

ABS and Nylon 6,6 – Synthesis, Properties & Applications

🌟 1. ABS (Acrylonitrile Butadiene Styrene)

✅ Synthesis of ABS

- **ABS is a copolymer** made by **polymerizing three monomers**:
 - **Acrylonitrile (A)**
 - **Butadiene (B)**
 - **Styrene (S)**
 - Made by:
 - **Emulsion polymerization** or
 - **Mass polymerization** of styrene and acrylonitrile in the presence of **polybutadiene** rubber.
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💡 Properties of ABS

- **Strong and impact-resistant.**
 - **Lightweight and tough.**
 - **Good electrical insulation.**
 - **Glossy finish** and **easily molded.**
 - **Heat and chemical resistant.**
 - Retains strength at **low temperatures.**
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🔧 Applications of ABS

- **Lego toys** and plastic blocks.
 - **Automobile parts** (dashboards, bumpers).
 - **Electronic housings** (TVs, computer cases).
 - **Pipes and fittings.**
 - **Luggage shells and helmets.**
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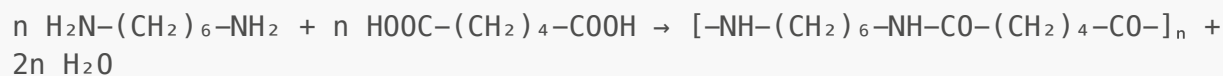
🌟 2. Nylon 6,6

Synthesis of Nylon 6,6

- **Condensation polymerization** between:
 - **Hexamethylene diamine** ($\text{NH}_2-(\text{CH}_2)_6-\text{NH}_2$)
 - **Adipic acid** ($\text{HOOC}-(\text{CH}_2)_4-\text{COOH}$)

- Forms **amide linkages (–CONH–)** with elimination of **water**.
- Reaction occurs under **high temperature and pressure**.

Equation:



💡 Properties of Nylon 6,6

- **High tensile strength** and **durability**.
- **Resistant to abrasion**, wear, and chemicals.
- **Good thermal stability**.
- Can be drawn into **fibers or molded into shapes**.
- **Moisture absorbing**, slightly hydrophilic.

Applications of Nylon 6,6

- **Textile industry** – fabrics, ropes, seat belts.
- **Engineering plastics** – gears, bearings, machine parts.
- **Carpets and upholstery**.
- **Sports equipment**.
- **Electrical insulators and toothbrush bristles**.

Comparison Table (Quick Revision)

Property	ABS	Nylon 6,6
Type	Thermoplastic copolymer	Condensation polymer
Synthesis	Acrylonitrile + Butadiene + Styrene	Hexamethylene diamine + Adipic acid
Strength	Tough, impact resistant	High tensile strength
Use	Housings, toys, auto parts	Fibers, engineering plastics

Summary

- **ABS**: A tough plastic used in **toys and electronics**, made by copolymerizing three monomers.
- **Nylon 6,6**: A **strong fiber-forming polymer** used in **textiles and mechanical parts**, made by condensation of diamine and diacid.
- Both are **important synthetic polymers** with wide industrial use due to their **durability and versatility**.