

SCIENCE TECHNICS SDN BHD

A BEGINNERS GUIDE TO INDUSTRIAL ENZYMES

Part II: A GLOBAL VIEW OF THE INDUSTRIAL ENZYMES MARKET

Background : In Part I we saw

- What are enzymes?
 - What are their properties?
 - How are they produced?
 - How do they work?
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- Thousands of tons of enzymes are produced
 - Sold as powder or as a liquid

Powder enzymes sold in boxes or drums



Liquid enzymes sold in Jerry cans or drums

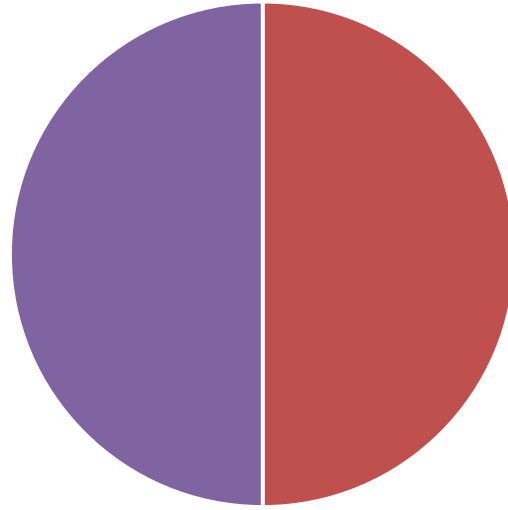


- In Part II we see where enzymes are used

SEVERAL THOUSAND ENZYMES EXIST IN NATURE

- ▶ Only about 2000 – 3000 have been characterized
- ▶ Only about 200 – 300 have been produced industrially
- ▶ Only about 20 – 30 are produced on a large scale
- ▶ 90% of industrial enzymes are
 - Amylases
 - Proteases
 - Lipases

ENZYMES MARKET



MEDICAL AND DIAGNOSTIC ENZYMES

- ▶ Typically sold in grams or less
- ▶ High price

INDUSTRIAL ENZYMES

- ▶ Typically sold in kilograms or more
- ▶ Lower priced

INDUSTRIAL ENZYMES

TECHNICAL ENZYMES

- ✓ Detergents
- ✓ Paper Production
- ✓ Paper Recycling
- ✓ Textiles
- ✓ Others



FEED ENZYMES

- ✓ Proteases
- ✓ Amylase
- ✓ Phytase

FOOD ENZYMES

- ✓ Starch based syrups
- ✓ Bread/Bun Production
- ✓ Biscuit Production
- ✓ Protein Hydrolysis
- ✓ Many others

DETERGENT INDUSTRY

- Proteases
- Amylases
- Lipases
- Mannanase
- Cellulase

PAPER AND PULP INDUSTRY

- Hemicellulase

PAPER RECYCLING

- Amylase

LEATHER INDUSTRY

TEXTILES INDUSTRY

➤ Cellulase

RUBBER INDUSTRY – Deproteinised Natural Rubber (DPNR)

GASOHOL – Alcohol enzymes

BIODIESEL - Esterase

NOTE: WASTE TREATMENT IS NOT ENZYMES

FERTILISER “ENZYME” IS NOT INDUSTRIAL ENZYME

ANIMAL FEED ENZYMES

- Proteases
- Amylase
- Phytase

FOOD ENZYMES

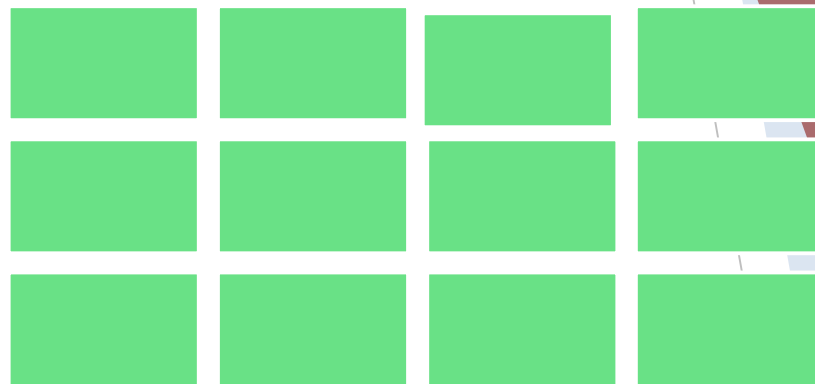
- Flour Mills
- Bread and Buns
- Biscuits
- Protein Hydrolysis – Soya Sauce
- Protein Hydrolysis – Hydrolysed Vegetable Protein (HVP)
- Breweries
- Alcohol Factories
- Sugar and Starch Syrups
- Enzyme Supplements
- Enzymes in Palm Oil Industry - Yield Increase
 - Enzymatic Degumming
 - Enzymatic Interesterification
 - 3 MCPD – R&D
 - Biomass Utilisation

STRUCTURE OF ENZYME INDUSTRY

Large Enzyme Producers



Small Enzyme Producers



Enzyme Formulators



Enzyme Users

