

CHLORINE DIOXIDE ANALYZER

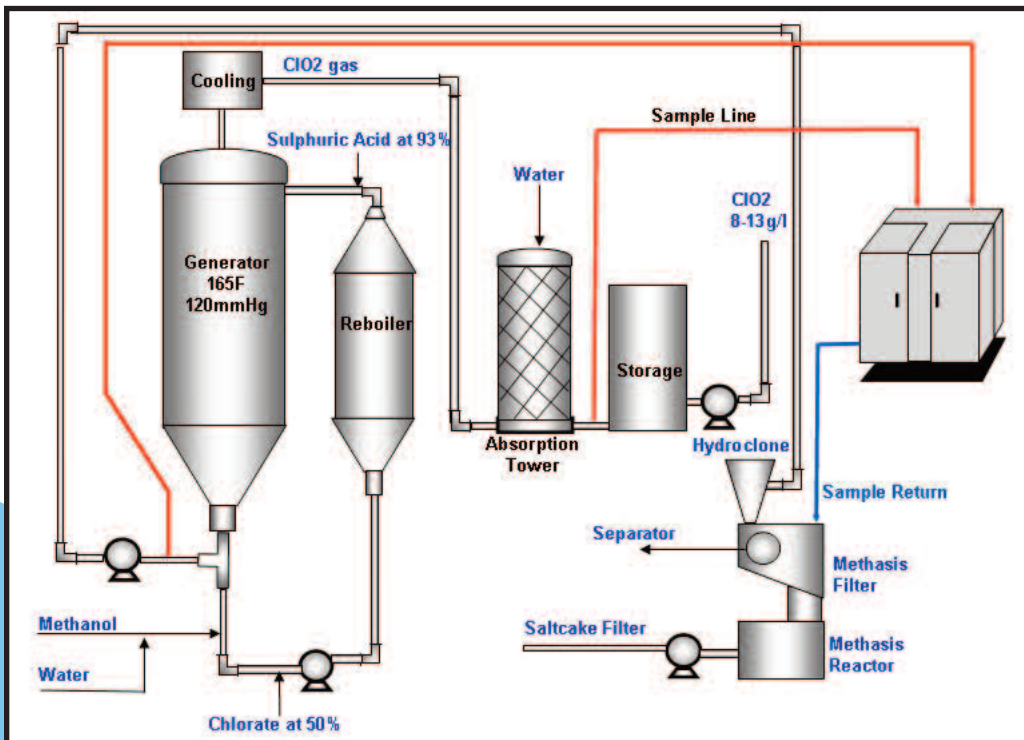
The DURALYZER-NIR Online Analyzer for Chlorine Dioxide Plant

THE CLO₂ PLANT CHEMICAL ANALYZER provides a reliable and accurate analysis of the critical chemicals in the R-10 (Solvay) process, with measurements every 5-10 minutes.

In this particular process the overall Chemical Reaction formula is:



In a typical manual control scheme the ClO₂ Production rate is controlled by the amount of Methanol feed to the Generator. By using look-up tables, the Chlorate and Sulphuric Acid feeds are adjusted by the plant operator. As the Chlorate and Acid concentration vary among any other process variables, the Generator outlet chemical composition is tested in the lab typically every 2 hours. The goal is to maintain Chlorate concentration Molarity at 1-4 and Acid concentration at 7-10-Normal. The make-up chemical feeds are adjusted accordingly based on the lab results. However, this very slow sampling frequency and the required production rate changes result in poor efficiency and chemical losses, especially for the expensive chlorate. The final control function is the water addition to the ClO₂ Absorption Tower in order to maintain a constant, desired ClO₂ concentration.



THE UNIQUE DESIGN of this system and materials used have proven themselves in several other difficult Kraft Pulping and Recovery applications to be practically maintenance free, physically small and portable with easy installation and low installed cost.

CHLORINE DIOXIDE PLANT ADVANCED CONTROL TECHNOLOGY

Chlorine Dioxide (ClO₂) is the most important bleaching agent in the pulp and paper industry for Elemental Chlorine-Free (ECF) bleaching. Different bleaching sequences must be used in the production of various pulps. This depends on the pulping process used, the residual lignin content of the pulp, and the target brightness. Key goals at most pulp mills include the optimization of reaction efficiency of ClO₂ generators, the proper dosage of chlorine dioxide, and improving the control of vent-gas scrubbers to reduce chlorine dioxide emissions into the atmosphere.

Reliable and accurate chemical analysis of the ClO₂ generation process is important for optimizing the efficiency and chemical consumption of it. Due to the complexity of this process, the Chlorate and Sulphuric Acid levels in the Generator need to be constantly monitored, after which an advanced control algorithm can then be fairly easily implemented. Even a small improvement in reducing the variations inside the Generator will result in a rapid payback from the DURALYZER-NIR based Advanced Control System.

Advanced Control is required for optimum performance of the generator due to reverse relationships of the main chemicals Sodium Chlorate and Sulphuric Acid. Due to the complex relationship between the three main chemicals, Model Predictive Controller (MPC) is used to control Methanol flow addition and set point correction to H₂SO₄ flow.

Benefits of Optimizing the ClO₂ Plant:

- Lower Chemical Consumption
- Reduced Cost
- Increased Plant Safety
- Reduced Environmental Impact
- Better Bleaching Quality due Reduced Variability

