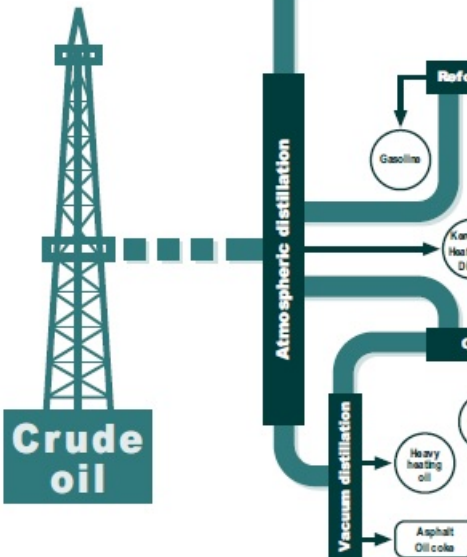
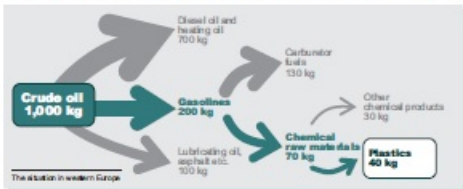


From crude oil to polymers

Selected reaction pathways, intermediate and end products



How plastics are made

Polymerization: polymer are formed from monofunctional monomers without by-product, e.g. polyethylene (PE)

Polycondensation: from bifunctional and multifunctional monomers with byproducts, e.g. H₂O, HCl, phenol, e.g. polycarbonate (PC)

Polyaddition: from bifunctional and multifunctional monomers without by-product, e.g. 10-lylene polyurethanes (PU)

**End groups are ignored*

Category	Substrate	Intermediate	End Product
Synthesis gas	Ammonia	Amines	Isocyanates
		+ Phenol	Polyurethanes (PU)
	Methanol	Formaldehyde	Polyamides (PA)
Paraffins	Methane	Chloromethane, hydrogen cyanide, carbon disulfide	Phenolic resins (phenoplasts)
	C ₂ -C ₄ -Alkanes	Olefins, chloroalkanes, carboxylic acids, aldehydes	Polyacrylamide (PAM)
	Butane	Maleic anhydride	Thermoplastic polyurethanes (TPU)
Naphthenes / Paraffins	C ₇ -C ₁₀ -Alkanes	Butadiene	Aromatic polyurethanes (PU)
		Dicarboxylic acids	Polyurethane (PU)
	Cyclododecane	Lauryl lactam	Polyurethane (PU)
Aromatics	Benzene	Styrene	Linear polyesters (PET), polybutylene terephthalate (PBT)
		Acrylonitrile	Linear polyesters (PET)
	Toluene	Phthalic acid	Linear polyesters (PET)
Olefins	Ethylene (C ₂)	Acetic acid	Polyurethanes (PU)
		Vinyl acetate	Thermoplastic polyurethanes (TPU)
	Propylene (C ₃)	Acrylic acid	Polyurethanes (PU)
C ₄ -Fraction	Butadiene	Acrylonitrile	Polyurethanes (PU)
		Styrene	Thermoplastic polyurethanes (TPU)
	Isoprene	Isoprene	Polyurethanes (PU)



Esterpol - Aromatic, Aliphatic Polyester Polyols, Polyureas

- EPAL Alkyds
- Isocyanate Prepolymers

esterpol
performance resins

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