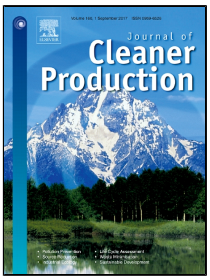
Accepted Manuscript



Gypsum plaster waste recycling: a potential environmental and industrial solution

Rodrigo H. Geraldo, Sayonara M.M. Pinheiro, Jefferson S. Silva, Heloysa M.C. Andrade, Jo Dweck, Jardel P. Gonçalves, Gladis Camarini

PII:	S0959-6526(17)31358-6
DOI:	10.1016/j.jclepro.2017.06.188
Reference:	JCLP 9938
To appear in:	*Journal of Cleaner Production*
Received Date:	06 September 2016
Revised Date:	02 June 2017
Accepted Date:	21 June 2017

Please cite this article as: Rodrigo H. Geraldo, Sayonara M.M. Pinheiro, Jefferson S. Silva, Heloysa M.C. Andrade, Jo Dweck, Jardel P. Gonçalves, Gladis Camarini, Gypsum plaster waste recycling: a potential environmental and industrial solution, *Journal of Cleaner Production* (2017), doi: 10.1016/j.jclepro.2017.06.188

Words: 7238

Gypsum plaster waste recycling: a potential environmental and industrial solution

Rodrigo H. Geraldo[a], Sayonara M. M. Pinheiro[b], Jefferson S. Silva[c], Heloysa M.C. Andrade[c], Jo Dweck[d], Jardel P. Gonçalves[e], Gladis Camarini[a,*]

[a]*School of Civil Engineering, Architecture and Urban Design, University of Campinas (UNICAMP), Rua Saturnino de Brito, 224, Campinas, São Paulo, Brazil, 13083-889*

[b]*School of Civil Engineering, Espírito Santo Federal University (UFES), Av. Fernando Ferrari, 514, Goiabeiras, Vitória, Espírito Santo, Brazil, 29075-910*

[c]*Chemistry Institute, Department of General and Inorganic Chemistry, Federal University of Bahia (UFBA), Rua Barão de Jeremoabo, s/nº, Campus de Ondina, Salvador, Bahia, Brazil, 40170-280*

[d] *Thermal Analysis Laboratory of the Inorganic Process Department, School of Chemistry, Rio de Janeiro Federal University (UFRJ), Bloco E do CT Sala E-206, Cidade Universitária, Rio de Janeiro, RJ, Brazil, 21941-900*

[e]*Polytechnic School, Centro Interdisciplinar de Energia e Ambiente (Cienam), Bahia Federal University (UFBA), Rua Aristides Novis, 02, Campus da Federação, 40210-630 Salvador, Bahia, Brazil.*

** E-mail address: gcamarini@gmail.com (G. Camarini).*

Abstract: Gypsum plaster waste (GPW) represents a large fraction of the total construction and demolition wastes generated by society, which may contaminate the soil and water resources. Although previous studies have indicated the possibility of recycling GPW, it is not known so far, if the recycling process affects the rehydrated products and how many times the GPW can be recycled without changing its characteristics. The present paper evaluated the properties of recycled gypsum plasters produced from a GPW after 1, 3, and 5 recycling cycles, RGP-1, RGP-2, and RGP-3, respectively. The unhydrated and hydrated recycled products were characterized by EDX, XRD, DTA, TG, DTG, as well as by measuring the recycled plaster setting times and the mechanical properties of respective rehydrated products. The recycling process does not change the gypsum plaster chemical composition which is similar to the commercial gypsum plaster. Physical properties are changed: bulk density diminished, setting times were shorter due to the change in the grain size with the recycling process. The mechanical performance was good with similar results at longer ages. GPW recyclability has a great potential to be a successful industrial solution and it allows the production of new reusable products, with less negative environmental impacts.

Keywords: Plaster of Paris; gypsum plaster waste; gypsum plaster recycling; recyclability; building materials; sustainability.