RHEOLOGY

Rheology is the science of the flow of matter. Applications may include pipeline transportation, ore beneficiation, autoclave feeding and operation, solid/ liquid separation processes, heat exchanger design, etc. rheology testing is imperative for capital - intensive unit operations that are mass - and/or energy-transfer based.

SGS uses state-of-the-art rheological testing equipment and procedures to test a wide variety of ore, waste and chemical process slurries. The SGS rheology team provides this service globally from two fully equipped and staffed laboratories located at our Canadian and Australian facilities.

EXPERIENCE

- Rheology testing using standardized operating equipment
- Design and development of specialized testwork
- Data analysis by a number of mathematical models
- Recommendation of plant operating procedures
- Preparation of design criteria for mineral and metallurgical processes as well as for equipment sizing

WHAT RHEOLOGY CAN CONTRIBUTE TO A PROJECT

- We obtain rheology data early in a project to determine the most suitable unit processes for a project to ensure proper allocation of resources.
- SGS data interpretation leads to the selection of accurate process rheology design criteria
- Compared to any commercial or corporate laboratory, SGS has the most comprehensive rheology database for minerals and metallurgical materials.

BENEFITS OF RHEOLOGY

- A thorough rheological understanding of any slurry system is needed because flow properties influence the economics of any continuous operation involving slurries.
- Accurate test results are consistently achieved through detailed rheological characterization of samples using test protocols established over a number of years.
- Proper data interpretation leads to the selection of accurate process rheology design criteria and to solutions to project challenges.

SGS CAPABILITIES

- Our project experience includes rheology of mineral and mining materials, pulp and paper, industrial minerals, waste disposal, oil sands, industries, etc.
- We are the only commercial laboratory that routinely performs rheological studies of high temperature slurries (200°C).
- We are an independent third party laboratory which may be utilized for assessing equipment performance and suitability for targeted applications

- We can integrate rheological studies on a project-specific basis. While we can do rheology studies on a stand alone basis, we have the depth of expertise to integrate process, environmental, analytical and mineralogical testing thus ensuring your success.
- Our on-line viscometry testing can be used to determine the viability of measuring systems for use in mineral, metallurgical and chemical process environments.

EQUIPMENT

- Concentric cylinder rotational viscometers (CCRV).
- Pilot - scale mixing equipment.
- Vane sensors for high yield-stress applications such as tailings paste disposal, thickened laterites, thickened bauxitie feeds, etc.
- High-precision torque measurement using calibrated vessels and impellers are applied to the measurement of rheological properties of unstable, fast settling slurries. Our testing protocol includes a "ready-to-use data reduction package" that can

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also be customized to meet project-specific requirements.

- Small and large-scale pump loops measure friction pressure losses in extreme situations such as long distance transportation of high-density slurries and pastes or coarse slurries.

TYPICAL APPLICATIONS

- "Rheological mapping" is the newest trend in commercial metallurgical testing, The processing risks are practically eliminated in the plant design stage where low-cost rheology data can be integrated into due-diligence studies. Examples in both gold and laterite processing have been completed.

- Rheology data is used both for reaction monitoring and control, as well as for traditional engineering design. Examples include slurries originating from a wide spectrum of industries, such as cobalt, nickel, magnesium, zinc, copper, etc. Typical processes include pressure leaching, paste production, hydroxide precipitation from leach solutions.

- High temperature rheology testwork can be applied to heat exchanger design. The rheology data produced is critical for the design of the indirect heat exchange systems involving lateritic autoclave feed slurries.

- "Traditional applications" for our rheology testwork include pumping of tailings, and concentrates, paste characterisation, slurry handling, screening, liquid-solid separation.

PROJECT WORK CONSIDERATIONS

A significant number of rheology projects have been completed to date. Testwork has focused on:

- Rheological characterisation of individual and composite ore slurry samples. "Rheological mapping" is the newest trend in commercial metallurgical testing, especially in areas such as laterite and gold processing. The net advantage of this approach is that the processing risks are practically eliminated. Hence, low-cost rheology data can be integrated in the project due-diligence studies from the start;

- Process rheology testwork involving chemical slurries containing various sludges, precipitates and reacting components. This testwork category deals with measurements in reacting systems. The data can be used both for reaction monitoring and control, as well as for traditional design criteria. Examples include hydrometallurgical slurries originating from a wide spectrum of industries,

such as cobalt, nickel, magnesium, zinc, copper, etc. Typical processes include pressure leaching, jarosite paste production, mixed hydroxide precipitation from lateritic leach solutions, etc;

- High temperature rheology testwork for application to heat exchanger design. The rheology data produced is critical for the design of the indirect heat exchange systems involving lateritic autoclave feed slurries;

- "Traditional applications" for our rheology testwork include pumping of tailings and concentrates, paste characterisation, slurry handling, screening, liquid-solid separation.

CONTACT INFORMATION

Email us at minerals@sgs.com
www.sgs.com/mining

WHEN YOU NEED TO BE SURE

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