SOLVAY

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ACORGA® OPT Series Solvent Extraction Reagents

Mining Chemicals

For more copper, try a better extractant

If your organic inventory consists mostly of an aldoxime/ketoxime mixture, converting the extractant formulation will substantially raise the efficiency of your circuit. Switching to a properly optimized reagent formulation – a modified aldoxime/ketoxime blend – can generate a significant increase in copper production and higher return on your investment.

SOLVAY'S BREAKTHOUGH IN MODIFIED ALDOXIME/KETOXIME BLENDS

To enable SX operations to realize the benefits of a correctly optimized organic, Solvay developed ACORGA® OPT series solvent extraction reagents. These reagents are aldoxime/ketoxime blends that include an equilibrium modifier to optimize the blend's aldoxime component. The result is a more versatile aldoxime/ketoxime extractant formulation that helps SX plants improve the metallurgical performance over their existing unmodified extractant.

ACORGA® OPT series solvent extraction reagents are effective over a wide range of conditions. They are especially suitable for:

- Lower feed grades
- Higher PLS pH
- Lean electrolyte grades of 30–40 g/l Cu
- Acid concentrations of 150 g/l

Compared to unmodified aldoxime/ketoxime products, a modified aldoxime/ketoxime blend improves metallurgical performance in many ways:

- Increases copper transfer
- Improves Cu/Fe selectivity
- Copes more efficiently with variations in leach and electrolyte solutions
- Reduces drop-off in recovery with variations in operating conditions

LIMITATIONS OF AN UNMODIFIED ALDOXIME/KETOXIME MIXTURE

Aldoxime is a strong extractant, with rapid kinetics and high selectivity, but it does not strip readily. To improve its stripping capacity, it needs to be modified. A modifier, however, even as it increases the oxime's strip potential, can reduce its extracting potential. Therefore the ratio of modifier to aldoxime needs to be carefully calibrated according to circuit conditions.

Ketoxime also has suitable transfer abilities for some situations, but suffers from low extraction strength. Because of its stripping ability under certain conditions, reagent suppliers sometimes mix it with aldoxime under the assumption that it acts as a chelating modifier. However, ketoxime is not a chelating modifier. It does not optimize the aldoxime portion of the mixture and does not shift its extraction/stripping equilibrium. Thus, any copper transfer is the result of ketoxime and aldoxime acting independently of each other within the mixture. Finally, aldoxime/ketoxime mixtures exhibit poor selectivity.

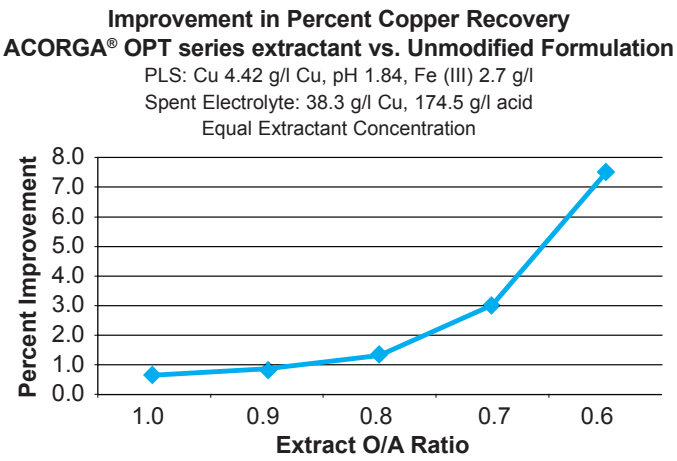

Figure 1. Higher Copper Recovery from Modified Blend

TRIALS VALIDATE SUPERIOR COPPER TRANSFER PROPERTIES OF ACORGA® OPT SERIES REAGENTS

Trials have demonstrated the superiority of OPT series solvent extraction reagents – under a variety of conditions – in copper transfer, selectivity and physical performance. ACORGA® OPT series solvent extraction reagents transferred significantly higher amounts of copper at different O/A ratios, as compared to a commercially available unmodified aldoxime/ ketoxime mixture when tested at equivalent extractant concentrations (See Figure 1). The differences can become even more significant for lower-strip acid conditions – at 150 gpl electrolyte acid, % Cu recovery is 1.5-15% higher for the modified aldoxime/ketoxime as compared to the unmodified version.

COPPER/IRON SELECTIVITY

In most plants, Cu/Fe selectivity is important to minimize electrolyte bleed requirements. The presence of a modifier in the ACORGA® OPT series reagent significantly improves its Cu/Fe selectivity. The organic copper and iron loadings on extract isotherm points show the extent to which the modifier increases the blend's selectivity. As Figure 2 shows, at the maximum copper loading of approximately 97.5%, ACORGA® OPT series solvent extraction reagent loads 64% less iron than the competition.

PHYSICAL PERFORMANCE OF MODIFIED EXTRACTANTS

Successful SX operations in North and South America that have converted from aldoxime/ketoxime mixtures have reported significant improvements in physical performance. Lower organic losses, lower aqueous entrainment, better phase separation behavior, and improved ability to handle solids in the solutions have significantly reduced operating costs. More importantly they have allowed plants to more efficiently use their SX plant capital investment to increase Cu production using the same equipment.

MODIFIED REAGENTS GAIN ACCEPTANCE WORLDWIDE

Recognizing the benefits of modified reagents, SX plants world-wide have been discarding old habits and shifting their attention to these reagents. As Figure 3 shows, global use of modified aldoxime reagents grew over the last ten years. The proven efficacy of modified reagents ensures that this trend will continue.

Those operations which have not switched from an unmodified aldoxime/ketoxime blend to a modified reagent would see an improvement in performance by including the proper level of equilibrium modifier within the blend.

For better results from your aldoxime/ketoxime extractant – more copper production under a wider range of conditions, better management of iron, increased copper transfer, higher revenues and ROI – Solvay's ACORGA® OPT series solvent extraction reagents are the answer you've been looking for.

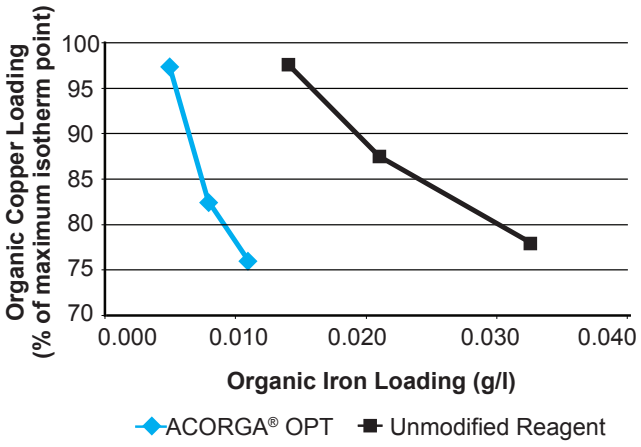

Figure 2. Higher Copper/Iron Selectivity from Modified Blend

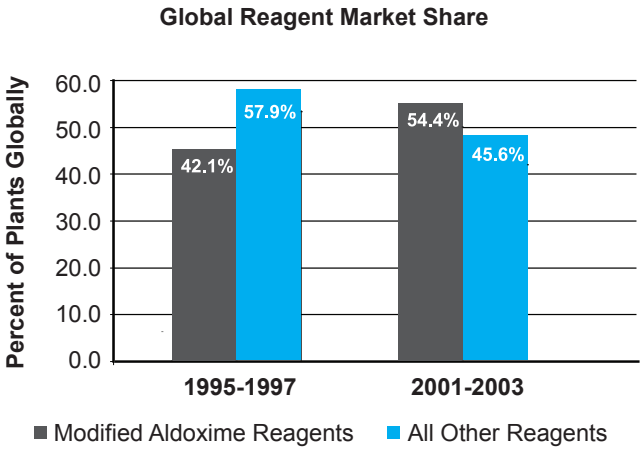

Figure 3. The Growing Market Share of Modified Reagents

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