

The use of pulping liquors as binders for chromite pellets

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PAPER

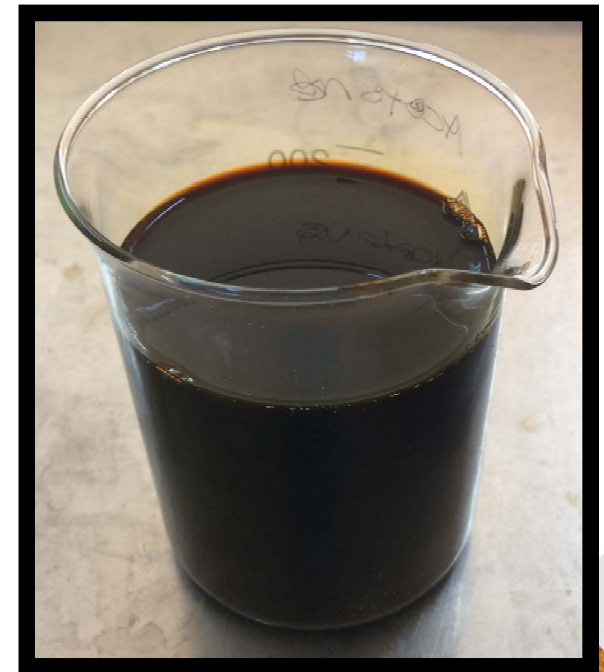
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Spent pulping liquors

- Have been used for:
 - Coal and bio-coal briquettes [1]
 - Iron ore pellets [2]
- Used in this study:
 - Sodium lignosulphonate (NaLS)
 - Magnesium lignosulphonate (MgLS)
 - Soda liquor (SL)
 - Kraft liquor (KL)



[1] Leokaoko, NT, Bunt, JR, Neomagus, HWJP, Waanders, FB, Strydom, CA and Mthombo, TS (2018), "Manufacturing and testing of briquettes from inertinite-rich low-grade coal fines using various binders", Journal of the Southern African Institute of Mining and Metallurgy, 118: 83–88.

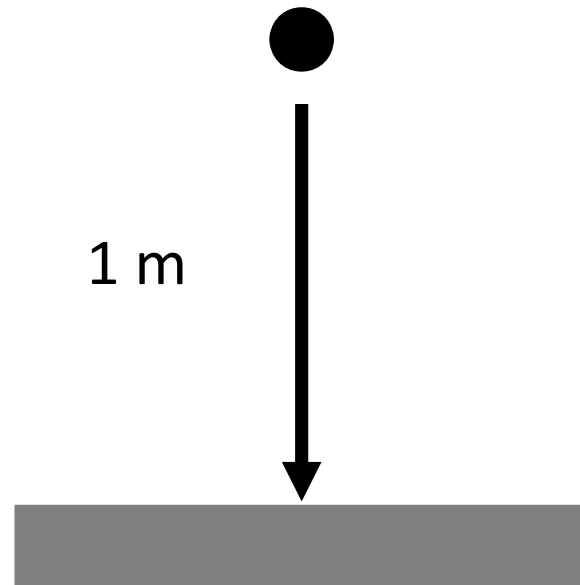
[2] Srivastava, U, Kawatra, SK and Eisele, TC (2013), "Study of Organic and Inorganic Binders on Strength of Iron Oxide Pellets", Metallurgical and Materials Transactions B, 44: 1000–1009.

Chromite

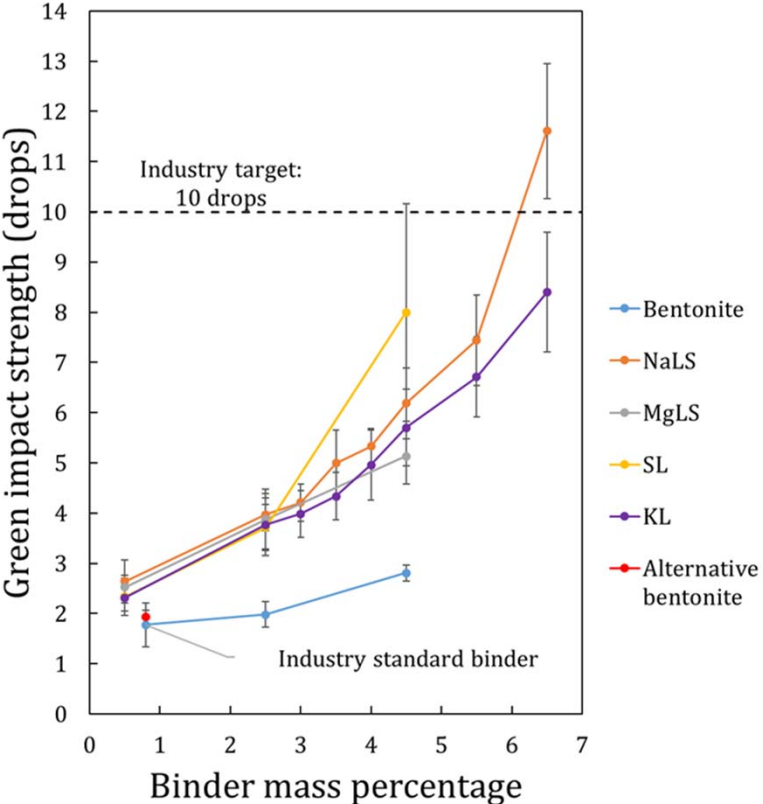
- Agglomeration of chromite
 - Industrial-scale methods vs lab-scale methods
 - Bentonite
- Two industrial processes: Outokumpu and Premus
 - Oxidative environment vs reducing environment
 - Different recipes



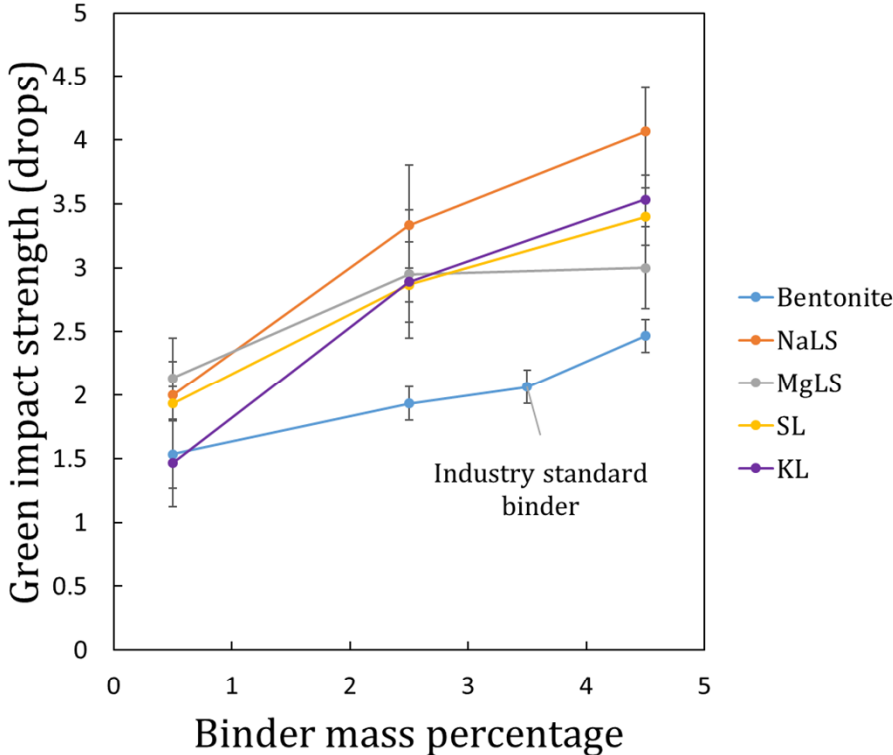
Green impact strength



Green impact strength



Outokumpu

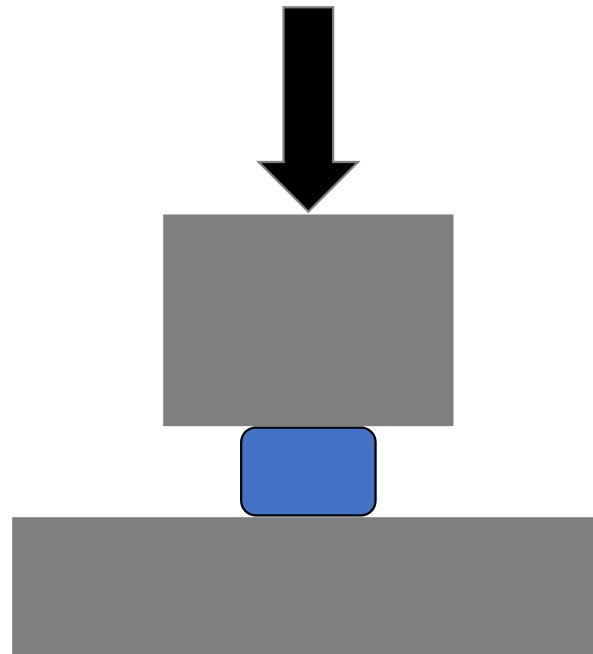


Premus

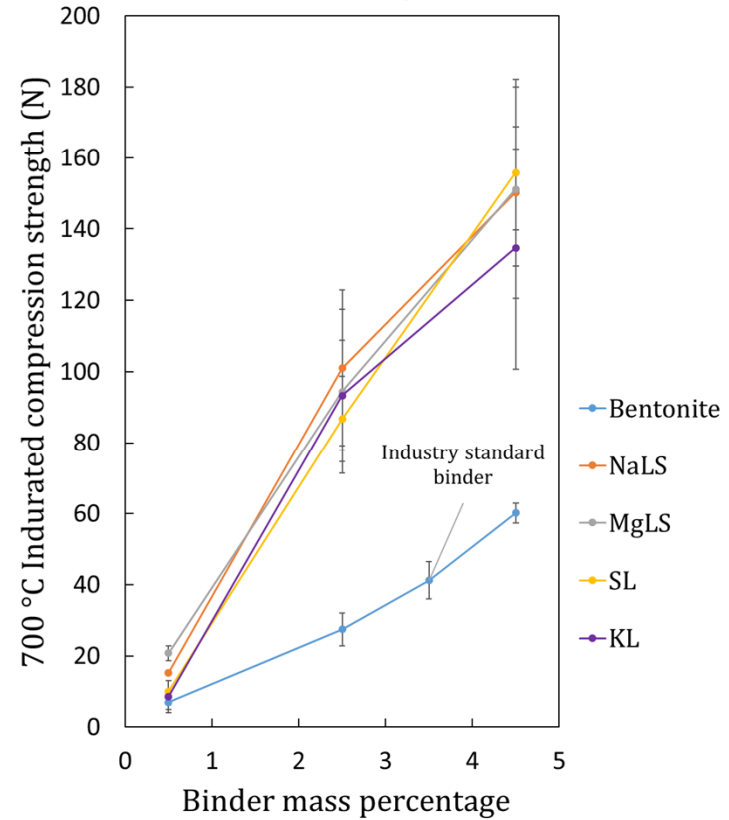
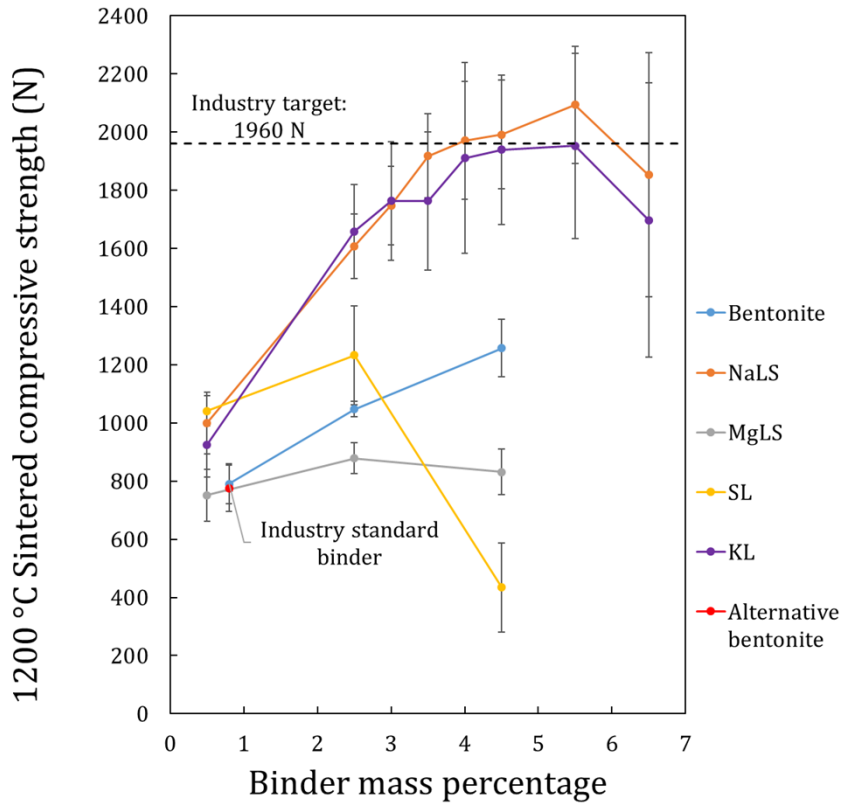


Indurated compressive strength

Applied force



Indurated compressive strength

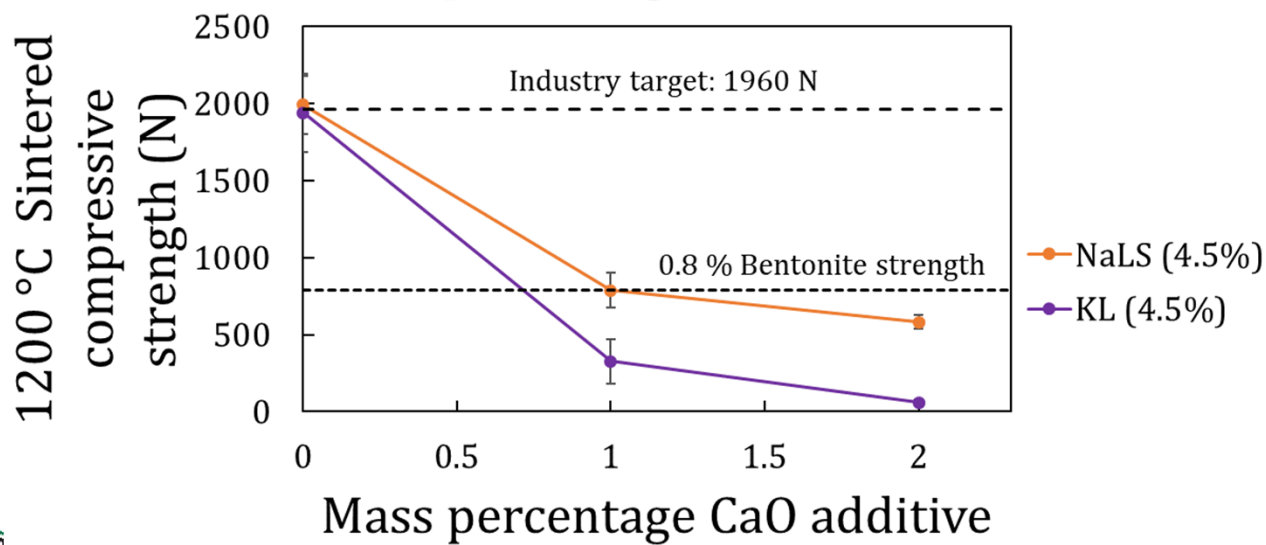
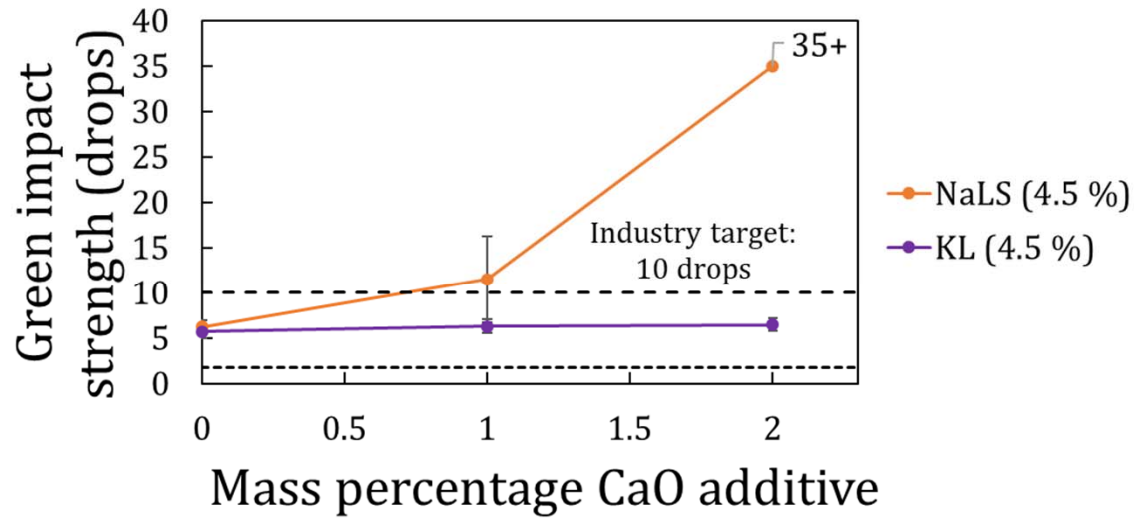


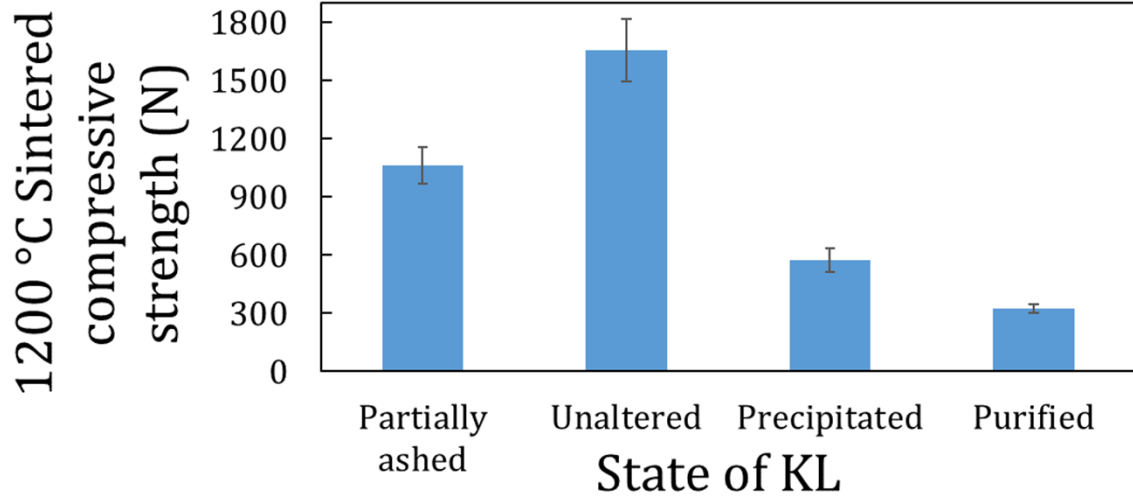
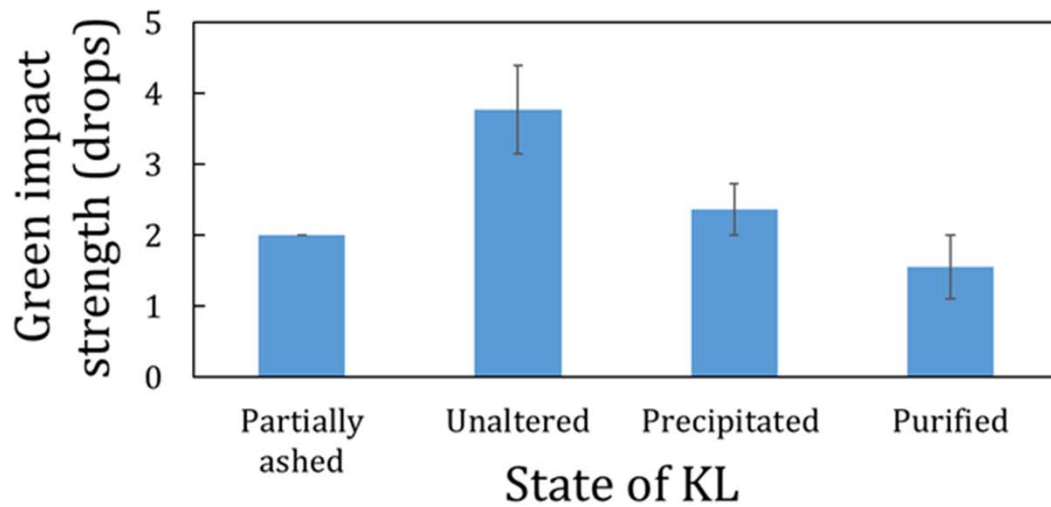
Outokumpu

Premus



Lime additive



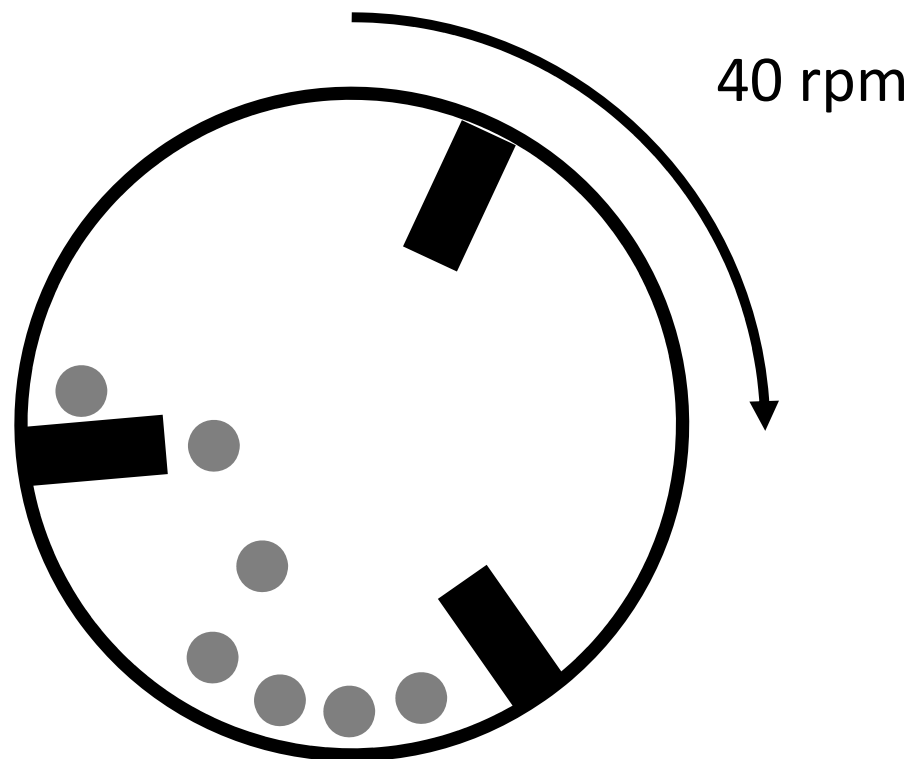


Changes to KL

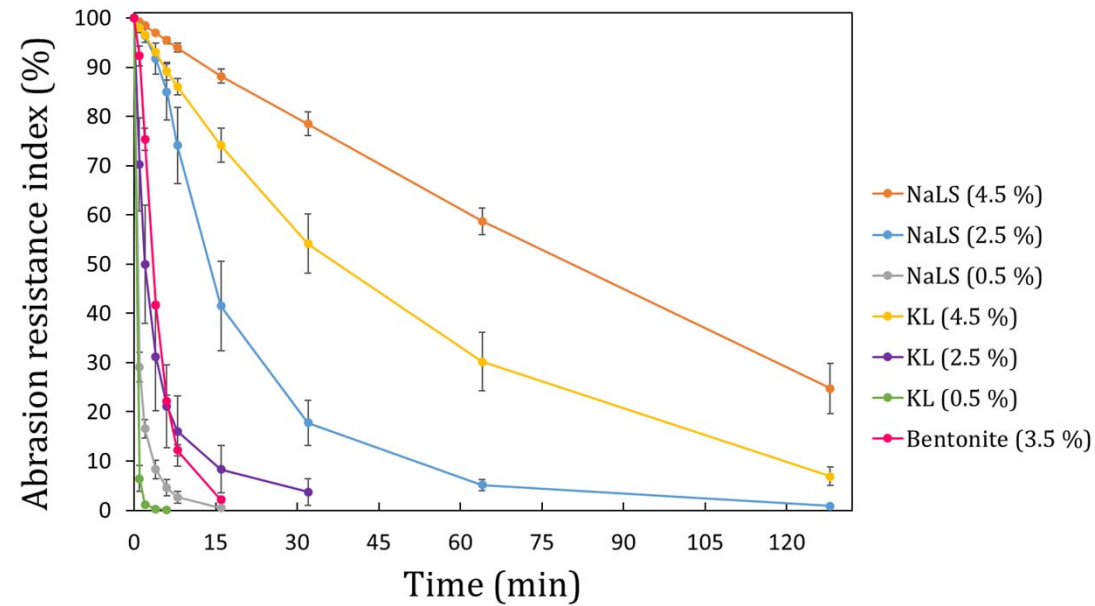
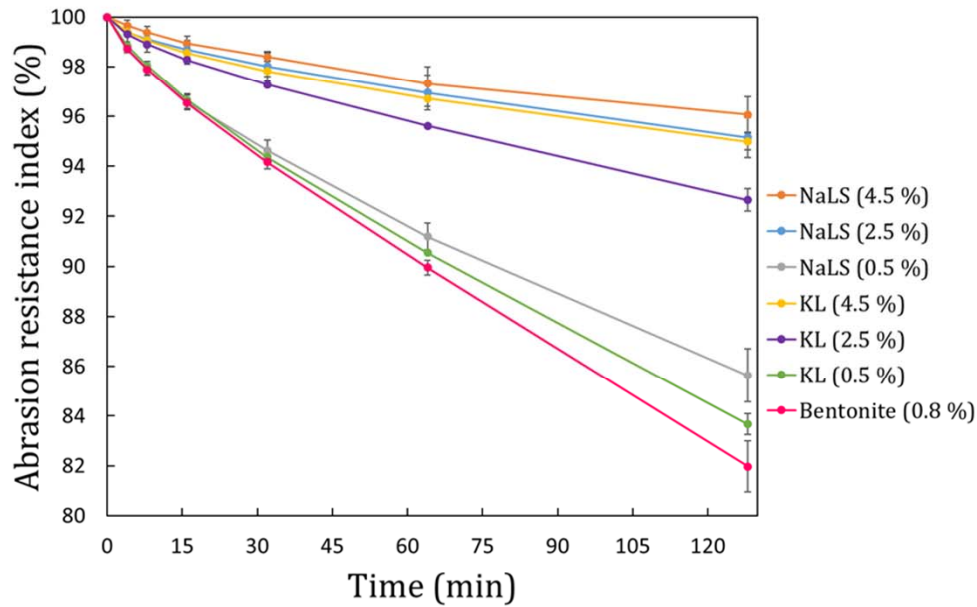
- Reducing inorganic content
- Reducing organic content



Abrasion resistance strength



Abrasion resistance strength



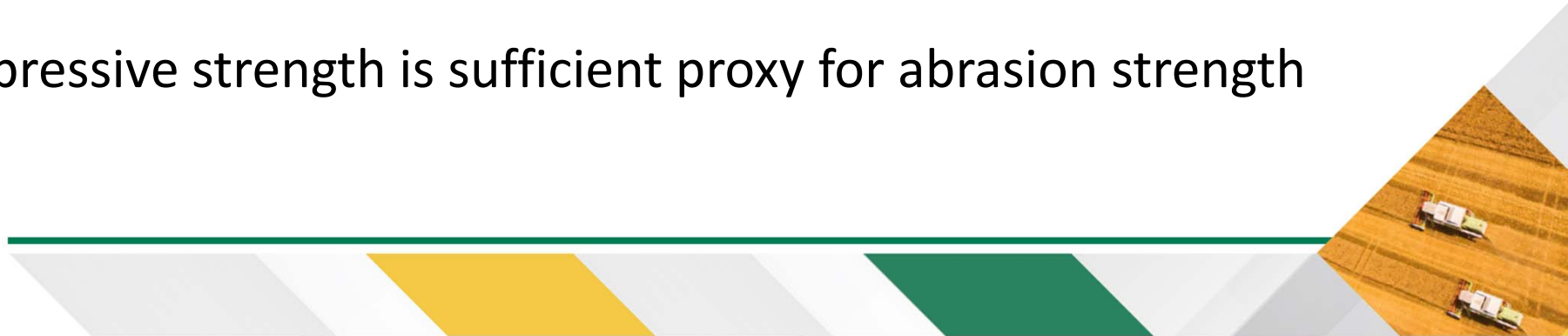
Outokumpu

Premus



Conclusion

- Pulping liquors match or outperform bentonite
 - For both Outokumpu and Premus processes
 - Sodium lignosulphonate and Kraft liquor top performers
 - Method of agglomeration not representative
- Lime not a suitable additive
- Both organic and inorganic components required
- Compressive strength is sufficient proxy for abrasion strength



What it means for industry

- Alternative binder to bentonite for chromite industry
- Higher-value use for pulping liquors



Thank you

