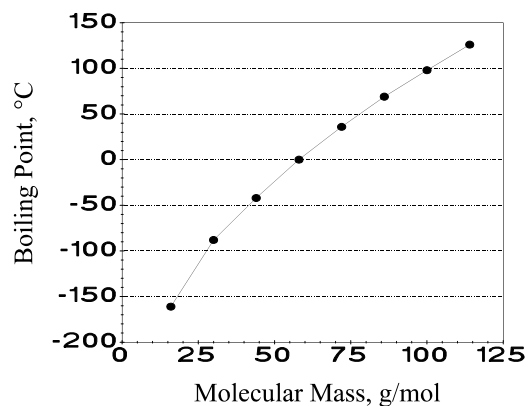


PROPERTIES OF THE ALKANES


<u>Name</u>	<u>Formula</u>	<u>MP, °C</u>	<u>BP, °C</u>
Methane	CH ₄	-183	-162
Ethane	C ₂ H ₆	-172	-89
Propane	C ₃ H ₈	-187	-42
n-Butane	C ₄ H ₁₀	-138	0
n-Pentane	C ₅ H ₁₂	-130	36
n-Hexane	C ₆ H ₁₄	-95	69
n-Heptane	C ₇ H ₁₆	-91	98
n-Octane	C ₈ H ₁₈	-57	126
n-Nonane	C ₉ H ₂₀	-54	151
n-Decane	C ₁₀ H ₂₂	-30	174
n-Undecane	C ₁₁ H ₂₄	-26	196
n-Dodecane	C ₁₂ H ₂₆	-10	216
n-Tridecane	C ₁₃ H ₂₈	-6	234
n-Tetradecane	C ₁₄ H ₃₀	6	252
n-Pentadecane	C ₁₅ H ₃₂	10	266
n-Hexadecane	C ₁₆ H ₃₄	18	280
n-Heptadecane	C ₁₇ H ₃₆	22	292
n-Octadecane	C ₁₈ H ₃₈	28	308
n-Nonadecane	C ₁₉ H ₄₀	32	320
n-Eicosane	C ₂₀ H ₄₂	36	dec.



PETROLEUM CONSTITUENTS

<u>Fraction</u>	<u>Distillation Temperature, °C</u>	<u>Carbon Number</u>
Gas	Below 20°	C ₁ - C ₄
Petroleum ether	20° - 60°	C ₅ - C ₆
Ligroin (light naphtha)	60° - 100°	C ₇ - C ₇
Natural gasoline	40° - 205°	C ₅ - C ₁₀ , cycloalkanes
Kerosene	175° - 325°	C ₁₂ - C ₁₈ , aromatics
Gas oil	Above 275°	C ₁₂ and higher
Lubricating oil	Non-volatile liquids	Long chains/cyclic
Asphalt	Non-volatile	Polycyclic
Coke	Solid Carbon	

HYDROCARBON AND FUNCTIONAL GROUP SUMMARY SHEET

Name	General Formula	Nomenclature	Examples	Properties
Alkanes	C_nH_{2n+2}	-ane	methane	Saturated (all single bonds)
Alkenes	C_nH_{2n}	-ene	ethene	Double Bond, C=C unsaturated
Alkyne	C_nH_{2n-2}	-yne	ethyne	Triple Bond, -C/C- unsaturated
Benzene Series	C_nH_{2n-6}	---	Benzene C_6H_6	

<u>Name</u>	<u>General Formula</u>		<u>Nomenclature</u>	<u>Examples</u>
Alcohols	R-OH		-ol	ethanol
Aldehydes	R-CHO	$\begin{array}{c} \text{O} \\ \parallel \\ \text{R}-\text{C}-\text{H} \end{array}$	-al	methanal
Ketones	$R_1\text{-CO-R}_2$	$\begin{array}{c} \text{O} \\ \parallel \\ \text{R}_1-\text{C}-\text{R}_2 \end{array}$	-one	propanone
Acids	R-COOH	$\begin{array}{c} \text{O} \\ \parallel \\ \text{R}-\text{C}-\text{O}-\text{H} \end{array}$	-oic acid	ethanoic acid
Esters	$R_1\text{-COO-R}_2$	$\begin{array}{c} \text{O} \\ \parallel \\ \text{R}_1-\text{C}-\text{O}-\text{R}_2 \end{array}$	-yl -oate	ethyl ethanoate
Ethers	$R_1\text{-O-R}_2$		-yl -yl ether	diethyl ether
Amines	R-NH ₂		-yl amine	triethyl amine
Polymers	$[-\text{CH}_2-\text{CH}_2-]_n$		poly-	polyethylene

ORGANIC PREFIXES

1 carbon = meth
 2 carbons = eth
 3 carbons = prop
 4 carbons = but
 5 carbons = pent
 6 carbons = hex
 7 carbons = hept
 8 carbons = oct
 9 carbons = non
 10 carbons = dec

Halogens

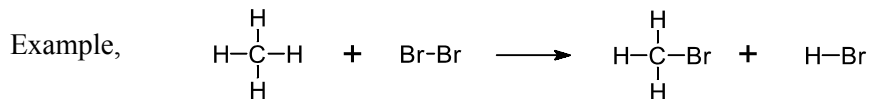
Fluoro = F-
 Chloro = Cl-
 Bromo = Br-
 Iodo = I-

Prefixes

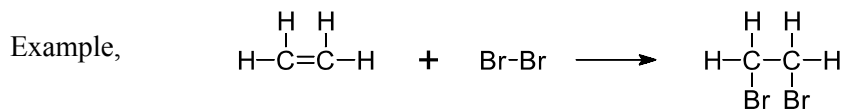
di = two
 tri = three
 tetra = four
 penta = five
 hexa = six
 hepta = seven
 octa = eight
 etc.

ORGANIC REACTIONS

1. Substitution - Only saturated compounds undergo substitution (**alkanes only**)

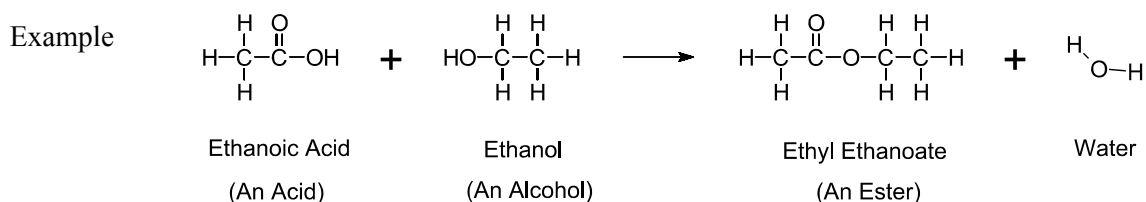


2. Addition - Only unsaturated compounds undergo addition (**alkenes and alkynes only**)

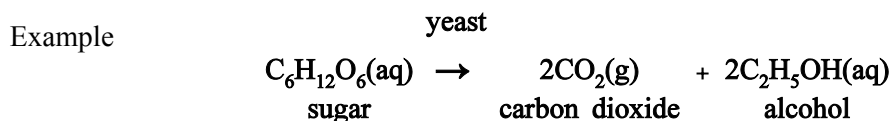


Hydrogenation: Alkene + hydrogen = Alkane ($\text{C}_2\text{H}_4 + \text{H}_2 = \text{C}_2\text{H}_6$)

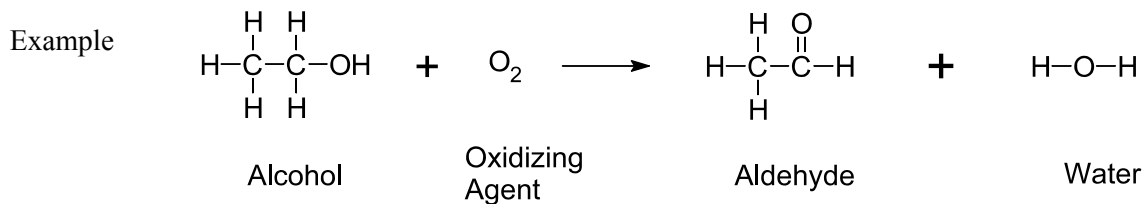
3. Esterification - The reaction between an acid and alcohol to produce an ester and water



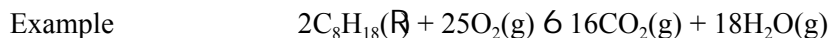
4. Fermentation - Fermentation of an alcohol gives alcohol and carbon dioxide



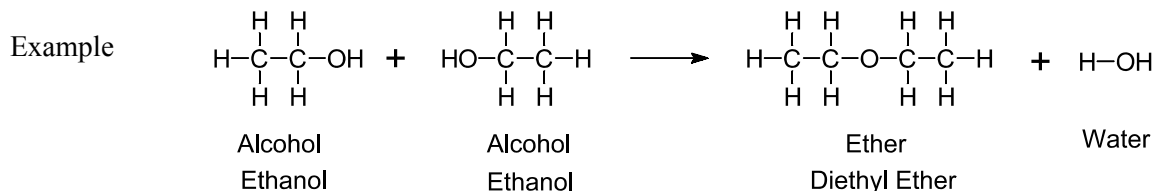
5. Oxidation of a primary alcohol gives an aldehyde



6. Combustion - Complete combustion always gives carbon dioxide and water

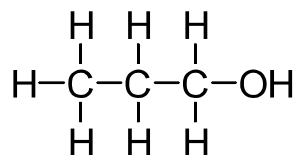


7. Dehydration of alcohols yield an ether and water

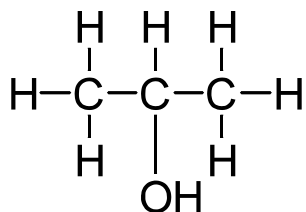


Special Alcohols

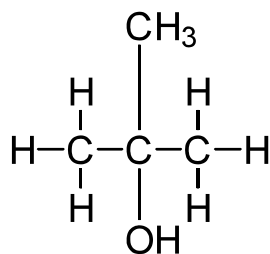
1. A primary alcohol, 1-propanol (-OH group on the terminal carbon)



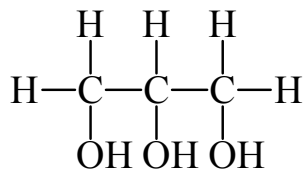
2. A secondary alcohol, 2-propanol (-OH group on a middle carbon)



3. A tertiary alcohol, 2-methyl-2-propanol (-OH group on a carbon surrounded by three other carbons)



4. Glycerol, a trihydroxy alcohol, also called 1,2,3 - propantriol, $\text{C}_3\text{H}_5(\text{OH})_3$



5. Ethylene glycol, a dihydroxy $\text{C}_2\text{H}_4(\text{OH})_2$ alcohol, also called 1,2-ethandiol,

