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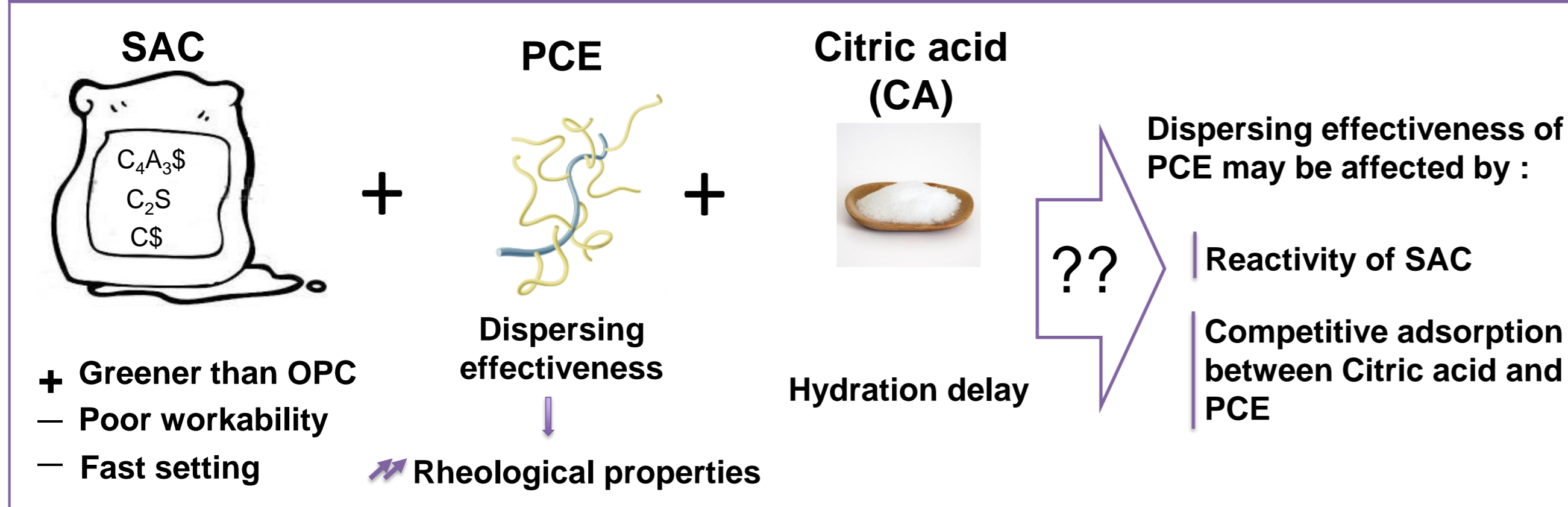
Hydration and rheology of sulfoaluminate-belite cements (SAC) in presence of polycarboxylate superplasticizers (PCE) and citric acid

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1. Context



3. Materials

Commercial SAC (i.tech ALI CEM)
Citric acid (99,5% Honeywell)
3 polycarboxylates ethers (PCE1, PCE2 and PCE3)

Phase composition of SAC (%)	C ₄ A ₃ S	C ₂ S	C\$
	49,3	15,1	23,5

	Mw (g/mol)	Charge density (mmol/g)	P	N	n
PCE1	48300	0,79	45	5	12
PCE2	138600	0,3	114	5	15
PCE3	11900	0,96	17	2,5	115

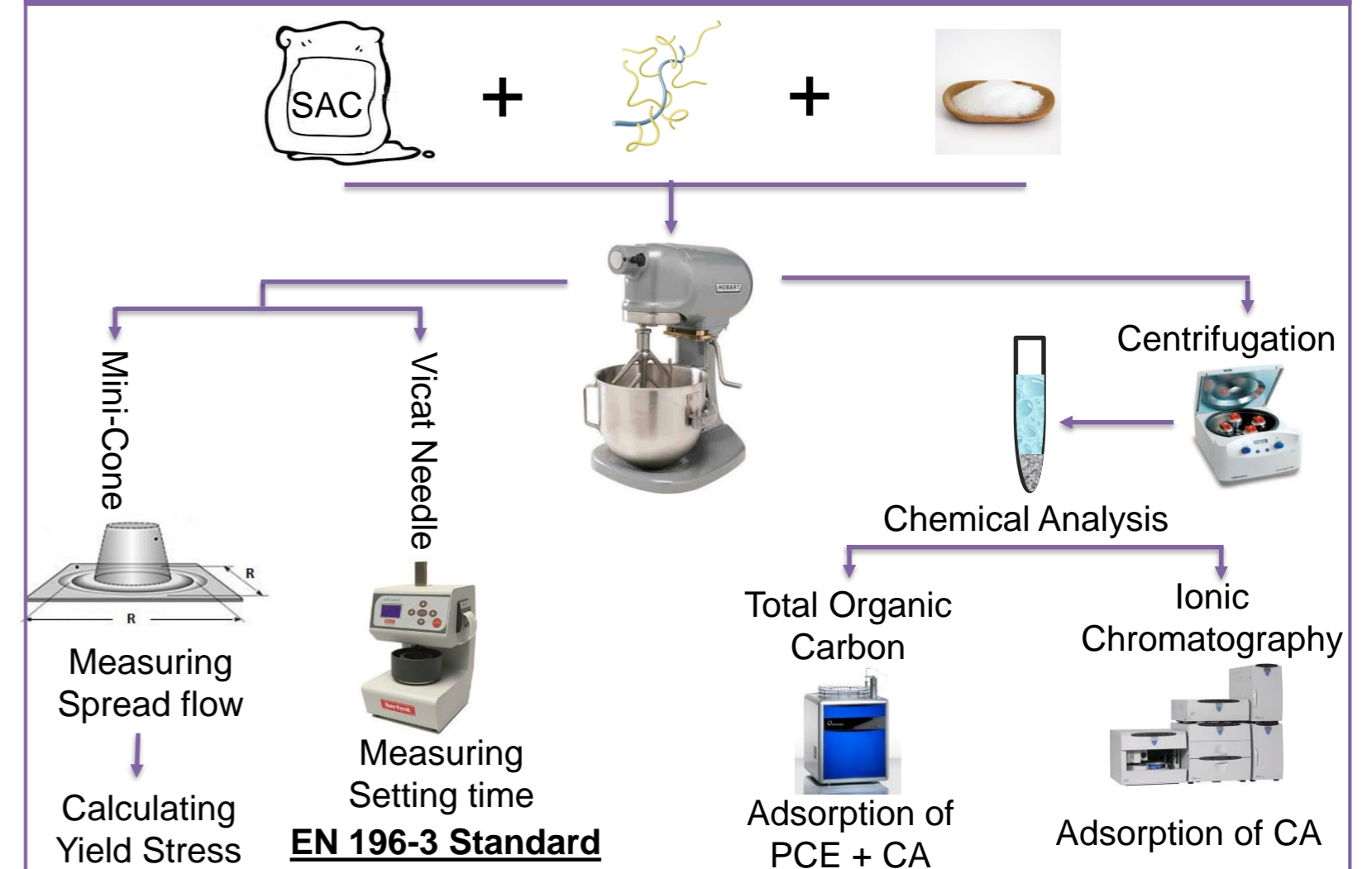
Chemical structure of PCE: $\left[\text{CH}_2 - \text{CH}(\text{COOCH}_3) - \text{CH}_2 \right]_n$ with substituents CH_3 , $\text{O}^-\text{P}(\text{CH}_3)_3$, and $\text{O}^-\text{P}(\text{CH}_3)_2$. $N=a+b$.

2. Objectives

Understand the:

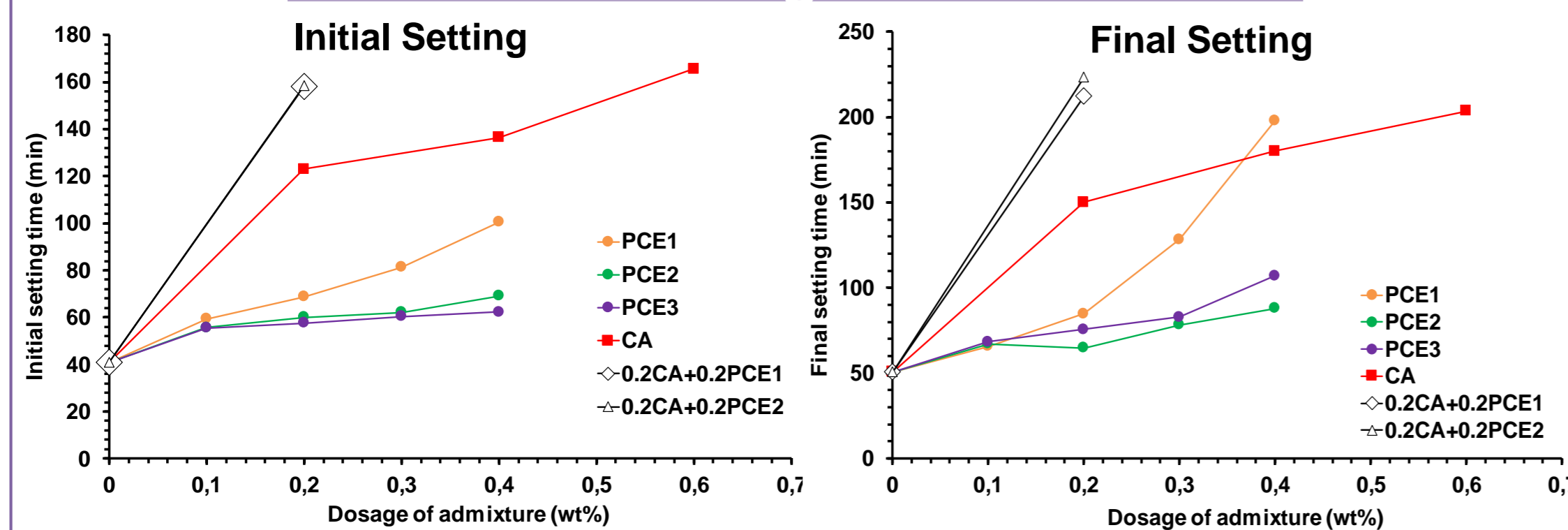
- Effect of the chemical structure of PCE on the hydration and rheology of reactive SAC
- Effect of combination of citric acid with PCE on hydration and rheology of reactive SAC

4. Methods



5. Results

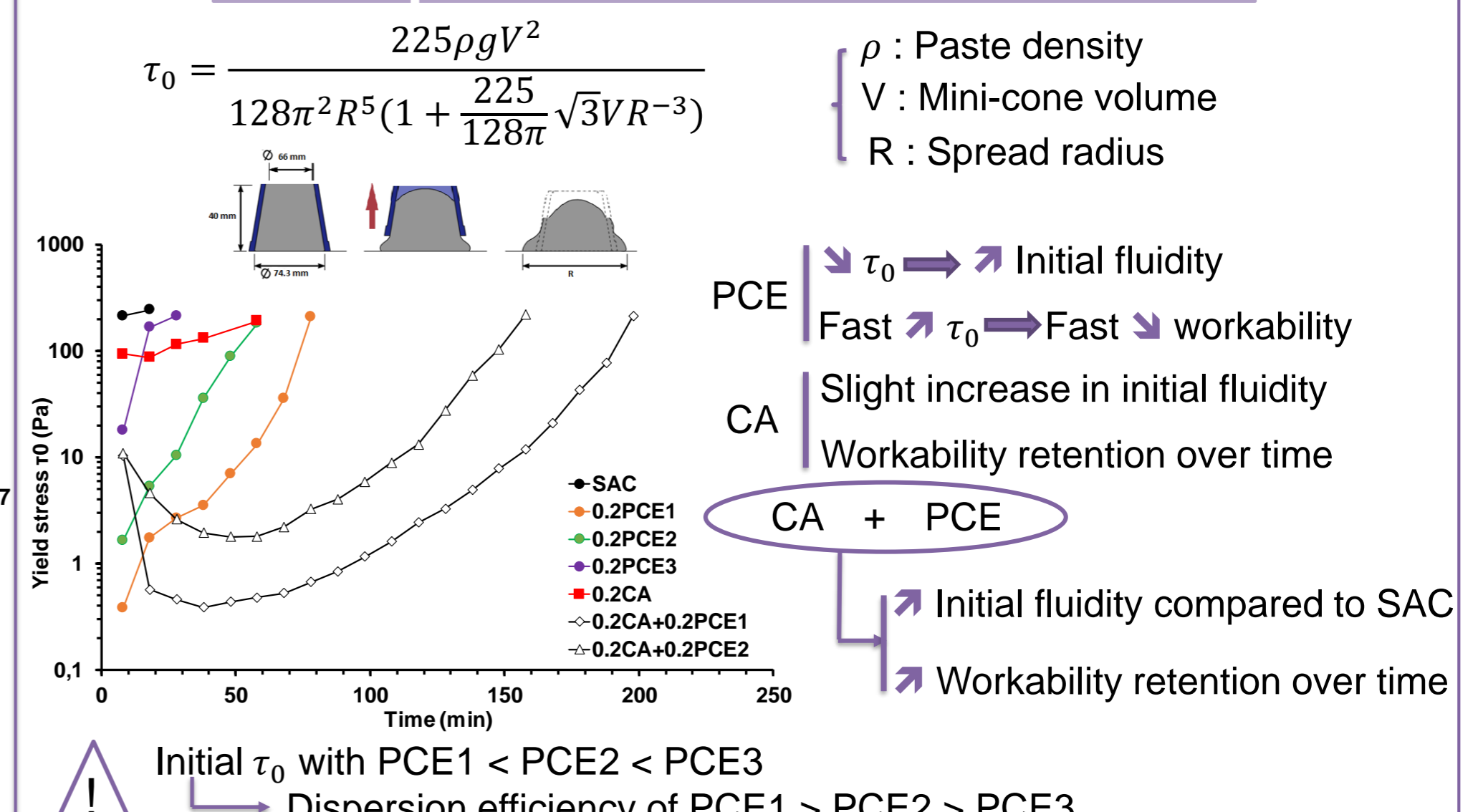
Setting-Time



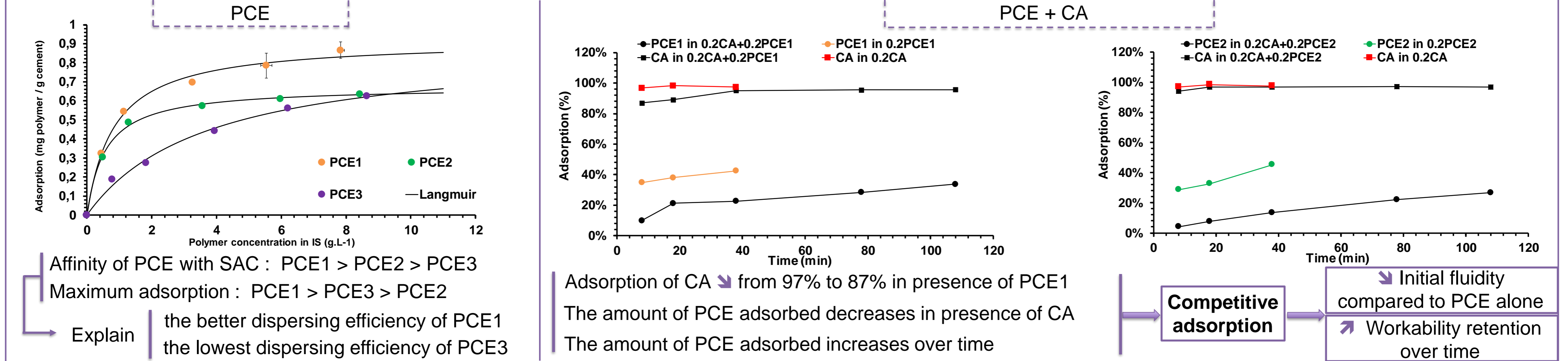
- Short setting time of SAC without admixtures
- CA delays significantly the Initial and Final setting times
- % in PCE → Initial & Final setting: PCE1 > PCE2 ≈ PCE3
- PCE + CA → Initial & Final setting: PCE+CA > CA > PCE
- PCE1 + CA ≈ PCE2 + CA

Fast hydration of C₄A₃S with C\$
Ettringite C₆A₃SH₃₂

Spread flow / Yield stress



Adsorption



6. Conclusions & Perspectives

