ROYCE TECHNOLOGIES

APPLICATIONS BULLETIN

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Measuring Dissolved Oxygen in Gold Leaching Processes

Gold (Au) and other minerals are commonly extracted from ore bodies using a chemical leaching process. This process is chemically simple, but the cost of chemicals, particularly Sodium Cyanide (NaCN), is high. To minimize the consumption of this leaching chemical, and yet maintain an economic yield, it is important to ensure sufficient dissolved oxygen is available during the reaction, as oxygen (O2) is necessary for the reaction to occur. One mole of O2 is required for every 2 moles of Au present.

In gold leach circuits, the oxygen for the reaction comes from either a tanked source or the atmosphere. The air is directed into the leaching solution, released as small bubbles so that it can dissolve into the leaching solution. Not all of the oxygen is used solely for AU dissolution, as the majority is consumed by iron and sulphur in the process.

To ensure adequate oxygen for the gold leaching process, the dissolved oxygen must be continuously maintained at approximately 7 parts per million. At the same time, the NaCN must be maintained at a ratio of 6:1 over the amount of oxygen present.

Attempts to raise the dissolved oxygen concentrations above levels typically required in gold leaching process circuits may not only be wasteful, but even detrimental. Excess oxygen may oxidize cyanide, generate cyanocides and/or passivate the gold by coating it in sulphide oxidation products.

In sulphide rich gold ores very low dissolved oxygen concentrations are optimal for a successful process. Galvanic coupling of the gold and the sulphide minerals provides the gold with an enormous cathodic surface area. The optimal cyanide:oxygen ratio will increase as the available cathodic surface area increases.

Royce dissolved oxygen sensors, using 2 or 5 mil membranes are very common in the gold leaching industry. The thicker membranes and rugged sensor bodies (made of urethane epoxy and stainless steel) guard the sensor against excessive sensor and membrane wear.

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