

Scale up of intracellular enzyme production for biocatalysis

Presented by
Stuart West at Biological Catalysis
Manchester Interdisciplinary Biocentre
June 11th 2010

 BIOCATALYSTS



Who is Biocatalysts?

- Speciality enzyme manufacturing company based in Cardiff, UK
- We have been established over 20 years and manufacture enzymes for many blue chip companies



Set-up to be different

- Biocatalysts was set up to serve the market not satisfied by the large enzyme companies. We produce enzymes for customers; rather than make enzymes and try to sell them
- We introduced the concept of Custom tailored enzymes



How do we operate?

- We are here to work together with our customers to help them solve their problems. We are an ideal partner for companies who operate an 'Open Innovation' strategy
- We focus on enzyme development and new enzyme applications
- We are a partnership company – we do many joint development projects with our customers

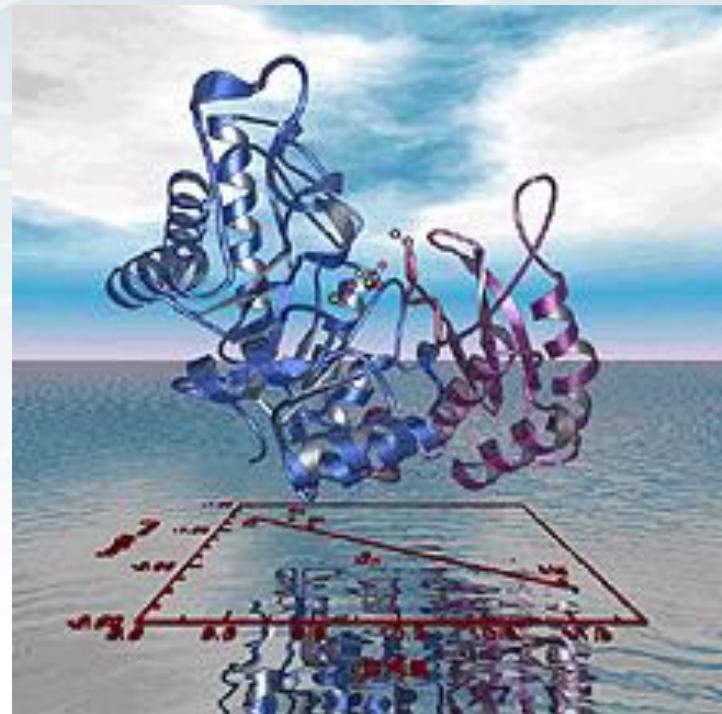
Diagnostic enzymes

- We have made a small range of diagnostic enzymes from intracellular organisms for over 20 years



First cloned enzymes

- Cloned and produced pea lipoxygenases (types 2 & 3) in *E. coli* in 1999
- Scaled up and optimised to produce 1 kg pure enzyme batches



Contract manufacturing

- For high value speciality intracellular enzymes
- We have and are installing a range of mid scale equipment and processes which enable us to make large batches of purified intracellular enzymes from organisms such as E coli and Pseudomonas

Problem

- You have had a University develop a cloned enzyme for you
- You have your biocatalytic reaction worked out
- Where do you go for 10s of kg of semi-purified enzyme for your scale up and large scale production?

Enzyme Manufacturing Solution

- For companies who have developed enzymes for:
 - manufacture of pharmaceutical intermediates
 - biosensors
 - flavour and other high value chemical manufacture

Scale up

- We can take a shake flask process and scale up it up to make >50kg of semi-purified protein or >10kg of purified protein
- Products can be made as stabilised liquids or freeze dried powders



Case Study - 1

- A UK biosensor company needed a University developed enzyme to be scaled-up from laboratory fermenters and optimised
- We optimised fermentation production giving them a 20-fold yield increase, replaced all animal components from medium and developed a highly reproducible DSP yielding about 40g of pure enzyme per batch (from 100 litre fermentation)

Case study - 2

- A pharmaceutical manufacturer needed an enzyme process taken from pilot scale (50 litre) to 10,000 litres with a new optimised DSP
- Optimised fermentation and DSP to yield over 25kg semi-purified end product enzyme per 1000 litres

Fully equipped laboratories

- Culture collection storage
- Analytical equipment: HPLC, GC, electrophoresis, isoelectric focusing etc



Years of practical production experience



- Experience with many micro-organisms: E coli, Pseudomonas and Pichia
- Downstream processing equipment: ultrafiltration cell breakers, chromatography, & freeze drying



What does Biocatalysts do?

- We are a small/medium volume manufacturer for food & non-cGMP enzymes
- We deliver World-Class customer service (benchmarked)
- We are a Business Excellent company (EFQM)



BiOCATALYSTS

A world-class manufacturing partner

- A financially stable company that can guarantee long term supply to anywhere in the world
- A company with a proven track record of supplying high quality products to our customers' delivery requirements
- We are fast, flexible and cost effective