary (3°) alcohols. Mp's and bp's: 1° > 2° > 3° as OH is more exposed for H-bonding in 1° than 2° than 3° alcohols.	Dispersion Hydrogen bonding	• React with carboxylic acid to produce an ester + H • 1° alcohol $\xrightarrow{oxidises}$ aldehyde $\xrightarrow{oxidises}$ carboxylic acid (2 step) OR 1° alcohol ⟶ carboxylic acid (when ox's 1 step) • 2° alcohol oxidises to produce ketone • 3° alcohols do not readily oxidise.
Amine amine	−NH₂  amine but called amino when attached	 $CH_3CHNH_2CH_2CH_2CH_3$ Pentan-2-amine		Dispersion Hydrogen bonding	
Alkene ene		 cis-pent-2-ene	Cis-trans isomerism	Dispersion only (Mp's and bp's lower than alkanes as due to stereochemistry (shape) molecules are not able to come as close to each other ∴ weaker intermolecular forces.)	• Undergo addition reactions (quick) eg $CH_3CHCHCH_3 + Cl_2 \rightarrow CH_3CHClCHClCH_3$ • Hydration produces an alcohol eg $CH_3CHCHCH_3 + H_2O \rightarrow CH_3CH(OH)CH_2CH_3$ • Combustion too
Alkane ane		 Pentane  2-fluoro-4-methyl pentane	Cycloalkanes have same molecular formula as alkenes.  = benzene	Dispersion only	• Undergo substitution reactions (slow) eg $CH_3CH_2CH_2CH_3 + Cl_2 \rightarrow CH_3CH_2CH_2CH_2Cl + HCl$ • Also undergo combustion eg $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$
Amino Acid	 α-amino acid	 2-aminopropanoic acid CH_3CHNH_2COOH	α-amino acids form zwitterions in solid state and in neutral solutions:  Zwitterion = amino acid that has both a positive and negative charge	Ionic in zwitterion form Amino acids combine to form proteins.	Zwitterions can act as acids or bases and ∴ also as buffers In acid: acts a base $R-CH(NH_3^+)-COO^- + H_3O^+ \rightleftharpoons R-CH(NH_3^+)-COOH + H_2O$ (proton acceptor) In base: acts as acid $R-CH(NH_3^+)-COO^- + OH^- \rightleftharpoons R-CH(NH_2)-COO^- + H_2O$ (proton donor)

Mp's and bp's in increasing order: alkenes (lowest) < alkanes < ketones + aldehydes + esters < amines < alcohols < carboxylic acids < amides < amino acids as zwitterions due to ionic bonding.