Biocatalysis in the Pharmaceutical Industry

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This project aim to review the current status within the field of biocatalysis. We identify key areas that crave improvements and thereby this project facilitate expansion of the technology among pharmaceutical companies in the future.

Due to a very comprehensive manufacturing process, with many complex processing steps, the production of pharmaceuticals is the most waste generating chemical production process with a waste production of 25-100 kg waste/kg product.

Biocatalysis is the implementation of enzymes in the production process and it enable manufactures to reduce the number of steps and make the reaction more effective, which means that less mass of raw materials need to be used. Additionally the waste produced become more environmentally compatible as enzymes primarily work under mild conditions, and there is no need for hazardous reagents. With enzymes as biocatalysts it is possible to produce complex pharmaceutical products, containing multiple chiral centers, with reduced waste generation and furthermore avoid the use of toxic solvents and reagents.

Biocatalysis is a promising technology that can lead to a greener production process, but much effort has to be made to implement it and convince the pharmaceutical companies that this innovative step not only contribute to a greener production, but will also save them both money and time. This can in turn enable them to produce affordable drugs to the developing world and reach people in need.

After reviewing the field of biocatalysis we can conclude that among future improvement in the field are:

- Development of commercially available enzyme libraries to cut down the resources related to protein engineering carried out by the pharmaceutical company
- Standardized procedures that make the technology easier to implement
- Development of modelling techniques to reduce the costly and time consuming experimental work