

TECHNICAL CHALLENGES OF MIXERS AND SETTLERS OPERATING IN COPPER SOLVENT EXTRACTION PLANTS OF THE DEMOCRATIC REPUBLIC OF CONGO

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ABSTRACT

The first commercial copper solvent extraction plant of the Democratic Republic of Congo was successfully commissioned in 2008. Over the last 14 years more than 40 small, medium, and relatively large size copper solvent extraction sites have joined this challenged contest of “fast-track” projects implementation. In 2021, electrowon copper cathodes have contributed by 81% to over 1,6 million tons copper exported by the country, making it rank among the 3 top world copper producing countries.

Over this period, opportunity was given for learning from various technical challenges faced by most of these operations at various stages of their still ongoing journey. This paper aims to offer a non-exhaustive review of some of these many learnings. This could serve as a background for possible upcoming upgrades of running operations and for the design of better documented greenfield projects still to come.

Mixers and settlers design and operation have an impact on the stability of emulsion phase continuity and on the control of impurity transfer from the leach solution to the electrolyte. Mixer O/A ratio can be increased without affecting copper production either by recycling organic or by increasing the organic flow. Solvent extraction plants of the democratic Republic of Congo that were designed with the possibility of increasing organic recycle and/or organic flow without reducing mixer residence time below 2 minutes and/or increasing settler specific flow above say 3.5 m³/h/m² were better prepared for the control of mixer continuity in the presence of aqueous contaminants like colloidal silica even without the need of using a coagulant to reduce the content of colloidal silica in the leach solution. On the other hand, they achieve the least transfer of impurities from the leach solution to the electrolyte even without the need of a washing stage in the solvent extraction configuration.

Keywords: Challenges, Copper, Solvent-Extraction, Democratic Republic of Congo