

## **ZEOLITES - SPECIAL MATERIALS WITH DIVERSE APPLICATIONS**

Zeolites are abundant in nature and were first described by the Swedish amateur mineralogist Baron von Cronstedt in 1756. Chemists have classified approximately 50 natural and more than 200 synthetic zeolites. A common property of all zeolites is their ion exchange capability. On the basis of this characteristic, zeolites were first put to industrial use in the sugar industry in 1896. In the 1920s, the adsorptive capacity of zeolites in separation processes led to the name "molecular sieve" being used as a synonym for industrially produced zeolites.

In the 60s, the catalytic properties of zeolites for petrochemical processes, especially the fluid catalytic cracking (FCC) process, were discovered. Today, around 300,000 tons of synthetic zeolites are being used annually in catalytic and adsorptive applications. In addition, a further 300,000 tons of natural zeolites per annum are being used in waste water treatment, in soil improvement, as an animal feed additive and as cat litter as well as (its largest use) in laundry detergents.

On the threshold of the new millennium, the attention of the detergent industry is focused on delivering against four challenges:

- Economics
- Safety and Environment
- Technology
- Consumer Requirements

To a large degree, the aforementioned challenges dominated the development of detergents in the 1980s and 90s. Zeolite, originally designed as a phosphate substitute for purely ecological reasons, increasingly had to meet the demands imposed by modified detergent composition and production technologies. In particular, the trend towards compact detergents increased the demand for builder systems with a high adsorption capacity for liquid components, especially for surfactants. Zeolite A, introduced approximately 20 years ago, proved to be a good carrier for surfactants and in the 90s advanced to become the builder leading to compact and supercompact detergents. Nevertheless, the market demanded further improvements. The manufacturers of detergent zeolites responded to the demand for higher standards of performance and processing by developing new grades of zeolite. These include the zeolites of types P, X and AX, which have all recently been introduced into the market

## **ZEOLITES - SAFE FOR HUMANS AND THE ENVIRONMENT**

### **KEY FEATURES OF DETERGENT ZEOLITES**

- robust builder performance under a wide range of conditions
- high product stability and ease of processing
- high liquid absorption capacity
- new zeolite qualities with better builder properties and improved liquid uptake,
- particularly suitable for non-tower processes (supercompacts, tablets)
- safe for humans and the environment
- peer-reviewed and approved LCI-study
- free of legislative restrictions
- wide acceptance by detergent manufacturers and consumers

### **TOXICOLOGICAL AND DERMATOLOGICAL SAFETY OF ZEOLITES**

Zeolite has undergone intensive toxicological studies and has been shown to be non-toxic in living organisms. In particular, no allergenic or irritancy potential was identified upon skin contact or inhalation... and no acute systemic toxic properties if swallowed, after dermal contact or upon inhalation. Potential residues on textile fibres which might contain zeolite therefore pose no hazard to the consumer. This has also been demonstrated in controlled exposure tests with zeolite-based detergents.