

## Process for the continuous flow synthesis of $\beta$ -amino crotonate (for use in anti-hypertensive drugs)

### EXECUTIVE SUMMARY

A process for continuous flow synthesis of >99.98% pure  $\beta$ - amino crotonates which are intermediates to calcium channel blockers (anti-hypertensive drugs)

### BACKGROUND

$\beta$ -amino crotonates are generally produced by a batch synthesis procedure resulting in longer reaction times.

### TECHNOLOGY DESCRIPTION

A novel production process for  $\beta$ -amino crotonate using a continuous mode reactor, with reduced reaction time, yet resulting in higher yield (>93%) and high-purity end-product (>99.98%). The process can be catalytic or catalysis-free : used to produce  $\beta$ -amino crotonate and its analogues.

### MARKET POTENTIAL

- In Asia, an estimated 200 million people suffer from hypertension<sup>1</sup>
- Calcium channel blockers help to decrease the heart rate, which can further lower the blood pressure, relieve the chest pain and control an irregular beat<sup>2</sup> -hence their use as anti-hypertensive drugs
- The world market for anti-hypertensive drugs is targeted to exceed \$66.2 billion by the year 2015<sup>3</sup>

<sup>1</sup><http://www.investis.com/re>, <sup>2</sup><http://www.srspharma.com/calcium-channel-blockers.htm>, <sup>3</sup>[http://www.prweb.com/releases/anti\\_hypertensive\\_drugs/blood\\_pressure\\_medicines/prweb3453394.htm](http://www.prweb.com/releases/anti_hypertensive_drugs/blood_pressure_medicines/prweb3453394.htm)

### VALUE/ADVANTAGES

- Catalytic as well as catalysis-free, continuous process
- $\beta$  amino crotonate yielded is of high purity-process provides better control on product profile
- Reduced reaction time
- Can be prepared from a variety of amines and beta keto esters

### APPLICATIONS

- As intermediates in the synthesis of Ca channel blockers such as amlodipine, nisoldipine, benidipine, nicardipine, etc
- Ca channel blockers are used as intermediates in preparation of anti-hypertensive drugs

### TECHNOLOGY STATUS

- Demonstrated at the lab scale
- On the lookout for potential partners for spin-off and licensing
- Patent application filed: Indian-1025/DEL/2011

Publication: Joshi, R. A. et al (2012) Continuous flow synthesis of  $\beta$ -amino  $\alpha$ ,  $\beta$ -unsaturated esters in aqueous medium, *Green Process Synth* 1, 205-210