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Robust and cost-efficient inline process monitoring in hydrofluoric acid alkylation units

LiquiSonic® inline analyzer continuously measures the hydrofluoric acid strength, water content and concentration of acid soluble oils

In petroleum refining, hydrofluoric acid alkylation units play an important role in order to produce high-octane gasoline. The alkylation involves the conversion of byproducts into iso-octanes, while hydrofluoric acid (HF) is used as a catalyst. For safety and efficiency reasons, processes in hydrofluoric acid alkylation units require a continuous monitoring. Using process analyzers, the detection of contaminants such as water or acid soluble oils in the feedstocks, the production of optimum product quality with minimum hydrofluoric acid consumption, and the risk mitigation of acid runaways, corrosion and leaks are possible.

SensoTech, the German manufacturer of process analytical technology, and the experts of the U.S. company HF Alkylation Consultants jointly developed an innovative solution for process monitoring: The LiquiSonic® 40 HF inline analyzer. The measuring system consists of two sensors and one controller, and sets new standards in terms of reliability, robustness, cost-efficiency and user-friendliness. The sensors are installed directly into the existing main pipe of the alkylation unit and simultaneously measure in the process stream the hydrofluoric acid strength, the water content and the concentration of acid soluble oils. The measurement accuracy is ± 0.05 wt% and the installation does not require a bypass. For the inline concentration measurement, a sonic velocity sensor and a density sensor are used, that are Ex-certified and made of corrosion resistant material (Hastelloy C276). The rugged design has neither moving parts nor windows to the process, so the sensors operate maintenance-free. The analyzer provides stable measurement results. Drift-free. And updated every second.

The real-time information will be provided online to the process control system. The LiquiSonic® controller visualizes and stores the data completely. Installing and operating the controller can take place in a safe area. Remote access options allow the operation from the laboratory or the PC at the workplace, for example. Via 4-20 mA, digital outputs, serial interfaces, fieldbus or Ethernet, the controller can be integrated into the network and process control system.

With the inline concentration measurement directly in the process, engineers as well as the control system are able to recognize deviations from reference values immediately, and so countermeasures can be taken in time. This reduces risks and improves the unit's operation stability. Compared to alternative analytical techniques such as laboratory analysis or atline analyzers, the inline analysis provides better response times and higher safety standards. Furthermore, the LiquiSonic® inline process analyzer involves lower investment costs and no risk of leakages in contrast to atline systems. The LiquiSonic® technology presents an asset in refining operations, because it demonstrates how simple and cost-efficient the monitoring of hydrofluoric acid alkylation processes can be with maximum safety and long-term stability.

For over 25 years SensoTech has been focused on the development, manufacturing and sales of inline analysis systems for process liquids. With worldwide installed, highly precise and innovative measuring systems for monitoring of concentrations, compositions and changes of chemicals as well as properties directly in the process, SensoTech has significantly contributed to the enhancement of the state of the art. In addition to the measurement of concentration and density, the phase interface detection as well as the monitoring of chemical reactions like polymerization and crystallization are typical applications. SensoTech inline analyzers set standards in the technological and qualitative valence, user friendliness and reproducibility of process values. Special calculation methods and sophisticated sensor technologies enable reliable and precise measuring results even under the most difficult process conditions.

The knowledge and the experiences of the highly motivated and committed SensoTech staff are the result of many different applications supported by well-known customers from the chemical and pharmaceutical industry, food technology, semiconductor technology, automotive and metal industry as well as many other industries. In addition, these experiences also open up unimagined solution possibilities for new measuring challenges.

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