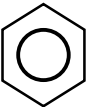
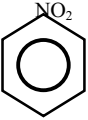
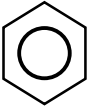


Comparison of Aromatic and Aliphatic Hydrocarbons

	<i>Ethane</i>	<i>Ethene</i>	<i>Ethyne</i>	<i>Benzene</i>
<i>Oxidation (a)</i>	Burns in air	...explosively	...explosively	Burns with a sooty flame
<i>With $KmnO_4$ (b)</i>	No reaction	Addition of OH groups Decolourisation tests for unsaturation Forms... $\begin{array}{c} \text{H} & \text{H} \\ & \\ \text{H}-\text{C} & - & \text{C}-\text{H} \\ & \\ \text{OH} & \text{OH} \end{array}$	Forms... $\begin{array}{c} \text{OH} & \text{OH} \\ & \\ \text{O}=\text{C} & - & \text{C}=\text{O} \end{array}$ (Ethandioic acid; oxalic acid)	No reaction
<i>Halogenation</i>	Substitution (Cl_2/Br_2) Free radical, UV light $\text{C}_2\text{H}_5\text{Cl}$, $\text{C}_2\text{H}_4\text{Cl}_2$, etc. ($\text{Cl}_2 > \text{Br}_2 > \text{I}_2$)	Addition reaction Electrophilic addition ← Test for unsaturation → Bromine decolourises Forms... $\begin{array}{c} \text{H} & \text{H} \\ & \\ \text{H}-\text{C} & - & \text{C}-\text{H} \\ & \\ \text{Br} & \text{Br} \end{array}$ Note: $\text{Cl}_2 > \text{Br}_2 > \text{I}_2$	Electrophilic addition (2 moles Cl_2 , Br_2 , I_2) Forms... $\begin{array}{c} \text{Cl} & \text{Cl} \\ & \\ \text{H}-\text{C} & - & \text{C}-\text{Cl} \\ & \\ \text{Cl} & \text{Cl} \end{array}$ (1,1,2,2-tetrahalogenoethane)	Both addition and substitution. With carrier substitution  + HX In sunlight... $\text{C}_6\text{H}_6\text{Cl}_6$ (addition) Also bromine, but not iodine
<i>Nitration</i>	No reaction	No reaction	No reaction	Mono nitro compound With concentrated HNO_3 ... H_2SO_4 as catalyst...Electrophilic substitution 
<i>Sulphonation</i>	No reaction	Adds on H_2SO_4 to form $\text{C}_2\text{H}_5\text{HSO}_4$ (ethyl hydrogen sulphate)	Adds on H_2O with $\text{H}_2\text{SO}_4/\text{HgSO}_4$ $\text{C}_2\text{H}_2 + \text{H}_2\text{O} \rightarrow \text{CH}_3\text{CHO}$	Electrophilic substitution Very slow $-\text{H} + \text{HOSO}_3\text{H} \rightarrow$  Benzene sulphonic acid
<i>Halogen Hydride</i>	No reaction	Electrophilic addition $\begin{array}{c} \text{H} & \text{X} \\ & \\ -\text{C} & - & \text{C} \\ & \\ \text{H} & \end{array}$ $\text{HI} > \text{HBr} > \text{HCl}$	Electrophilic addition $\begin{array}{c} \text{H} & \text{X} \\ & \\ -\text{C} & - & \text{C} \\ & \\ \text{H} & \text{X} \end{array}$ (Markownikoff's Rule)	Only special reactions: Friedel-Craft's alkylation and acylation reactions 