

How to Make AdBlue (Diesel Exhaust Fluid) Using Urea

AdBlue, also known as Diesel Exhaust Fluid (DEF), is a solution composed of **32.5% high-purity urea** and **67.5% deionized water**. It is used in **Selective Catalytic Reduction (SCR)** systems in diesel engines to reduce **NOx emissions**.

Step-by-Step Process to Make AdBlue

1. Raw Materials Required

- **High-purity Urea (ISO 22241-compliant):** Technical-grade or industrial urea is not suitable due to impurities.
 - **Deionized (DI) Water:** Must be free from minerals and contaminants to prevent injector clogging.
 - **Storage & Handling Equipment:** Stainless steel or high-density polyethylene (HDPE) tanks.
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2. Urea Dissolution Process

1. Water Preparation

- Take **67.5% deionized water** in a stainless steel mixing tank.
- Heat the water to **40–50°C** to help dissolve the urea faster.

2. Urea Addition

- Gradually add **32.5% high-purity urea** into the heated water while stirring.
- Ensure the urea is **completely dissolved** to form a clear solution.
- Maintain a **pH of 9.0–10.0** during mixing.

3. Filtration

- Filter the solution using **5-micron and 1-micron filters** to remove undissolved particles.
 - This step ensures that the final product meets **ISO 22241-1** standards.
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3. Cooling & Storage

- Allow the solution to **cool down to room temperature (20–25°C)**.
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- Store in **sealed, UV-protected HDPE or stainless steel containers** to prevent contamination.
 - **Avoid copper, zinc, or aluminum** containers, as AdBlue is **corrosive to these metals**.
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4. Quality Control & Testing

To meet **ISO 22241 standards**, test for:


- **Urea concentration (32.5%)** using a refractometer.
 - **pH level (9.0–10.0)**
 - **Biuret content (<0.3%)**
 - **Aldehydes and insoluble particles** (which must be minimal).
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Key Considerations

- **Temperature Sensitivity:** AdBlue freezes at **-11°C** and decomposes above **30°C**.
 - **Shelf Life:** Around **12 months** if stored properly.
 - **Contamination Prevention:** Even a small amount of oil, grease, or metal ions can degrade the solution.
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Industrial vs. Homemade AdBlue

While it's possible to make AdBlue following these steps, producing **high-purity, ISO-compliant DEF** requires **strict quality control and specialized equipment**. For commercial use, it's recommended to purchase **certified AdBlue** instead of making it manually.

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