CONTINUOUS FLOW SYNTHESIS OF SULPHOXIDE COMPOUNDS FOR USE IN DRUG FORMULATIONS

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Technology

- Sulphoxide compounds such as modafinil/prazole compounds are currently produced by batch synthesis procedure
  - The process yields about 85% product over a duration of 1-4 hours under low temperatures- leading to long processing times
- A more efficient process is required at the industrial level
  - These compounds are mainly used as proton pump inhibitors
  - Which consumes less time and yields lower unnecessary side products continually unlike the batch synthesis procedure
- Our process is a continuous flow synthesis of sulphoxide compounds with reaction times of $\leq$ 1 minute
  - The reaction results in over 90% conversion and over 95% selectivity towards the target sulphoxide compounds (with less than 5% formation of undesired sulphone compounds)

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Applications

- The process can be used to make the following drugs which are mainly used as proton pump inhibitors- used to make drugs to treat the acid-related diseases of the gastrointestinal (GI) tract
  - Such as omeprazole, pantoprazole, lansoprazole, tenatoprazole, rabeprazole, esomprazole
- The process can also be used to make drug molecules that can be used as modafinil compounds
  - Which can be used as central nervous system stimulants- wakefulness promoting agents*
  - In production of drugs which act as neuroprotective agents

* http://pubchem.ncbi.nlm.nih.gov/summary/summary.cgi?cid=4236

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Market Potential

- GI disorders have been projected to affect more than a 250 million people in the 7 large pharma markets by 2012[1]
  - Overall GI tract disorders treatment market is expected to reach $32.2 billion by 2014[2]
- In 2009, proton pump inhibitors were the third largest therapeutic class amounting up to $13.6 billion of sales in the US[3]

http://www.astrazeneca-annualreports.com/documents/2010/therapy_review_area_factsheets/gastrointestinal.pdf[1]
http://www.prnewswire.com/news-releases/reportlinker-adds-gastrointestinal-pharmaceuticals-technologies-and-markets-68849697.html [2]
http://www.imshealth.com/portal/site/imshealth/menuitem.a46c6d4df3db4b3d88f611019418c22a/?vgnextoid=d690a27e9d5b7210VgnVCM100000ed152ca2RCRD[3]

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Value

- Process capable of easy scale up
  - The process is continuous with the reaction time of ≤ 1 minute
- Results in high yield of the product with 95% of selectivity towards the sulphoxide compounds
  - Side product (sulphone compounds) formation- less than 5%
- Conversion rate is > 90%
- The process provides an alternative solvent (to chloroform, which is a volatile solvent that evaporates at room temperature and changes the reaction mass)

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Technology Status, IP Status

- Patent applications filed
- Demonstrated at lab scale
- Ready to be licensed/ commercialized

Links & References

- Patent links
  - Indian: 1392/DEL/2009
  - WO/ PCT application: PCT/IN2010/000456
- Choe, J. et *al*. (2003) Micromixer as a Continuous Flow Reactor for the Synthesis of a Pharmaceutical Intermediate, *Korean J. Chem. Eng., 20(2), 268-272*

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Summary

Technology Summary	
Technology title	Continuous flow synthesis of sulphoxide compounds for use in drug formulations
Industry /sector	Pharmaceuticals
Year of development	2009
Related patents (with links)	Patent pending
Technology readiness level	Demonstrated at lab level
Licensing status	Ready to be licensed
Encumbrances	None
Availability	Yes

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