

**PRELIMINARY STUDIES ON DIVERSE THEMES**

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<a rel="license" href="http://creativecommons.org/licenses/by-nc-sa/4.0/"></a><br />O trabalho <span xmlns:dct="http://purl.org/dc/terms/" property="dct:title">THE PRODUCTION POTENTIAL OF HALLOYSITIC KAOLIN IN THE REGION OF JUIZ DE FORA - MG - BRAZIL</span> de <span xmlns:cc="http://creativecommons.org/ns#" property="cc:attributionName">JOB TOLENTINO JUNIOR</span> está licenciado com uma Licença <a rel="license" href="http://creativecommons.org/licenses/by-nc-sa/4.0/">Creative Commons - Atribuição-NãoComercial-Compartilha Igual 4.0 Internacional</a>.

**THE PRODUCTION POTENTIAL OF HALLOYSITIC KAOLIN IN THE REGION OF JUIZ DE FORA - MG - BRAZIL**

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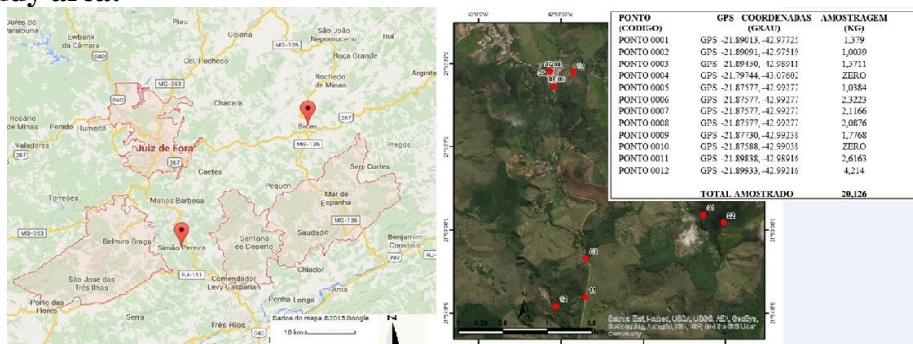
**Abstract:**

Brazil is one of the world's largest producers of processed kaolin. Its geological diversity is reflected in the diverse environments in which the associations of kaolinitic clay minerals were formed.

**Keywords:** Kaolin; Halloysite; Juiz de Fora; bionanocomposites

**1 - Aims:**

To evaluate the potential of Brazil (region of Juiz de Fora - MG) in the production of halloysitic kaolin for its application in the pharmaceutical industry and in the production of polymers.

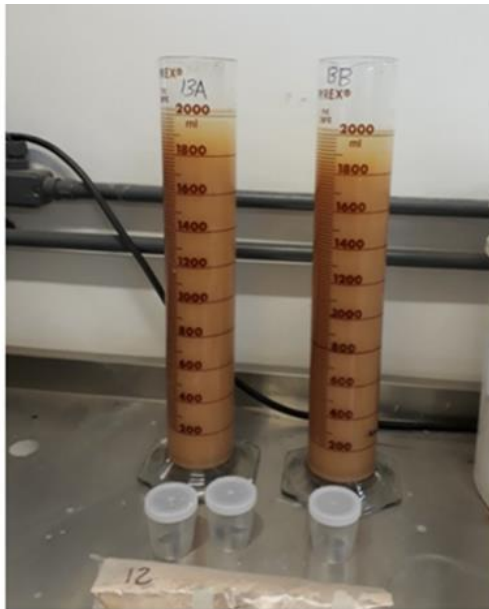
**2 - The study area:**

The study involves the stages of beneficiation and technological characterization.

### 3 - Materials and methods

Clays are considered as pharmaceutical raw materials which, once evaluated and / or modified, can be used in the manufacture of pharmacological and cosmetic products. The clays with tubular structural arrangement (halloysite), make this material that has the characteristic of being nanoparticulate attractive, since it is an alternative in the preparation of new bionanocomposites [1]. There is a growing interest in the research of halloysite in new industrial applications due to the use of its natural tubular morphology [2], the nanoscale diameter and the internal and external surfaces of its structure. Their nanotubes have potential applications such as microfiber filling, carriers for delivery and controlled or sustained release of active agents for delivery of the drug [3].

Field sampling (20 samples, 20.12 kg) was carried out at the Mineral Technology Center involving the stages of disaggregation, homogenization, classification, granulometric classification, magnetic separation in high intensity field, sedimentation concentration and vibratory table.



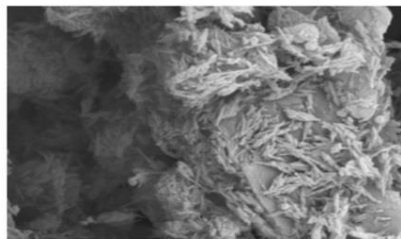
Separator by sedimentation in bench.



Separator by vibrating table.

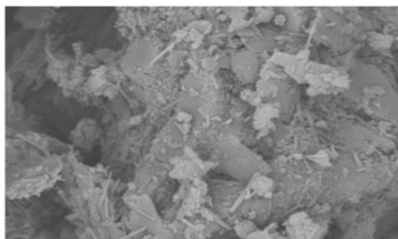
### 4 - Results:

The study area of the samples was identified as halloysite. In the beneficiation stages the vibratory table promoted the concentration of halloysite in the final product. Halloysite can be clearly seen in electronic scan microscope images.



CETEM 2016/10/27 15:06 HL D8.1 x6.0k 10 µm

Image of the reference sample



CETEM 2016/09/22 13:52 NM D8.0 x7.0k 10 µm

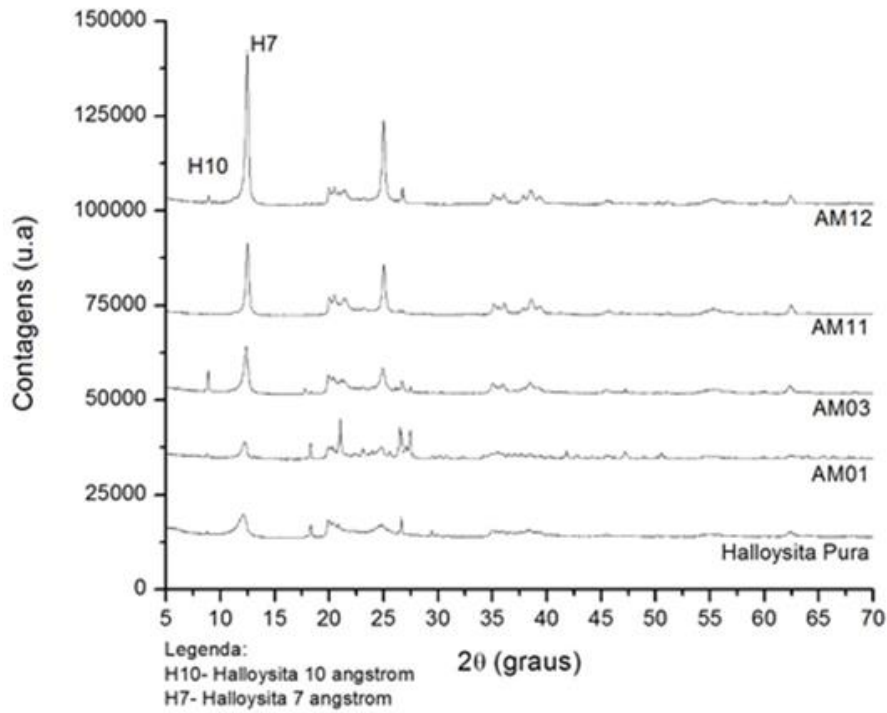
Image of the am12 sample



CETEM 2016/09/22 14:55 NM D8.0 x12k 5.0 µm

Image of the am11 sample

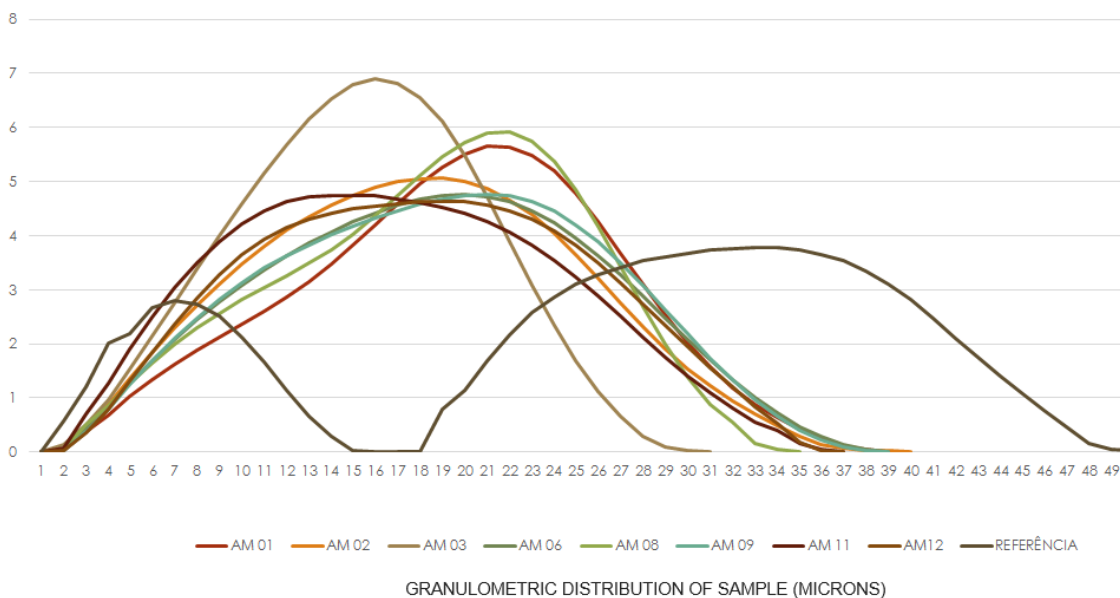
The analysis by means of the diffractometry indicated that the halloysite found, presents in the diffractograms (XRD) the interplanar space of 7Å and 10Å and very sharp peaks.



X RAY COMPARATIVE DIFRATOGRAMS FOR HALLOYSITE  
 7 Å e 10 Å. CuKα (40kV, 40 kA)

### 5 - The MALVERN diagrams

In the MALVERN diagrams, the reference sample shows the following distribution data.



The crystallinity index (hinckley) of sample 6 is between 1.5 and 2.0; Samples 8, 7 and 2 are between 1.5 and 1.0; Samples 12, 11 and 9 are between 1.0 and 0.5; And the sample 3 is between 0 and 0.5.

The brightness index (ISO Brightness) of the reference sample is 73.10 and whiteness is 90.55. The samples had values before chemical bleaching, respectively: am3 (ISO B = 47,80, L = 82,77); Am8 (ISO B = 54.23, L = 84.58); Am12 (ISO B = 50.22, L = 83.84); am12 (ISO B = 43.35, L = 81.14). After the chemical bleaching, the samples had the following values: am3 (ISO B = 49.76 to 46.3, L = 83.45 to 82.06); (ISO B = 47.75, L = 83.29).

## 6 - Conclusions:

So far, the beneficiation process used in a vibratory table is the best option, with 46.50% efficiency compared with the sedimentation process, which was 14.11%, for the sample am12 with granulometry below 1.18mm.

Electron paramagnetic resonance (EPR) analyzes will be performed in the CBPF as a mode of control of the chemical bleaching process that aims to remove the impurities and concentrate the halloysitic clay.

It is important to emphasize that this project has a technological focus, that is, it aims to discover the deposits of halloysitic clay, characterize it and find the best beneficiation process to be used in the industry.

## 7 - References

- [1] RUIZ-HITZKY, E., *et al.*, "Fibrous clays based bionanocomposites", *Progress in Polymer Science*, v. 38, pp. 1392-1414, 2013.
- [2] SILVA, J., *et al.*, Utilização de argilas fibrosas e tubulares para a liberação modificadas de fármacos: uma revisão, *Researchgate* v.21 n.01, pp. 204-212, 2016.
- [3] PASBAKSH, P., *et al.*, "Characterization of properties of various halloysites relevante to their use as nanotubes and microfibre fillers", *Applied Clay Science*, v. 74, pp. 47-57, 2013.