The **Gabriel Phthalimide Synthesis** is a method used to prepare primary amines (R-NH_2) from alkyl halides (R-X) via the reaction of phthalimide with the alkyl halide, followed by hydrolysis.

Steps of the Gabriel Phthalimide Synthesis:

1. **Preparation of Potassium Phthalimide:**
   - Phthalimide ($C_6H_4(CO)_2NH$) reacts with potassium hydroxide (KOH) to form potassium phthalimide ($C_6H_4(CO)_2NK$).

$$\mathrm{C_6H_4(CO)_2NH} + KOH \rightarrow \mathrm{C_6H_4(CO)_2NK} + H_2O$$

2. **Alkylation:**
   - Potassium phthalimide reacts with an alkyl halide (R-X) in an SN2 reaction, forming N-alkylphthalimide.

$$\mathrm{C_6H_4(CO)_2NK} + \mathrm{R\text{-}X} \rightarrow \mathrm{C_6H_4(CO)_2NR} + KX$$

   - This step is selective for primary alkyl halides to avoid side reactions.
3. **Hydrolysis or Hydrazinolysis:**
   - N-alkylphthalimide undergoes hydrolysis (with acids or bases) or hydrazinolysis (with hydrazine, NH_2-NH_2) to yield the primary amine (R-NH_2) and phthalic acid ($C_6H_4(COOH)_2$).

$$\mathrm{C_6H_4(CO)_2NR} + 2H_2O \xrightarrow{\mathrm{Acid/Base}} \mathrm{R\text{-}NH_2} + \mathrm{C_6H_4(COOH)_2}$$

Key Features:

- **Selective for Primary Amines:** The method avoids the formation of secondary or tertiary amines, as the phthalimide group blocks further alkylation.
- **Mild Conditions:** The synthesis is versatile and can be carried out under relatively mild conditions.

Applications:

- Synthesis of aliphatic and aromatic primary amines.
- A key method in organic synthesis for amine preparation in laboratories and industrial settings.

The Gabriel Phthalimide Synthesis is an elegant, practical, and widely used method in organic chemistry for the selective synthesis of primary amines.