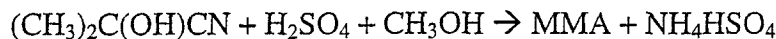


### Acetone Cyanohydrin Method

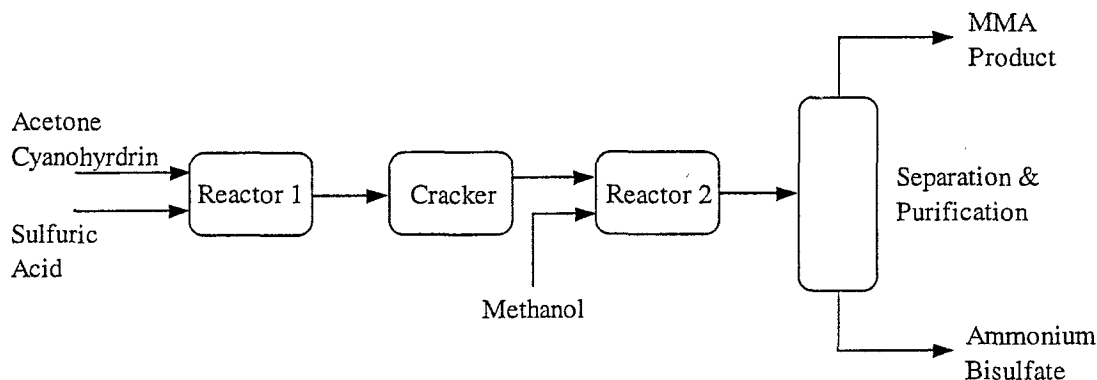
The majority of the MMA produced today is made via the acetone cyanohydrin (ACN) method. This process was put into commercial use in 1936 and was the only method used until 1983. Today, it is still the only method used in the United States. This method was developed by ICI (McKetta, 1989, p. 71) and has since been modified to improve product quality and comply with stricter environmental regulations.

The overall reaction carried out by the acetone cyanohydrin process is:



**Figure 1.** Overall reaction to produce MMA by acetone cyanohydrin

A simplified process flow diagram for this process is shown in figure 2.



**Figure 2.** Simplified PFD for the production of MMA by acetone cyanohydrin

In this process acetone cyanohydrin reacts with 40 to 80 % excess concentrated sulfuric acid in Reactor 1 to form methacrylamide sulfate. This stream is sent through a thermal cracker at 257 to 320 °F to convert by-product to methacrylamide sulfate. The methacrylamide sulfate is then esterified with aqueous methanol in Reactor 2 to produce MMA and ammonium bisulfate. The stream proceeds through several separation and purification steps to separate the two products, after which the ammonium bisulfate acid is often regenerated at an acid regeneration facility. This process generally has between 80 and 90 % conversion (Elvers, 1990, p. 444).

Two general safety and environmental concerns have arisen from this process: hazards for transporting hydrogen cyanide (used for making acetone cyanohydrin) and disposal of waste acid. Acid regeneration has been the option of choice for the latter problem, which avoids having to dispose of large quantities of contaminated ammonium sulfate but adds to the operating expense of this process. These hazards have been the driving force behind the development of the alternative MMA processes.

Figure 12. Detailed... for the ACN process

