Monitoring sulfuric acid and oleum strength with only one measuring device

Inline measurement with real-time data

Monitoring sulfuric acid and oleum strength (wt%) directly in the process enhances the safety and efficiency of the plant. In comparison, manual sampling is time-consuming, risky and may result in significant deviations across operators. Additionally, common laboratory analysis only provides information during random checks. With inline analyzers, the process is continuously monitored in real-time; time delays and imprecise values are things of the past.

In the production processes of several industries, including chemical, petrochemical and mining, highly concentrated sulfuric acid is commonly used and must be precisely measured. The analysis of sonic velocity (figure 1) generates a clear signal in the concentration range of 80 to 100 wt% H₂SO₄ and provides reliable process information. SensoTech’s® LiquiSonic® technology is based on sonic velocity measurement and provides clear and stable measuring results with an accuracy of up to 0.03 wt%.

It is often necessary to measure sulfuric acid and oleum (SO₃ in H₂SO₄) at the same measuring point, i.e. in the production of oleum. Here, SO₃ gas is absorbed by highly-concentrated sulfuric acid. For this measuring task, SensoTech is able to provide an appropriate solution. Apart from H₂SO₄ monitoring with LiquiSonic® sonic velocity analyzers, the oleum strength can be monitored by incorporating a second measurement technology, such as a density measurement. Figure 2 shows the dependence of sonic velocity and density on the sulfuric acid and oleum concentration. By analyzing both measuring parameters, the sulfuric acid and oleum strength can be monitored inline with only one measuring device.

Applications of sonic velocity analyzers include, sulfuric acid and oleum production, alkylation, oil refining, syngas drying, fertilizer manufacturing, mineral processing or etching and pickling baths. The LiquiSonic® sensors are robust, maintenance free and with optional special materials, like Hastelloy C2000 or tantalum, offer long process life. The installation is done directly into the existing pipe or vessel. The measuring results are updated every second, and if the measuring values exceed or fall below critical process thresholds, a signal can be sent immediately to a control system, via 4-20 mA.
signal, digital outputs, fieldbus or Ethernet, thus ensuring timely countermeasures can be initiated. This real-time information significantly increases work environment safety, product quality, and reduces costs caused by acid wastage and failed production. Companies using the LiquiSonic® technology for online sulfuric acid and oleum measurement are, AkzoNobel, BASF, DuPont, Dow, Honeywell, Merck, and many more.

Image subtitles
Figure 1: The LiquiSonic® analyzer by SensoTech monitors precisely the sulfuric acid and oleum strength providing the data online and in real-time.
Figure 2: Monitoring sulfuric acid and oleum strength with only one measuring system, through combination of sonic velocity and density.

Attachment
Image files
Figure 1: G2440_01.jpg
Figure 2: G1923_01_02.jpg
SensoTech:
For more than 25 years SensoTech has been focused on the development, manufacturing and sales of inline analyzer systems for process liquids. With a worldwide install base, SensoTech has significantly contributed to the enhancement of the state of the art by supplying highly precise and innovative measurement systems for monitoring concentrations, compositions and reactions directly in the process. In addition to the measurement of concentration and density, 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 experience of highly skilled and committed SensoTech staff are the result of various applications with 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, this experience opens up unimaginable solution possibilities for new measuring challenges.

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