

Synthesis of 1-Bromo-3-nitrobenzene

<https://gemini.google.com/app/7cbbedcb1f452d10>

Response: Based on the provided image, the target molecule is **1-bromo-3-nitrobenzene** (or *m*-bromonitrobenzene).

The correct choice is **(3)**.

Analysis of the Options

- **Option (1):** Bromobenzene reacts with conc. HNO_3 /conc. H_2SO_4 .
 - The bromine atom is an **ortho/para-director**, so nitration yields *o*-nitrobromobenzene and *p*-nitrobromobenzene as major products, not the *meta* isomer.
- **Option (2):** *m*-nitroaniline with NaNO_2 /dilute HCl forms a diazonium salt, but then adding $\text{Br}_2/\text{FeBr}_3$ is an electrophilic aromatic substitution reagent rather than the reagent used for replacing the diazonium group.
- **Option (3):**
 1. Reaction of 3-nitroaniline with NaNO_2 /dil. HCl at $0 - 5^\circ\text{C}$ forms the **diazonium salt** (diazotization).
 2. Treatment with cuprous bromide (CuBr) via the **Sandmeyer reaction** replaces the $-\text{N}_2^+$ group specifically with a $-\text{Br}$ group to form 1-bromo-3-nitrobenzene cleanly.
- **Option (4):** Diazotization requires low temperatures ($0 - 5^\circ\text{C}$) to prevent the decomposition of the diazonium salt into 3-nitrophenol. Running step (1) at 25°C results in hydrolysis instead.
- **Option (5):** Direct bromination of nitrobenzene with Br_2 requires a Lewis acid catalyst such as FeBr_3 or Fe to proceed effectively. Without a catalyst, the reaction will not proceed at an acceptable rate.

Correct Answer

(3)
