



“Protect your core values with Kemcore. Cut costs by simplifying your supply chain without compromising your standards. Purity and quality guaranteed.”

CASE STUDY

Example 2: Procuring xanthate

Overview

Over the past year, the prospects for mining companies have been adversely affected by the slump in commodity prices. With waning demand, slump in commodity prices and pressure to ensure profitability at mining operations and maximising shareholder return cutting costs is the theme. A recent research by Kemcore found many mining companies are sourcing or planning to source for mining consumables such as Xanthate and mining chemicals from low cost base production countries such as China.

This paper highlights leading risks with traditional Xanthate flotation reagents procurement from China — risks you can avoid when you work with us.



Introduction

Many xanthate compounds designed for use as flotation reagents are produced in China. Xanthate sources are limited, and hundreds of trading companies compete to win customer orders. The combination of fierce competition and limited sources has led to a number of well-documented fraudulent schemes.

Xanthates in Mining Industry.

Xanthates were first discovered by Zeise in 1822 and the name of Xanthate is derived from the Greek word xanthos meaning yellow, as this is the color of the insoluble cuprous xanthate salt (Harris, 1988). Xanthates were not fully exploited in any commercial sense until 1925, when Keller(1925) successfully introduced xanthates as mineral collectors in the froth flotation process.



Today Xanthate are still widely used, especially for easy-to-treat ores where selectivity (especially against iron sulfides and penalty elements) is not an issue. They are usually supplied in the powder or pellet forms and are readily soluble in water, and could be made up to any strength for convenience in dosing. Xanthate solutions have relatively poor long-term stability and, therefore, are supplied in liquid form only when the manufacturing plant is in close proximity to the use location. Xanthates are available in a range of carbon chain lengths, generally from C2 to C5. The collecting power generally increases with increase in chain length, but the selectivity decreases. Xanthates are relatively unstable at low pH and, therefore, are not suitable for flotation in acid circuits. Each producer has its own grades for xanthate composition, including purity, which is stated as a minimum percentage up to 100 per cent, and moisture. Four types of xanthates (ethyl, butyl, propyl and amyl) are produced in various combinations with sodium and potassium, which are stabilizers in the chemical formula.⁵

Potassium amyl xanthate (PAX)

Sodium ethyl xanthate(SEX)

us \$ 1900
80%
us\$ 1520

us \$ 1200
20%
us\$ 240

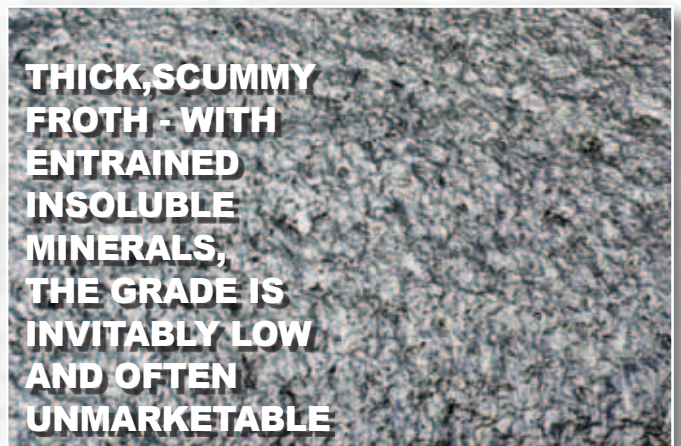
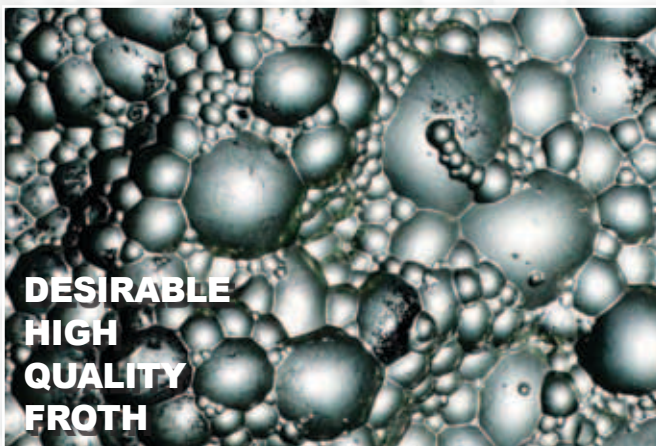
US\$ 140 = 1900-1760

Fraudulent Practices in Xanthate Supply Chain in China.

Fraudulent trading companies establish “mixing centres,” disguised as warehouses, near shipping ports in locations like Qingdao. These centres mix various grades of xanthates together, blending long-chain xanthates with short-chain

xanthates that are cheaper to produce because of their reduced raw material and production requirements. Popular blended combinations include Potassium amyl xanthate(PAX)mixed with sodium ethyl xanthate (SEX) at an 80/20 ratio. Sold to the customer as pure Potassium amyl Xanthate(PAX), this mixed blend earns the supplier an extra 5-10% profit. Traditional inspection methods, which test xanthate compounds using lead acetate titration, cannot detect the blend ratios of these mixed xanthate compounds. A sensitive and robust analytical method like Gas Chromatography Analysis must be employed to determine the exact composition of the xanthate compounds. Low-quality xanthate has an impact on the mining refinement process.

PURE XANTHATE		MIXED PAX (MIXED XANTHATE)	
Name	Unit cost (USD/mt)	Mixture ratio	Mixed cost ratios (USD/mt)
Potassium amyl xanthate (PAX)	1900	80%	1520
Sodium ethyl xanthate(SEX)	1200	20%	240
Total cost of mixed PAX which is sold as pure PAX			1760
PRICE DIFFERENCE of pure PAX and mixed PAX			140 = 1900-1760



- Low-quality xanthate recovers lower-grade concentrate, resulting in decreased yield.
- A precious metal recovery loss of just 0.5 - 1.0% can result in millions of dollars of lost revenue every year.
- At worst, production losses can cause a total plant shutdown.
- Disciplinary action against those responsible for procurement often follows.

Conclusion.

A full GC chemical analysis, can play an intergral role in ensuring quality Xanthates are supplied. This should also be complemented with a good quality control program to ensure a consistency in the supply chain. Kemcore assist mining executives in cutting costs without cutting corners!

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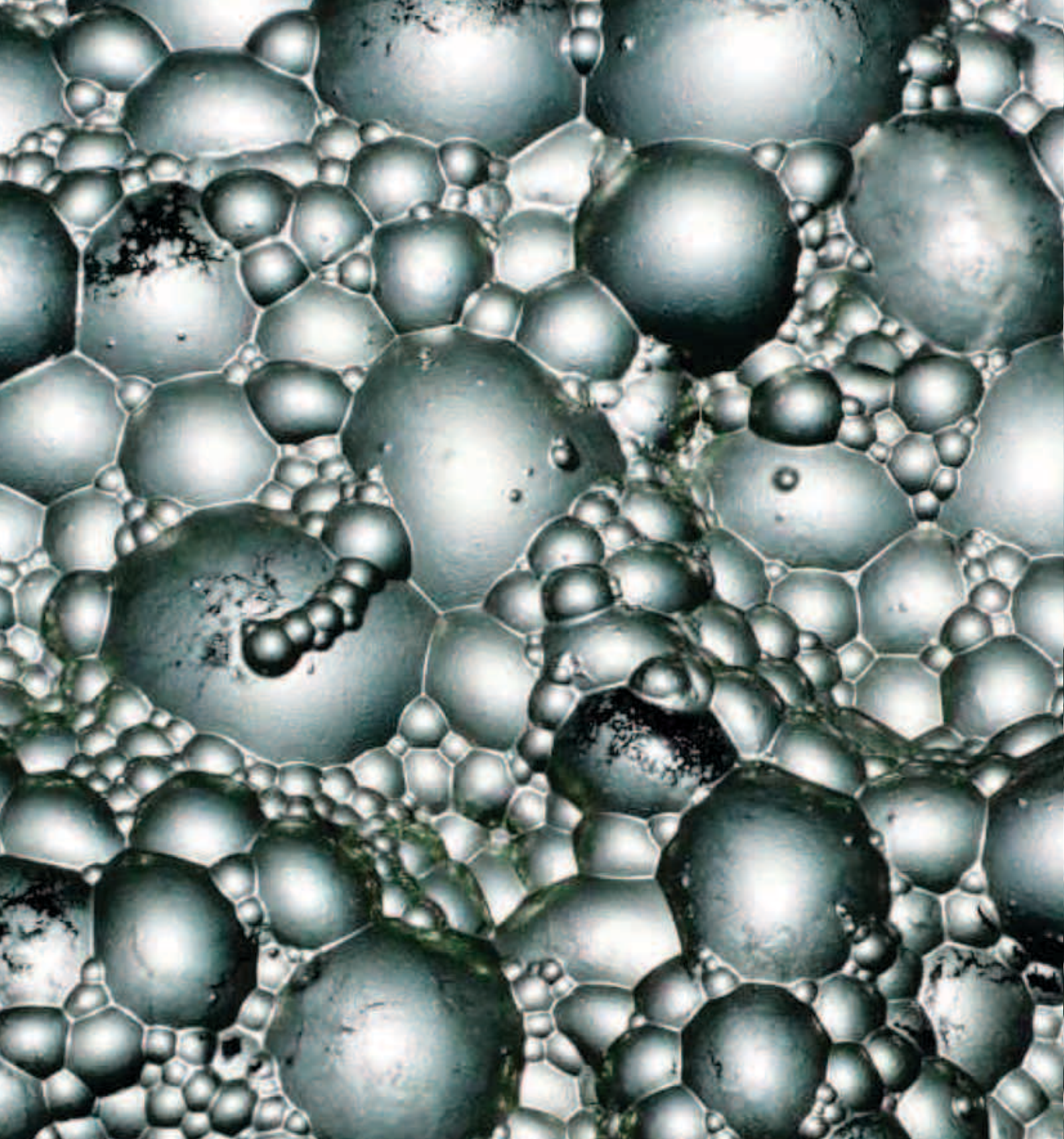
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Calisto has over 10 years' experience in mining-chemical sourcing, procurement, and supplier auditing. He has personally inspected over 50 chemical factories in China, South Korea, Taiwan, India, Philippines and the Czech Republic. Calisto has worked with diverse clients providing procurement strategies to facilitate cost-effective, high-quality chemical procurement. As Managing Director, Calisto drives Kemcore strategy and oversees the company's global sourcing and supply chain management platform. Calisto holds a Bachelor's Degree in Commerce with a major in Finance from Bond University, Australia.

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