



## Quench Tower Simulation

### *Accurately Model TGU Quench Operations*

A quench tower is a cooling tower that achieves liquid or gas cooling by direct contact between the phases. Cooling results from evaporative or transpiration cooling as well as by sensible heat transfer. In a quench tower, some of the liquid vaporizes and transfers the heat associated with sensible cooling into latent heat of vaporization. This is a form of humidification operation which, in engineering, is recognized as a fairly difficult calculation to make.

Quench towers may be spray-type devices but usually they contain internals. The internals are always packing, either a very large crimp structured type of packing or very large random packing such as Raschig Rings. This is called film contact because the liquid runs over the packing as a film. Alternatively, splash contacting can be done using a drip grid type of packing.

ProTreat® is extremely well suited to simulating quench towers because of its strict mass and heat transfer rate basis. In a TGU Quench tower, hot gas from hydrogenation is directly contacted with the cooling water running over the packing. The **cooling rate is actually controlled by water evaporation and condensation rates**—sensible heat transfer plays a relatively *minor* role. In fact, water evaporation and condensation rates are controlled by the gas-phase resistance to the transfer of water between the gas and the water surface. Evaporation occurs in the tower bottom section while water condensation takes place in the top. Ammonia and SO<sub>2</sub> slip can be accurately modeled to predict sour water bleed disposition, solution pH, and contaminants slip into the downstream amine system.

ProTreat models the process using gas and liquid resistances to mass *and heat* transfer together with the interfacial contact area. These quantities are unique to the packing type, size, and material, allowing ProTreat to predict quench tower performance with high level of accuracy.

**Optimize your design and build a plant you can be certain will perform as expected**



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