Improving Copper Heap Leaching

BASF The Chemical Company

Background:

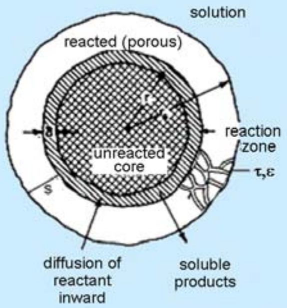
- annually rising demand of copper ⇨ increasing prices
- ca. 20 % of primary world Cu production by heap leaching processes + SX/EW
- so far recovery of conventional heap leaching processes range by 75-80 % of the ore's Cu-content during leaching periods of several months

Target: Improve productivity (recovery and leaching time)

⇨ **by addition of wetting agents**

Heap leaching:

Depends on solid-liquid-interactions at phase boundaries, capillaries



Theory:

According to Washburn eq. the penetration length l_p of a fluid into a capillary is

$$l_p = \sqrt{\frac{r_K \cdot t_p \cdot \gamma_L \cdot \cos\theta}{2\eta}}$$

and 1st Fick's Law the total leaching time t(F=1) of an ore particle is

$$t(F=1) = \frac{2B \cdot r_0^5 \cdot \tau}{3V_{m,Cu} \cdot D \cdot C_{A,0} \cdot n_K \cdot r_K^2} \cdot \sqrt{\frac{2\eta}{r_K \cdot t_p \cdot \gamma_L \cdot \cos\theta}}$$

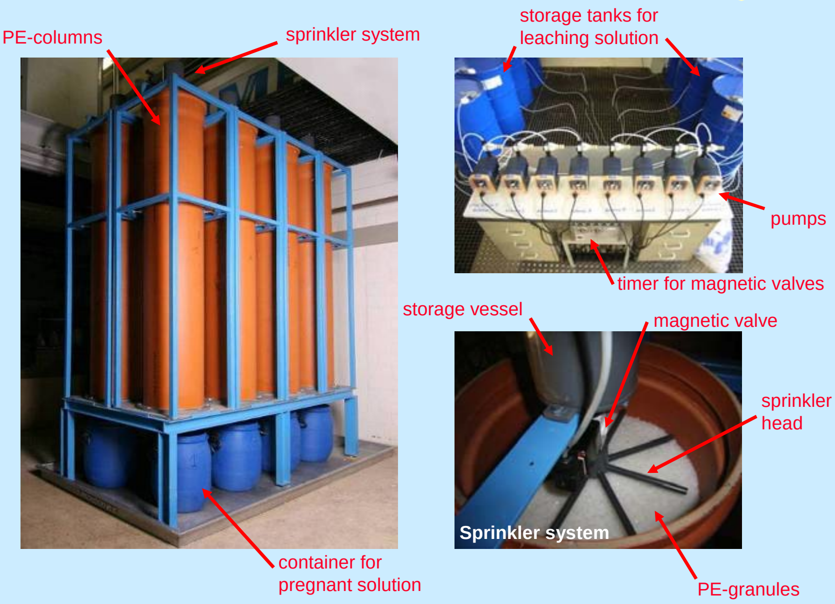
can be influenced by wetting agents

Requirements on wetting agents for heap leaching:

- good wetting performance
- improved capillary penetration
- no negative impact on further processing steps (SX-EW)
- stable in acid solution
- low foaming
- biodegradable, no eco-toxicity

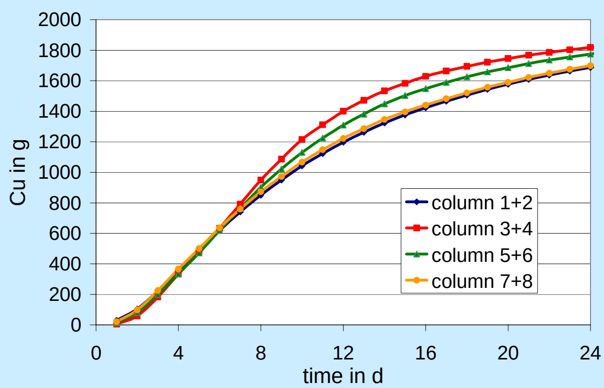
BASF SE has been developing tailor-made wetting agents which meet these requirements.

Simulating heap leaching at IME-facilities



List of additives:

column	additive
1 + 2	blank
3 + 4	nonionic surfactant (fatty alcohol alkoxylate)
5 + 6	nonionic surfactant (fatty alcohol alkoxylate)
7 + 8	anionic surfactant (alkyl ether sulfate)



Results:

- rise of Cu-recovery
- improvement in leaching kinetics

IME Metallurgie Prozesstechnik Recycling DIE METALLURGEN

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