

Combustion	
Reagent	O ₂
Complete equation	Alkane + O ₂ → CO ₂ + H ₂ O
Incomplete equation	Alkane + 2O ₂ → CO + 2H ₂ O

Synthesis	
Hydrogenation of alkenes and cycloalkenes	
Reagent	H ₂ gas
Conditions	heat / 200°C pressure 50atm
Catalyst	Ni / Pt / Pd
Equation	Alkene + H ₂ → Alkane

Cracking (pyrolysis)	
Large alkanes become smaller alkanes and alkenes	
Condition	500°C
Catalyst	Zeolite (SiO ₂ - Al ₂ O ₃)
Equation	C ₆ H ₁₄ → C ₂ H ₄ + C ₃ H ₆ + CH ₄

Halogenation	
Reagent	Cl ₂ / Br ₂
Condition	UV light / sunlight
Mechanism	Free radical substitution
Rules	Carbon 3° > 2° > 1° > CH ₄

Equations	
Initiation (<i>homolysis</i>)	Br ₂ → 2Br•
Propagation (<i>radical + molecule</i>)	Br• + CH ₄ → CH ₃ • + HBr
	CH ₃ • + Br ₂ → CH ₃ Br + Br•
Termination (<i>radical + radical</i>)	Br• + Br• → Br ₂
	Br• + CH ₃ • → CH ₃ Br
	CH ₃ • + CH ₃ • → C ₂ H ₆

Halogenation	
Initiation :	Br ₂ \xrightarrow{UV} 2Br•
Propagation :	Br• + CH ₄ → $\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}\cdot \\ \\ \text{H} \end{array}$ + HBr
	ĊH ₃ + Br ₂ → $\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{Br} \\ \\ \text{H} \end{array}$ + Br•
Termination :	Br• + Br• → Br ₂
	ĊH ₃ + ĊH ₃ → C ₂ H ₆ (ethane)
	Br• + ĊH ₃ → $\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{Br} \\ \\ \text{H} \end{array}$

