

Issue Highlight: Air Effluent Control

Rotabed scrubber: One way to meet Cluster Rules in the bleach plant

The so-called Cluster Rule promulgated by the US EPA at the end of 1997 seeks to legislate control of both air and water emissions under one, all-encompassing regulation.

With proper design and application, Cluster Rule requirements can be met easily and economically on modern kraft bleaching sequences using fluidized bed gas scrubbing technology such as the Rotabed™, a product of Bionomic Industries, Inc., Mahwah, NJ.

According to Bionomic, the primary reason for the success of the fluidized bed scrubber is that it can handle bleach plant emission surges.

The performance of the Rotabed unit is based on the Coriolis Effect which causes the fluidized bed to rotate slowly which imparts stability to the fluidized zone, Fig. 1. The Coriolis Effect, being a natural result of the Earth's rotation is free in that it requires no man-made energy to occur.

Contaminated gas and particulate matter enter at the gas inlet and flow upward while scrubbing liquid is introduced through the scrubbing liquid distributor.

A stationary Coriolis swirl

inducer with gas turning vanes and liquid drain sleeve imparts an angular component to the up-flowing gas and a vortex swirl to the draining liquid to rotate the bed. The Rotabed scrubber's pack-less design uses simple, conical, open grids to form and control the fluidized zone. Fully open, straight pipe liquid inlets with no spray nozzles to plug or bind are used to introduce the scrubbing liquid above the grid at less than 5 psig.

The rotating zone produces violent mass transfer. The resulting high gas throughput with low pressure drop and enhanced scrubbing action produces the most efficient mass transfer and particulate capture possible, says Bionomic.

Clean air leaves through the gas outlet and absorbed toxic contaminants and trapped particulate matter self-drain into the scrubber's sump.

The grids may be made of alloy, CPVC or, in some bleach plants, titanium grade 2. The vessels are typically made of glass-fiber reinforced plastic with a double Nexus interior surface veil and vinyl-ester resin system.

The Rotabed can operate at gas velocities of 16 to 30 ft/sec without efficiency loss. Another feature of the

Rotabed system is that it can use various scrubbing liquors including Eo filtrate, the extraction stage effluent. The Eo usually contains residual fibers that can plug a fog spray, packed or tray tower as used in some conventional systems.

Since Eo usually has some residual oxidant (such as peroxide) or caustic in it, some mills use the Eo as a scrubbing stream. The Eo must have sufficient available alkalinity to neutralize the absorbed chlorides.

Testing at Finch Pruyn and other mills showed that the scrubbing liquor must also have a reducing agent or residual lignin to reduce the chlorine dioxide to chloride ion.

Bionomic says that a Rotabed scrubber requires less installation space than other types; it has a 6-ft. maximum diameter and a 28-sq-ft area. Other features include a 600% absorption efficiency per unit volume compared with packed scrubbers and removal efficiencies greater than 99%.

• Bionomic offers a pilot rental program through which clients may rent a ski-mounted unit for on-site testing. Up to 25% of the weekly rental cost can be applied to later purchase of a Rotabed scrubber. **PI**
Bionomic Inc.

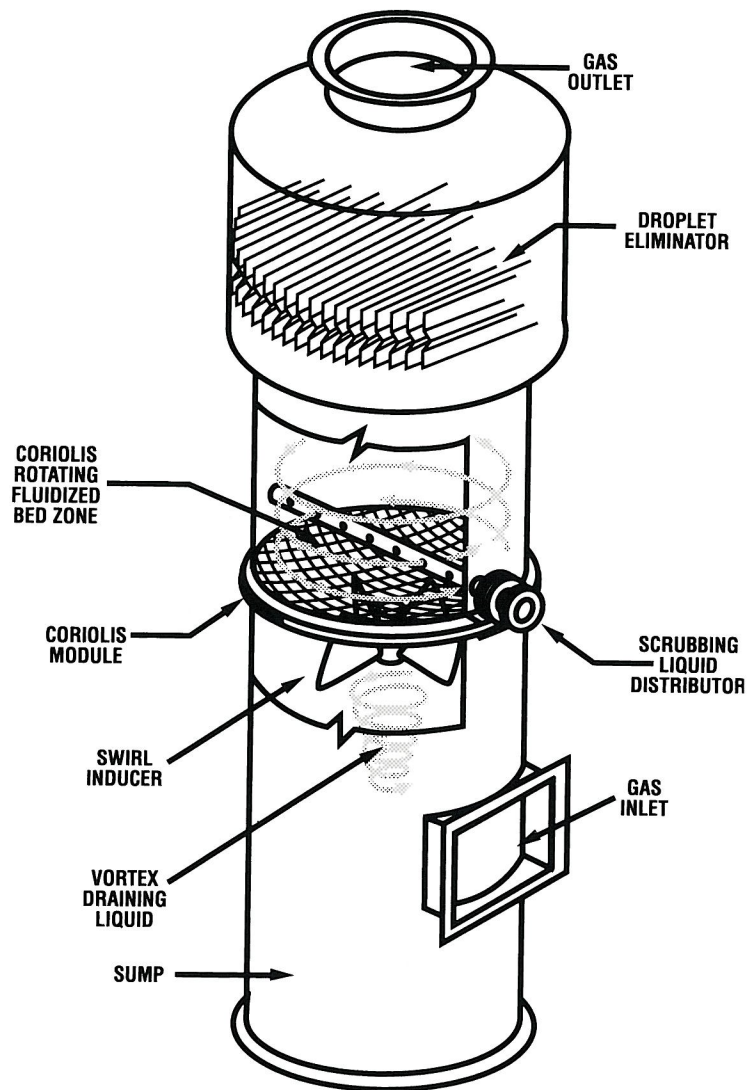


Fig. 1. This cut-away view shows the Coriolis module in the Rotabed fluidized bed scrubber.