

MONITORING OF OXYGEN IN PHARMACEUTICAL AND SPECIALTY CHEMICAL REACTORS



Process

The manufacturing of prescription, non-prescription drugs, and anaesthesia often takes place in several phases and in different types of plants. Often times the pharmaceutical company will classify their own plants as a pharmaceutical plant (where the actual drugs are manufactured) and a chemical plant (where the specialty chemicals are prepared for use in the pharmaceutical plant). It is the latter where these companies prepare the specialty chemicals used to manufacture the end product.

Application

Specialty chemicals are manufactured in a batch process by mixing several ingredients including solvents and powder in a sealed tank reactor with a mixer. The ingredients within the reactor are often highly corrosive chlorinated compounds mixed with solvents and the tank materials range from stainless steel and glass lined, to Hastelloy C. Along with being highly corrosive, the vapours that occupy the headspace between the top of the reactor and the liquid level are highly flammable and for this reason a Nitrogen purge is used to assure the mixture of air

and solvent vapours stays below flammable levels. The purge is usually intermittent and when the Oxygen concentration gets to 5%, the purge is activated until the concentration drops back to safe levels. By maintaining the Oxygen concentration below 5%, the operator can assure that the process is operating safely.

Solution

The Servomex 1900 and Sample System are ideally suited for monitoring Oxygen levels in reactors.

The 1900 analyser uses a non-depleting fail-safe, paramagnetic measuring cell which provides a fast response measurement (typically <5 seconds) and is largely unaffected by changes in background gases. The analyser has a solvent resistant cell, which is not contaminated by solvent laden samples and is extremely stable (typically only requiring a calibration once every 3 months). The 1900 can be used in European ATEX Ex 11 2G and US Class I, Division 1 areas without the use of a purge and can be calibrated without the need of a "hot work permit". The 1900 has a rugged IP66/NEMA 4X enclosure to protect the analyser's electronics from dusty and/or corrosive atmospheres.

The 1900 has dry contacts that can be used as concentration alarms. When the customer programmed high Oxygen concentration levels are reached, the relay contact opens and initiates the Nitrogen purge until the Oxygen concentration returns to safe levels. This not only assures safe operation, but also saves on Nitrogen consumption as the purge is activated only when Oxygen levels are high.

The principle advantage to the 1900 is that, unlike analysers using electrochemical type sensors, the measuring cell does not require programmed replacement. In the case of a measuring cell failure, the analyser's 4-20mA and alarm contact outputs can be configured to indicate a sensor failure. This fail-safe feature allows the operator to have confidence that the cell is operating unlike electrochemical cells that by principle of operation only produce a signal in the presence of O₂. If there is no signal produced by the electrochemical cell this can mean 1 of 2 things:

The reactor is sufficiently purged and there is no O₂ present in the sample or

The cell has failed, thus potentially leading the operator to believe that he or she is operating under a safe condition when potentially he or she is operating in a dangerous condition; without an analyser.

Since the sample is highly corrosive in most cases, it must be carefully designed to handle such aggressive components as Hydrochloric Acid. The system is typically manufactured out of Teflon or Hastelloy C components to assure long term reliable operation with minimal downtime. Certain reactors with high levels of pharmaceutical powders require a system with a sintered Hastelloy C probe with provisions for on-line Nitrogen blowback to keep the probe from clogging. The system can be supplied in a NEMA 4X Stainless Steel or Fibreglass enclosure with a corrosive gas purge which maintains the enclosure free of corrosive gases that may be present in the atmosphere.

Visit www.servomex.com for technical data sheets, application and technology information for all Servomex analysers.

Servomex has a policy of constant product improvement and therefore reserves the right to change specifications without notice.



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