MANUFACTURE OF copper SLAGS ALKALI ACTIVATED CEMENTS USING OLIVE POMACE ASH AS AN ALTERNATIVE ALKALI ACTIVATOR

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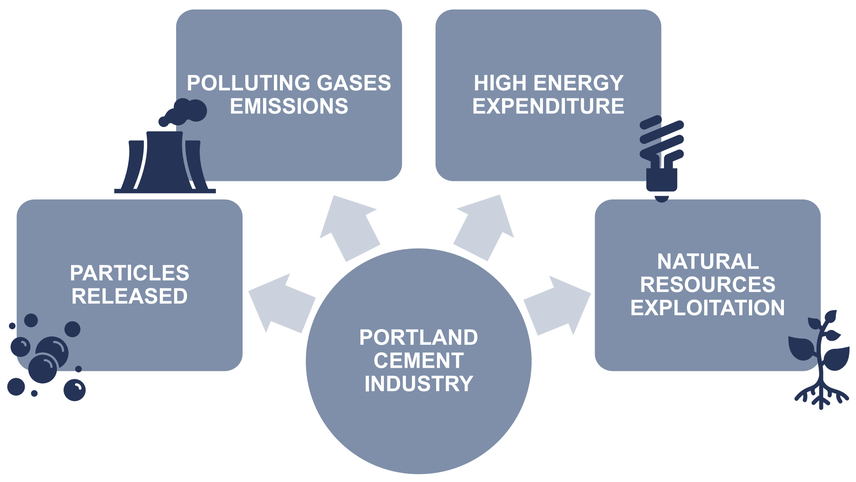
INTRODUCTION



ALKALI ACTIVATED CEMENTS

ENVIRONMENTALY FRIENDLY MATERIAL → ALTERNATIVE TO REPLACE PC

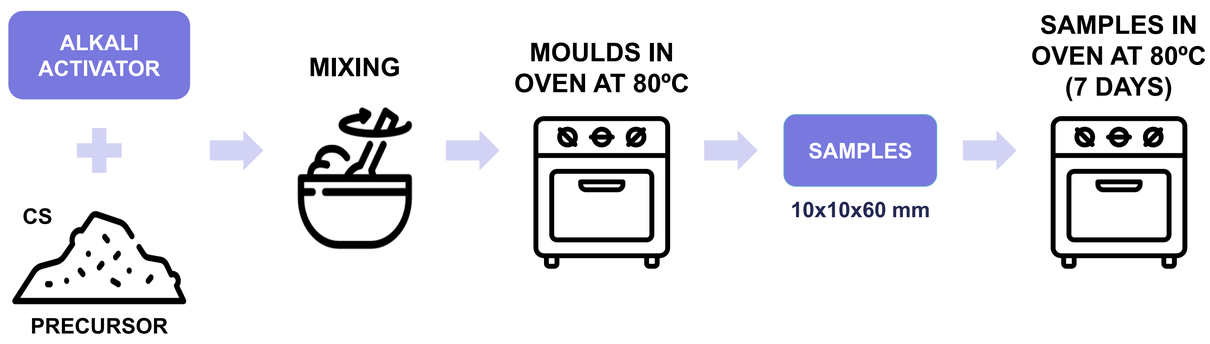
PRECURSOR: Aluminosilicate (SiO_2, Al_2O_3 and CaO) + ALKALI ACTIVATOR → Mixing → CHEMICAL REACTION → Setting and hardening → ALKALI ACTIVATED CEMENT

COMMERCIAL ALKALI ACTIVATORS → OBTAINED THROUGH QUITE EXPENSIVE AND HIGHLY POLLUTING PROCESSES

OBJETIVES

The purpose of this work was to investigate the possibility of using olive pomace fly ash (OPA) as alternative alkali activator to produce copper slags (CS) based alkali activated cements.

MATERIALS AND METHODS



SAMPLE	CS (g)	OPA (g)	H_2O (ml)	KOH (g)	M (mol/L)
70CS-30OPA	252	108	90	-	-
60CS-40OPA	216	184	90	-	-
50CS-50OPA	180	180	90	-	-
4M-KOH	336.2	-	90	23.8	4
8M-KOH	312.5	-	90	47.5	8

ALKALI ACTIVATOR

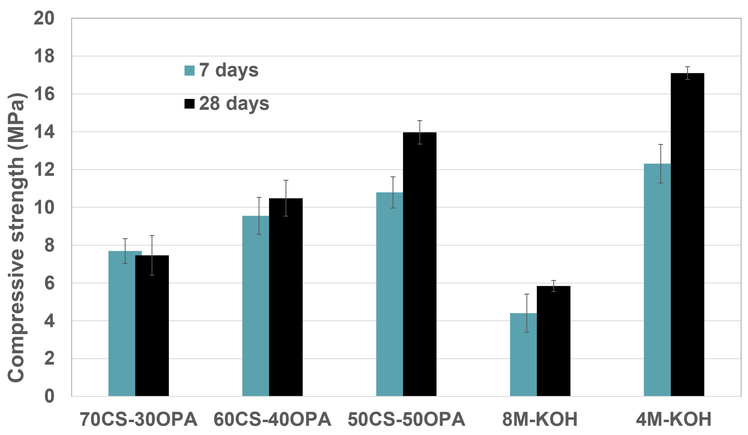
COMMERCIAL (ACTIVATION SOLUTION): KOH (4M), KOH (8M)

ALTERNATIVE: POMACE FLY ASH

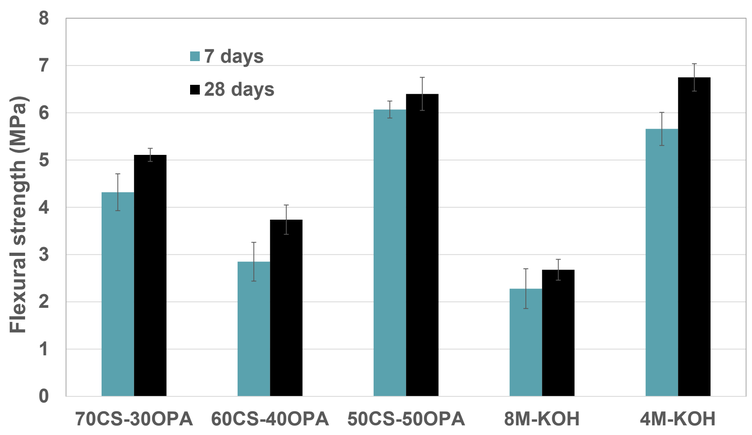
Three different binders were designed mixing olive pomace fly ash and copper slags in different weight ratios. Besides, potassium hydroxide activated cements were used as control specimens. The solid/water ratio was set to 0.2.

RESULTS AND DISCUSSION

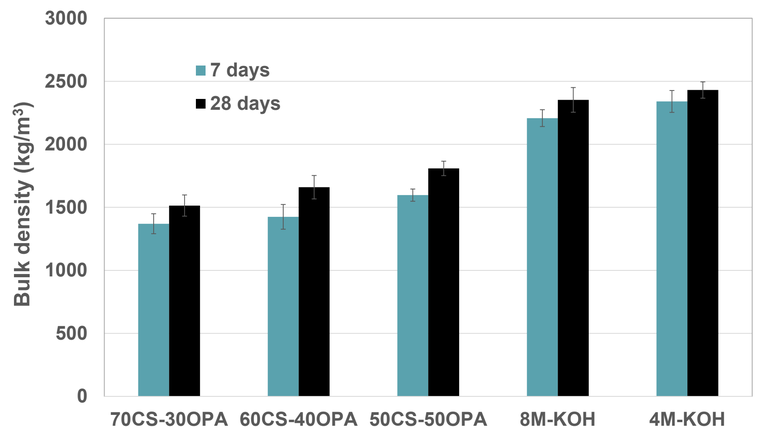
COMPRESSIVE STRENGTH



FLEXURAL STRENGTH



BULK DENSITY



The results showed that materials activated with olive pomace fly ashes reached higher properties than those activated with commercial activating solutions, KOH solutions.

CONCLUSION

The study demonstrates the possibility of using pomace fly ash as an alternative activator in the production of alkali-activated cements. In order to obtain binders with an almost zero carbon footprint and to mover towards circular economy, it is necessary to replace commercial activators by alternative activators obtained from waste, such as OPA. This study presents new sustainable materials with important economic and environmental advantages.

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