Integrity
MUNICIPAL SYSTEMS


**SLAKER**
CASE STUDY

# Lime Slaker System from Integrity Municipal Systems Provides Consistent Milk of Lime Concentrations for Producing High Quality Food-Grade Calcium Phosphates at Aditya Birla Chemicals (Thailand)

In Thailand, the Aditya Birla Chemicals (Thailand) Ltd. (ABCTL) Phosphates Division facility plays a pivotal role in the regional chemical industry. With an extensive array of top-quality food-grade phosphates and specialty chemicals, the facility serves as a crucial chemical supplier to diverse sectors, including the food industry as well as industrial applications.

ABCTL has historically utilized a traditional detention-type lime slaker to produce lime slurry for the saponification process of allyl chloride into epichlorohydrin. However, it experienced issues trying to produce high concentration milk of lime using this technology. Despite working with various calcium oxide suppliers to address the shortcomings of the slaking method, converting calcium oxide to calcium hydroxide continued to pose many challenges. The facility faced limitations in producing high-concentration milk of lime within the 13-15% range, and efforts to increase concentration were unfruitful. In an attempt to compensate, ABCTL installed water heating systems to improve the slaking reaction, but this only resulted in high steam production.

In 2021, ABCTL initiated a project to manufacture food-grade calcium phosphates which required a high lime concentration and consistent, highly reactive milk of lime. Using the detention-type lime slaker, however, proved inadequate for meeting these requirements, resulting in a lack of operational consistency. Seeking a solution, ABCTL turned to Integrity Municipal Systems LLC (IMS), which proposed its unique A-758™ paste-type lime slaker

system. With the capacity to consistently produce high-concentration and highly reactive milk of lime, the system would effectively resolve ABCTL's operational issues.

Paste-type lime slakers utilize a 2:1 water-to-lime slaking ratio for both slaking lime as a paste and achieving the complete slaking reaction ($CaO + H_2O \leftrightarrow Ca(OH)_2$ + heat). This ratio provides several benefits over the 4:1 water-to-lime ratio employed by traditional detention slakers. These benefits include reduced power requirements, faster slaking, a smaller footprint, and, most importantly, a more reactive lime slurry solution that results in lower chemical costs for ABCTL.

The IMS A-758™ lime slaker maintains paste consistency through a mechanically actuated, torque-controlled water valve which regulates water flow to the slaking reaction chamber. Using a gear reduction unit to drive the slaker mixing paddle shafts and maintain a specified torque, the system can respond to changes in the paste viscosity. When torque increases (due to thicker paste), the water valve opens to admit more slaking water. Conversely, when torque decreases (due to thinner paste), the water valve closes, reducing water addition and thus thickening the paste. The desired lime paste viscosity can be adjusted by altering the spring compression between the gear reducer and the water control valve.

The IMS A-758™ lime slaker system was shipped to ABCTL in September 2022 and commenced operation in December 2022. Now that it's utilized at ABCTL's Phosphates Division facility, the system can process up to 4,000 lbs./hr. (1,800 kg./hr.) of quicklime (CaO) and yield lime slurry concentrations of up to 20%. This system has numerous features that enhance system reliability, accessibility, quality, and performance while also reducing maintenance needs. These features include:

- Stainless steel material construction of the feeder, slaker trough, grit remover, and control panel for increased corrosion resistance.
- A robust, heavy-duty, variable-speed volumetric screw feeder with just five moving parts for easy maintenance and servicing.
- A two-level, screen-type grit remover for consistently reducing grit and producing high concentration milk of lime.
- A modular dust arrestor and spray bar that can be easily removed for cleaning and maintenance.
- A dust arrestor venturi fan and damper for improved steam and dust removal.
- Clean-out ports for the water weir and slaker bottom for ease of access to the slaking chamber.
- A torque-based mechanical water control valve for accurately and consistently achieving desired slurry concentrations.

*"We are having a wonderful experience with "Integrity Municipal system" company. Mr. Georgios is always keeping in touch with us and providing the status to us. We are quite confident this unit will perform to our expectations."*

**- Natarajan Kulandaivelu, Joint President**
Aditya Birla Chemicals (Thailand) Ltd - Phosphates

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