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Factors involved in the aging process and its implications in the properties of clays for the Ceramic Industry

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Currently it is well known that the use of stockpiling systems in the Ceramic Industry provides significant improvements in clays properties. In accordance with this system, clays are left to age under the action of environmental elements for periods of time before entering the production process. This system renders superior technological properties to clays when compared to those obtained with the material that is used directly as extracted from the deposit. The mechanisms that act during aging of clays are not yet enough understood. In accordance to the literature, chemical and biological factors possess great importance in clay aging. This investigation aims at studying the aging process of clays used in the Ceramic Industry, analyzing the likely mechanisms involved and their implications in the technological properties of the raw materials. Clays of the three most important ceramic poles of the States of Rio de Janeiro and São Paulo were used in the investigation. The study of the aging process was carried out by exposure of four different types of clays both in open and closed places for a total of six months. Periodic samplings were carried out to monitor the changes in physical, chemical, microbiological and technological properties of the samples with exposure time. The physical and chemical characterization consisted of water content determination, particle size analysis, plasticity, pH (in water and KCl), oxidation-reduction potential (potentiometric methods), organic substance (Walkley & Black method), and cation exchange capacity measures. The cation exchange capacity was measured by two methods: methylene blue index and the methodology from Embrapa Solos for exchangeable cations Ca^{+2}, Mg^{+2}, Na^{+}, K^{+}, H^{+} e Al^{+3}. The biological characterization was carried out by measuring enzymatic degrading activities as described by Adam & Duncan. The technological properties measures consisted of apparent density, linear retraction, bending strength (ASTM C 674-77), water absorption (ASTM C 373-72), and loss on ignition. These tests were performed with the test body pressed under 30MPa. The measures were conducted with the test body before and after sintering. Sintering was carried through at 1050ºC, at a rate of 10ºC/min keeping at the set temperature for 1 hour.

Exposure of clays to aging resulted in a significant improvement in the technological properties of the samples during the total period of the investigation. The results demonstrated the importance of biological action in clay aging. Moreover, results also indicated the existence of periods of the year that were most favorable to the aging process.

Key-words: clays, aging, technological properties, enzymatic activity.