PROJECT INITIATION

Date: September 27, 1972

Project Title: Analysis of Kaolin Samples
Project No.: A-232-632
Project Director: Max Munoz
Sponsor: American Cyanamid Company
Effective: 9/20/72
Estimated to run until: Open

Type Agreement: P.O. P. AN-237
Amount: $1700

Assigned to Technology Applications Group Division

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GEORGIA INSTITUTE OF TECHNOLOGY
Engineering Experiment Station

PROJECT TERMINATION

Date: February 24, 1973

PROJECT TITLE: Analysis of Kaolin Samples

PROJECT NO: A-232-632

PROJECT DIRECTOR: Max Munoz

SPONSOR: American Cyanamid Company

TERMINATION EFFECTIVE: February 24, 1973

CHARGES SHOULD CLEAR ACCOUNTING BY ALL CHARGES HAVE CLEARED.

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Introduction

American Cyanamid Company has extensive deposits of kaolin in Andersonville, Georgia. Samples from these deposits were studied in the past \(^1,2\) by the Engineering Experiment Station at the Georgia Institute of Technology.

In September, 1972, the sponsor submitted a sample of these clays to determine its properties upon calcination at several temperatures. This report covers the work performed in the period October 3, 1972 to October 31, 1972.

The scope of work to be performed included splitting of the sample received into representative fractions, calcination of these fractions at 2400°, 2600°, 2800°, 3000°, and 3200°F, and analyses of aluminum, iron, titanium and alkalies, and determination of true specific gravities.

Experimental Procedure

A five pound sample of partially ground kaolin was received at the Mineral Beneficiation Laboratory. The sample was split into six sub-samples of approximately 360 gm. each. One sub-sample was retained as control, and the other five were used in the calcination study.

Calcination. The calcination samples were dried 24 hours at 105°C and placed

\(^1\)Husted, J. E., Poulos, N. E., and Bellinger, F., Investigation of Kaolin-Type Clays, Summary Report, Project A-630, Engineering Experiment Station, Georgia Institute of Technology, Atlanta, Georgia, October 1962.

\(^2\)Munoz, M. F., Evaluation of Kaolin Clays, Final Report, Project A-1094, Engineering Experiment Station, Georgia Institute of Technology, Atlanta, Georgia, January 1969.
into plastic bags. Each sample was placed into an alumina box and introduced into the kiln when the temperature reached the desired level. The temperature in the kiln decreased when the door was opened, and therefore, the retention time was counted from the time the kiln reached the desired temperature onwards. The retention time was one hour for each sample. After the calcination period for a given sample ended, the sample was extracted from the kiln. The temperature was then raised to the next higher temperature and the process repeated for the next sample.

It was discovered that the high temperature kiln (>3000°F) did not have a chamber large enough to accept the sample. After discussing this with Mr. Soennichsen it was decided that a 3200°F sample would not be required.

After calcination, the samples were allowed to cool to room temperature and re-bagged in plastic.

Analyses. The calcined samples were split and a portion of each batch was ground to pass a 100 mesh screen. The remainder of the sample was bagged to send to the sponsor, as requested.

The minus 100 mesh sample of each calcined batch was analyzed for iron, titanium, aluminum, alkalies, and true specific gravity.

Silica, iron as Fe₂O₃, aluminium as Al₂O₃, and titanium as TiO₂ were determined following the ASTM Standard Methods for Chemical Analysis of Refractory Materials, ASTM Designation C-18-60.

The alkalies, lithium, sodium, and potassium, were determined by atomic absorption, as Li₂O, Na₂O and K₂O respectively.

True specific gravities of the calcined batches were determined following the ASTM Standard Test for True Specific Gravity of Refractory Materials, ASTM Designation C-135-47.

The results are presented in Table I.