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### INCORPORATION OF GLASS POLISHING SLUDGE WASTE INTO CLAY BRICKS

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The *incorporation of wastes into clay ceramics*, such as bricks and roofing tiles, envolves some advantages:

1. Recycling the waste as a sub-product with possible inertization of toxic and dangereous elements;

2. Saving of clayey material that is a non-renewable resource;

3. Enhancing the ceramic processing and the quality of the fired product and saving energy.



One type of industrial waste is that generated during the processing (benefiting and transformation) of common soda-lime flat glass. In particular, the sludge from the final polishing stage, after cutting the glass plate.





### OBJECTIVE

The objective of this work was to evaluate the technological properties of a kaolinitic clay used to fabricate heavy clay ceramic products, such as bricks and roofing tiles, incorporated with glass polishing waste fired at 900 and 1000°C.



#### **MATERIALS AND METHODS**





#### Chemical composition in terms of oxide (%) of GPW and clay

	SiO <sub>2</sub>	Na₂O	CaO	MgO	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	K₂O	SO <sub>3</sub>	TiO₂	NiO	ZrO <sub>2</sub>	Cr <sub>2</sub> O <sub>3</sub>	P <sub>2</sub> O <sub>5</sub>	Lol
GPW	67.88	13.57	8.44	2.44	2.31	1.25	0.30	0.25	0.17	0.11	0.10	0.09	0.05	2.80
Clay	49.45	0.34	0.29	0.39	31.31	1.44	3.26	-	1.88	-	-	-	-	14.75



#### Particle size distribution of the glass polishing sludge and clayey body





# Extrusion prognosis of the formulations through Atterberg plasticity





#### Optical dilatometry of glass polishing sludge



850 1000 1100

1110



## Water absorption and mechanical strength of the ceramics as a function of the amount of incorporated GPW





#### CONCLUSIONS

- The incorporation of a glass polishing sludge, generated as a waste in a glass processing industry, into clay ceramics fired a 900 and 1000°C caused substantial improvements in their technological properties;
- The chemical composition of the waste is typical of a soda-lime glass with high amount of fluxing elements that form liquid phase in a temperature range typical to obtain bricks and roofing tiles, contributing to reduce the porosity of the ceramic;
- The waste has an appropriate particle size to be used in clay ceramics body, also acts as a non-plastic material, adjusting the elevated plasticity of the clay;
- The temperature exercises a strong influence on the evaluated properties, making possible an increase in the mechanical strength, as well as a reduction in the water absorption of clayey ceramic;
- The studied waste can be recycled into clayey ceramic products, assigning economic value and leading benefits to the environment by avoiding its disposal in landfills.



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#### **THANK YOU!**

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