APPLICATION OF MICROREACTOR TECHNOLOGY FOR CYANOHYDRIN PRODUCTION: EXTENDING THE SCOPE TOWARDS RENEWABLE RESOURCES

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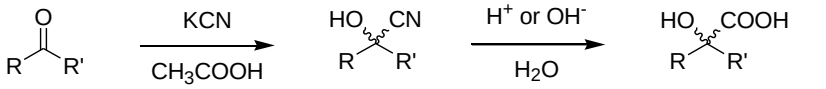
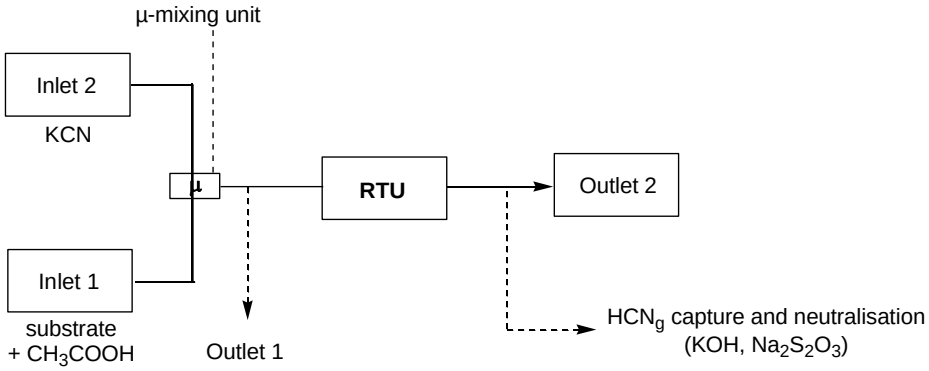
Addition of hydrogen cyanide to functional groups is not widely developed industrially because of safety issues regarding the handling of HCN. *In situ* production of HCN from cyanide salts and a H^+ source definitely presents a safer route for handling such processes. Microreactor technology allows a variety of reactions including cyanohydrin production on a micro and milli-scale with an increased efficiency and safety.



R, R'=H, CH_3, CH_2OH, $(CHOH)_nCH_2OH$

Acetone cyanohydrin production is inevitably connected with a certain safety risk related to the management of HCN in the gaseous or the liquid state. While safely handling the HCN in the closed system, we have achieved a 99% conversion to a >98% pure product by simple modification of the reaction conditions, at relatively low temperature and with a high throughput.

The Kiliani reaction – leading to the extension of the carbohydrate chain by the addition of HCN to a carbonyl group – is a well-known reaction and a convenient synthetic tool opening the way towards α-hydroxycarboxylic acids, important building blocks in organic chemistry. Due to the unfavourable equilibrium, it is difficult to obtain high conversions in a reasonable reaction time under batch conditions. Under microreactor conditions it is possible to obtain a significant increase in reaction efficiency and conversions of up to 99% to the nitrile and/or the corresponding acid, i.e., the product of the *in situ* nitrile hydrolysis. This good result is, however, limited to the lower chain carbohydrates, as with the increase of the number of C atoms in the carbohydrate skeleton the reaction is adversely affected by a number of practical difficulties, such as hemiacetal formation and the solubility of the substrates.



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