

Synthesis of Glycine, Methyl Ester Hydrochloride from Formaldehyde

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Synthesis of Glycine, Methyl Ester Hydrochloride from Formaldehyde

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Formaldehyde was made into Glycine, methyl ester in a three step synthesis. First, formaldehyde was hydrolyzed with dilute potassium cyanide and acetic acid to form methylene-amino acetonitrile. The nitrile was then hydrolyzed with barium hydroxide, and boiled with norit to produce glycine. Finally, the glycine was then allowed to react with sulfuric acid and thionyl chloride to produce glycine, methyl ester.

After each step, the product was purified using recrystallization, and was identified using IR, NMR, and melting point. Green chemistry practices were implemented in this procedure to conserve atom economy. Typically, nitriles are hydrolyzed using *hydrochloric acid*; however the product becomes very difficult to separate and low yields are common. When the hydrochloric acid is replaced with barium hydroxide a significantly higher yield is produced. In addition, hydrochloric acid can lead to photochemical smog, and can be toxic to aquatic environments, so barium hydroxide can be a better alternative. This synthesis is important because glycine, methyl ester is a precursor for creatine, which is an organic acid that is made in the body from amino acids to increase the production of ATP that can be used by the muscles.