

BIOTECHNOLOGY

Aktieselskabet Grindstedværket has expanded their enzyme operation and formed a BioTech department. Plus-words to me. When I began research and development in their Aarhus facility they had already build a pilot plant in Grindsted for submerge cultivations of *Bacillus subtilis* and were planning a larger factory in Grenå, near the sea.

The *B. subtilis* strain excreted a heat tolerant alkaline protease useful as an additive in laundry detergents.

Main competitors were Kali-Chemie GmbH and Novo A/S.

Abstract of GB1344253 1344253 Detergents containing enzymes GRINDSTEDVAERKET AS 19 April 1971 [23 Jan 1970 2 Sept 1970] 3476/70 and 42018/70 Heading C5D Spherical free-flowing particles of an enzyme product for incorporation in a detergent composition, are produced by suspending a pulverulent enzyme or mixture of enzymes in a molten non-ionic surfactant at a temperature between 35 and 90 C. and solidifying the mixture in the shape of particles by spray-cooling. The enzyme mixture is preferably homogenized and spray-cooled under conditions such that the particles solidify while they are still airborne. The ratio of enzyme to surfactant is from 1 : 10 to 1 : 1. The preferred surfactant is an ethoxylated fatty alcohol of melting point 45 to 55 C. A dyestuff may be present. Specifications 1,156,238 and 1,204,123 are referred to.



Figure 1 Samden Milk Powder Factory, Aabenraa

Procter & Gamble - a large multi-national manufacturer of laundry detergents - began to add alkaline heat-tolerant protease to washing powders to cope with persistent blood stains. Other manufacturers copied.

The protease, however, did also attack human skin with adverse effect on factory workers and caused allergic reactions among end-users.

The whole industry was about to abandon washing enzymes. Saponja in Osijek promised to do the tests if I could come up with a solution.

Prilled Laundry Enzymes.

Non-ionic detergents are available in various viscosities from liquid to waxy substances. Secretly I prepared for spray-cooling a mixture of proteolytic enzyme and molten detergent wax. A cool winter day the first spraycooled prills were made in an open shed outside. In these spherical prills the enzyme was encapsulated reducing skin contact to a minimum. Being a detergent itself the wax did not really add cost to the preparation.

The prills did the trick. I got the necessary production capacity by renting a huge milk spray-tower from Samden, Aabenraa and modified it for the purpose.

We turned our total stock into prills and I even bought all in stock at Kali-Chemie, who eventually surrendered.

Unfortunately we were not able to take the market as we were short of enzyme and the factory in Grenaa was not ready yet. This gave our last competitor Novo enough time to develop his own coated granules.