DEPARTMENT OF COMMERCE

BUREAU OF STANDARDS

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PREFACE

The War Industries Board requested the Bureau of Mines to investigate the properties of the white-burning clays of the United States. This was with a view of determining the possible domestic resources of clays of the character which formerly had been imported and the supply of which had been curtailed by war conditions.

This investigation was assigned to the Ceramic Experiment Station at Columbus, Ohio, and Arthur S. Watts, consulting quarry technologist, began in June, 1918, to take representative samples for the investigation. The United States Geological Survey at the same time began independently a similar investigation from a geological point of view, the ceramic station of the Bureau of Mines, by request, assisting the Geological Survey in this investigation. Thirteen of the clay samples gathered by the survey were received by the ceramic station for study as regards ceramic properties.

A total of 77 white-clay samples were collected independently by the Bureau of Mines. Twenty-two of these were taken from properties visited later by a Geological Survey representative. Where samples were duplicated, only the one collected by the bureau was tested, and the ceramic data on it were furnished by the bureau to the Geological Survey. The ceramic data on these samples have been published in the survey's Bulletin 708 entitled "High-Grade Clays of the Eastern United States," by H. Reis, W. S. Bayley, and others, and are not presented in this present paper.

The magnitude of the problem prevented its completion before the armistice. Thereafter the urgency of other problems outweighed this one for awhile, although partial reports have been issued. References to these are given in the following text. It appears, however, important that the completed data be published, as they have direct application to the deposits sampled, even though some time has elapsed since samples were taken. A questionnaire sent out in April, 1923, furnished the latest information as to whether the deposits were being worked or not.

The investigation was outlined by R. T. Stull, former superintendent of the ceramic station of the Bureau of Mines, and the laboratory work was largely completed under his direction. The elutriation tests and microscopic examination of materials were conducted by H. G. Schurecht, ceramic chemist, and R. T. Watkins, ceramic assistant. The determinations of physical properties and burning behavior were begun by M. C. Booze, ceramic engineer, and R. N. Long, ceramic assistant, with other assistants. The glazing of the porcelains and determination of their color values were performed by F. G. Jackson, assisted by E. E. Pressler.

On the transfer of the ceramic work of the Bureau of Mines to the Bureau of Standards on July 1, 1926, this paper was one of a number handed over to the latter bureau. Members of the staff of the latter have assembled the various data into several groups of tables instead of a separate table covering the elutriation tests, properties of the clays, and properties of the porcelains from the clays, for each sample. The text, however, remains as originally prepared by the several authors, with the exception that the characteristics of the fractions of each clay, obtained by screening and elutriating, are presented in the text rather than in separate tables, as in the original.

The data obtained in the sieving and elutriating tests of the clays from Pennsylvania, Delaware, Maryland, and Virginia are given in Table 1. In Table 2 similar data from the North and South Carolina clays and in Table 3 the data from the Georgia clays are given. In Table 4 are presented data showing the properties of the clays from Pennsylvania, Delaware, Maryland, and Virginia, and in Table 5 similar data for the clays from North Carolina and Georgia. In Table 6 the properties of porcelains made from the clays from Pennsylvania, Delaware, Maryland, and Virginia are presented, and like data are given in Table 7 for the porcelains from the clays from North Carolina and Georgia. The locations of the mines and names of mine owners are given in Table 8 for the deposits of Pennsylvania, Delaware, Maryland, and Virginia; in Table 9 for the deposits for North and South Carolina; and in Table 10 for the deposits of Georgia. Considerable data, relating especially to the properties of the clays and the porcelains made therefrom, had already been published in the United States Geological Survey Bulletin 708 and are not presented herewith. When the data have been so published reference is made to the fact in the text.

CERAMIC PROPERTIES OF SOME WHITE-BURNING CLAYS OF THE EASTERN UNITED STATES

ABSTRACT

This paper contains a rather thorough study of certain of the qualities of a large number of white-burning clays from the Eastern United States. This study was made with a view to determining the possible domestic sources of clays of the character which are so largely imported for the pottery trade. The work covers the determination of the fineness of grain, the mineral constituents, and the burning properties of the clays, and also a study of the character of the porcelain produced when these clays were used as the source of china clay.

CONTENTS

I. INTRODUCTION

The average annual consumption of clays classed as kaolins and china clays in the United States for the period of 1909–1918 amounted to 404,000 tons.[1] Of this total, 250,000 tons, or 62 per cent, were imported, most of it coming from England. These clays find uses principally as fillers for paper, oilcloth, and paint, and for ceramic purposes.

Manufacturers maintain that it is necessary to use imported china clays for the better grades of paper, oilcloth, and pottery, and that the substitution of the domestic clays has not been entirely satisfactory. Part of this dissatisfaction was due to the fact that American clays are not of a uniform quality as prepared for the market. The consumer can not be sure that a later order will bring a shipment of clay with the same properties as a previous lot. It is also claimed that English clays are finer grained than our primary clays and coarser in grain than are the so-called secondary kaolins of the coastal plain. This is an important factor, as many physical properties, such as plasticity, dry strength, shrinkage, and ease of vitrification and of fusion, are, to a limited extent, functions of grain size.

[1] Middleton, Jefferson, Clayworking Industries, Silica Brick and Building Operations in the Larger Cities. U. S. Geological Survey Report; 1918.

It therefore seemed important to investigate more thoroughly our domestic deposits. Seventy-seven representative samples of white clays were gathered and are reported in the publication. For each sample there is given—

1. A brief account of the nature of the deposit.
2. The results of an elutriation of the clay by water.
3. A microscopic determination of the mineralogical composition of each fraction obtained by elutriation.
4. The molding properties, workability, color, per cent of tempering water, and volume shrinkage on drying of the clay.
5. Certain of the burning properties of the clay.
6. Certain of the properties of a porcelain body containing this clay.

II. METHOD OF PROCEDURE

Collection of Samples and Information.

Each deposit was visited personally by Mr. Watts, who examined the situation, took notes on the conditions existing at each mine, and supervised the taking and shipping of each sample, in 1918. In some cases more recent information is given as obtained from a questionnaire sent out to each of the owners of clay properties in April, 1923.

Washing Tests.

The method of separation of clays into fractions according to grain size has already been published.[2] Briefly, this consisted in first determining the concentration of caustic soda solution which gave maximum dispersion of the clay, then plunging the clay in such a solution. The slip thus produced was passed through a series of screens, then into a washing apparatus of the Schultz type. In this washing apparatus the clay is floated from the bottom to the top of the four successive conical cans, each larger than the preceding one, to a large overflow vessel. The larger the can the more slowly the water rises in it, hence the smaller the particle that will be floated out. The rate of flow was so adjusted that only material of clay-like fineness would pass out of can No. 2. Distilled water, or at least a soft-water supply, is necessary for the separation. A method of sedimentation[3] has also been applied to some of the finer clays taken up in this publication.

Microscopic Examination.

Standard methods of microscopic examination were employed in the study of the more common minerals present in the fractions obtained by washing. A sample of each fraction was then fired to

[2] Elutriation tests on American kaolins, by H. G. Schurecht, J. Am. Ceramic Soc., **3**, p. 355; 1920.

[3] Sedimentation as a means of classifying extremely fine clay particles, by H. G. Schurecht, J. Am. Ceramic Soc., **4**, p. 812; 1921.

1,000° C., after which it was again examined under the microscope to determine the cause of the color. Some of this work has already been published.[4] Its color was determined by matching against the color charts in "Color standards and nomenclature." [5]

Physical Properties.

The determination of physical properties of the raw clay was made in the customary manner. All "porosities" determined in this work were apparent porosities, determined by boiling in water.

Burning Properties.

Three bars of each clay were burned to 1,190, 1,250, 1,310, 1,370, and 1,410° C. (approximately cones 3, 6, 9, 12, and 14). The bars were tested for porosity and shrinkage. The color was matched as before, by comparison with Ridgway's charts. The deformation temperature was also determined. In a few cases, where the clay was overburned at 1,370° C., a test was made at 1,130° C. (cone 1) instead of at 1,410° C. (cone 14).

III. PORCELAIN BODY

Each clay was then made up into a standard porcelain body and tested. Bars were made and the workability and drying qualities noted. The per cent of tempering water and volume shrinkage and the modulus of rupture of the dry green bar were determined.

The porcelain bars were then burned to the same temperatures as were the clay bars. In addition to porosity and volume shrinkage, the modulus of rupture of the burned bar was determined. The bars were compared with the color charts as before, and the bars which would thus be classed as white were carefully cleaned and glazed with a colorless glaze and compared with certain glazed neat clays prepared in the following manner, in an endeavor to make the survey of more practical value to the porcelain industry.

The clays selected as standards were—

1. Best commercial grade of North Carolina (primary) kaolin. This clay is carefully washed, using the deflocculation process.
2. One of the whitest-burning English china clays.
3. A good white-burning English china clay, somewhat more plastic than No. 2.
4. A good grade of English china clay.
5. A washed Georgia (secondary) clay known as the Dry Branch brand.

These standards were at the plant of the Onondaga Pottery Co., Syracuse, N. Y., and comparisons with the test bars were made under the supervision of the company's experts. They were made from

[4] The microscopic examination of the mineral constituents of some American clays, by H. G. Schurecht, J. Am. Ceramic Soc., 5, p. 3; 1922.

[5] Ridgway, Robert, Washington, D. C.; 1912.

the neat clays and glazed with a colorless fritted glaze. A porcelain body containing these clays might have a color superior or inferior to the neat clay, depending upon the purity of the other ingredients and upon the firing conditions. Hence it was considered advisable to use glazed clays as standards rather than porcelain bodies.

The nearly white porcelains produced in this investigation were divided into five classes:

Class 1 matches No. 3 in the above list and passes as a cream-tinted porcelain equivalent to certain American-made ware.

Class 2 matches standard No. 4.

Class 3 matches standard No. 5.

Class 4 has a marked cream color.

Class 5 has a fair-to-good color, but contains specks which unfit it for porcelain-making purposes unless these specks can be eliminated by proper washing of the clay.

IV. DEPOSITS IN PENNSYLVANIA, DELAWARE, MARYLAND, AND VIRGINIA

The numbers of the samples taken from the various deposits in Pennsylvania, Delaware, Maryland, and Virginia, together with the location and the name of the organization operating the deposit, are given in Table 8.

Sample No. 1.44 from the Sandusky Portland Cement Co. deposit at Mount Holly Springs, Pa.

For a description of this property, see United States Geological Survey Bulletin 708, pages 85 and 86.

The fractions obtained on the sieves were largely quartz, aggregates of fine-grained kaolinite, and coarse crystalline kaolinite. In the cans and in the overflow it was found that the fractions were largely aggregates of fine-grained kaolinite, with some coarse crystalline kaolinite. The minor accessory minerals were quartz, hydrated silica, tourmaline, and zircon. All fractions, excepting those in cans 3, 4, and the overflow, which were characterized by the absence of colored particles, when burned at 1,000° C. showed discoloration due to brown kaolinite particles.

Sample No. 1.46 from the John A. Russel deposit at North East, Md.

This deposit is only a short distance from the other Russel property. It is mined in the same open-pit fashion. This crude kaolin is distinctly more yellow than the previous one; the occurrence, however, is practically the same, and the dike may be a continuation or a stringer from the other deposit. This material is sold chiefly for manufacturing stove linings and similar refractory products and is reported to burn a dark-cream color. Mining operations are intermittent. Both of these deposits have been worked more like sand banks than like clay deposits.

The fractions on the sieves were largely quartz, with minor amounts of kaolinite. Coarse crystalline kaolinite predominated in the fractions remaining in the cans, whereas the overflow showed largely fine-grained kaolinite. Minor minerals were biotite, tourmaline, and hydrated silica. All fractions on burning at 1,000° C. were discolored due to brown quartz and kaolinite particles.

Sample No. 1.47 from the James B. Russel deposit at North East, Md.

The mine is one-half mile west of Leslie and 1 mile north of North East. Leslie is on the Baltimore & Ohio Railroad. The deposit is a primary one of dike formation and occurs in a slightly rolling country. The width of the dike can not be determined, since all the mining which has been done consists in digging a pit into the deposit and loading the crude kaolin directly into wagons in which it is hauled to the railroad. No systematic operations have been attempted.

The crude kaolin, where exposed in these shallow pits, is of good color, but the owner claims that the deposit improves in depth. This was impossible to confirm. The overburden is only 2 or 3 feet thick, underlaid by a somewhat stained material which is not over 6 feet thick, and below this the clean, sandy, primary kaolin is exposed. The property has been worked in this simple manner at various times and the product sold to fire-brick and other refractory manufacturers. As none of the material has been washed, so far as can be learned, we have no data on the ceramic white material. The property was not being operated at the time of a visit in 1918, and no response was added to the questionnaire of 1923.

Quartz comprised the greater portion of the fractions obtained on the sieves and in cans 1 and 2. The remainder of the fractions were largely coarse crystalline kaolinite. The minor accessory minerals were muscovite, quartz, and a black "colloid." On burning at 1,000° C. all fractions were discolored excepting the overflow, which was characterized by the absence of color.

Samples Nos. 1.49, 1.63, and 1.64 from the Bacon Hill Clay Co., Bacon Hill, Md.

The deposit is only about 800 feet from the railroad station, in slightly rolling country. The deposit is secondary and appears to be a pipe clay similar to the English pipe clay rather than a secondary china clay. It is dark in color as mined but is reported to burn white. The overburden consists of 4 to 5 feet of sand and gravel. On both sides of this deposit, however, the clay dips abruptly, and at the railroad station the overburden is 75 feet thick. The clay next to the overburden is sandy but becomes more plastic with depth. The clay deposit has been worked for a depth of 25 feet. The overburden is removed by steam shovel and hand labor. The clay is mined by spade in a manner similar to that employed for the English pipe clays. It is sorted to remove any sand streaks or portions, the same as the English pipe clay. After mining, the clay is dried for a day or two in the open air and then loaded into cars and shipped. It has been chiefly used for electrical porcelain, sanitary ware, and retort manufacture. Some has also been sold to terra cotta and sagger manufacturers. The mine was not operated in 1918 when inspected, and recent inquiry indicates that the company is now out of business.

The fractions obtained from sample 1.49 in the screening and elutriation tests were largely fine-grained kaolinite aggregates, with some coarse crystalline kaolinite. Quartz, muscovite, and tourmaline were the minor accessory minerals. On burning at 1,000° C. all fractions were discolored due to brown kaolinite. The fractions of sample 1.63 obtained on the No. 100 sieve and the coarser sieves were largely quartz. The other fractions, excepting the overflow, were coarse crystalline kaolinite. The overflow fraction was largely fine-grained kaolinite, with some coarse crystalline kaolinite. Burning at 1,000° C. developed discoloration in all fractions due to the brown kaolinite. The fractions from sample 1.64 retained on the sieves and remaining in the first can were largely quartz and coarse crystalline kaolinite. In cans 2, 3, and 4 the residue was found to be coarse crystalline kaolinite, while in the overflow fine-grained kaolinite predominated over the coarse crystalline kaolinite. All fractions were discolored due to brown kaolinite when burned at 1,000° C.

Samples Nos. 1.54, 1.56, and 1.48 from the Holly Clay Co. deposit at Mount Holly Springs, Pa.

For a description of this property, see United States Geological Survey Bulletin 708, pages 86 to 88.

The residue from sample 1.54 on the sieves was largely aggregates of fine-grained kaolinite. The residues in the elutriating cans were largely coarse crystalline kaolinite, with some fine-grained kaolinite aggregates. In the overflow fraction the fine-grained kaolinite predominated. All fractions on burning at 1,000° C. were discolored due to brown kaolinite. The residues of sample 1.56 on the sieves were largely quartz, with some kaolinite. Those in the cans and in the overflow were largely fine-grained kaolinite aggregate, with some coarse crystalline kaolinite aggregate. The minor minerals were tourmaline, zircon, and hydrated silica. On burning at 1,000° C.

all fractions were discolored due to brown kaolinite. The residue from sample 1.48 on the No. 200 sieve was quartz. The residues in the cans and the overflow were largely fine-grained kaolinite aggregate, with some coarse crystalline aggregate. There were traces of tourmaline and biotite present. All fractions on burning at 1,000° C. were discolored due to the brown biotite.

Samples Nos. 1.55 and 1.74 from the Mount Eaton Clay Co. deposit at Saylorsburg, Pa.

For a description of this property, see United States Geological Survey Bulletin 708, pages 112 and 113.

The residues from sample 1.55 on the sieves were quartz and muscovite, with some smaller quantities of fine-grained kaolinite aggregates. The residues in the cans were coarse crystalline kaolinite, with some fine-grained kaolinite particles. The residue in the overflow was largely fine-grained kaolinite. All fractions on burning at 1,000° C. developed discoloration due to the brown kaolinite particles. All fractions of sample 1.74 were largely coarse crystalline kaolinite. Only in the overflow was there found any fine-grained kaolinite. Tourmaline, zircon, and quartz were the minor minerals. All fractions on burning at 1,000° C. developed discoloration due to gray impurities in the kaolinite.

Samples Nos. 1.58A and 1.58B from the Golding Sons Co. (Trenton, N. J.) deposit at Hockessin, Del.

The mine is 1 mile west of the village. The deposit is a primary one occurring in dike formation and is mined by means of narrow shafts on account of the very loose nature of the wall material. The structure of the deposit is not definitely obtainable on account of the fact that the shafts are cribbed with wooden blocks. It is reported that the overburden averages about 12 feet. Below this the kaolin occurs as a yellow to cream-colored deposit with a large sand content. The mine continues for a depth of about 50 to 60 feet. Below this the kaolin yield becomes too poor to justify operation. In 1923 this mine was not being operated, but in 1922 it put out 2,246 tons of finished china clay with a force of 14 men. No changes are contemplated in the immediate future.

This company operates a mine at Jefferes, Del., which is not far from Hockessin. The kaolin from this mine, while of good color, is very unplastic and is not acceptable alone. The clay from these two mines is mingled in a washing plant in the proportions of 5 parts Jefferes clay (1.58B) to 1 part of Hockessin clay (1.58A) to form the washed product (1.58).

The residues from sample 1.58A on a No. 100 sieve and those coarser were largely quartz. The fractions obtained in the elutriation test were largely coarse crystalline kaolinite excepting in the overflow, where considerable amounts of fine-grained kaolinite were also obtained. The minor minerals were biotite, muscovite, and zircon. All fractions on burning at 1,000° C. were discolored due to the brown mica. The fractions on sample 1.58B were the same excepting that fine-grained kaolinite appeared in the last can. Feldspar was noted among the minor accessory minerals. All fractions on burning at 1,000° C. were discolored due to biotite.

Sample No. 1.59 from the Newark China Clay Co. (Wilmington, Del.) deposit at Pleasant Hill, Del.

The mine and washing plant is 4 miles from Newark, Del. This deposit is a primary one, resembling the deposit worked by Golding Sons Co. The formation is a dike, and the overburden is about 10 feet thick maximum. The kaolin in the deposit has a very high content of silica sand but, when washed, produces a material of similar raw color to the Golding deposit and is more plastic. The mining is all done by shaft, which requires cribbing to prevent caving. Kaolin in commercial quantity has been produced at a depth of 80 feet. It was impossible to examine the face of the deposit. The material is removed by pick and shovel, hoisted to the surface in buckets, and carried to the washing plant one-eighth of a mile distant by wagon. The washing plant consists of clay washers, sand and mica troughs, which total 3,200 feet in length. The washed clay goes to large concrete vats and from these is pumped into two filter presses. The capacity of the plant is reported to be about 20 tons per day.

In 1918 the plant was not being operated on account of the high price of labor. In 1922 it produced 1,076 tons with about 8 to 10 men employed in mining and about 10 men in washing. No changes are contemplated for the future.

The residues of 1.59 on the No. 100 sieve and the other coarser sieves were largely quartz and muscovite. The residue on the No. 200 sieve contained, in addition to these, some coarse crystalline kaolinite. The residues obtained from the elutriation cans were largely coarse crystalline kaolinite. The material obtained in the overflow showed, in addition to coarse crystalline kaolinite, some fine-grained kaolinite. The minor mineral was muscovite. All fractions on burning at 1,000° C. were discolored either by the brown quartz or by the mica.

Sample No. 1.60 from the Peach Kaolin Co. deposit at Hockessin, Del.

The mine and washing plant are 3 miles west of Hockessin. The operation is the same as at other neighboring plants, and it was impossible to examine the formation. The material being mined was very much stained and contained a great deal of salmon-colored sand, producing a kaolin of a decidedly yellowish cast when raw. The superintendent, however, said that the washed kaolin burns to a very good color. The plant was being operated at the time of inspection, but the working force was only eight men and the production could not be estimated. The plant has produced 25 tons per day, according to report. The washing equipment is of the customary sort with two filter presses. The plasticity of the clay is about the same as that of the Newark China Clay Co. The plant was reported to be closed in 1922.

Sample 1.60 gave residues on the sieves composed of quartz, muscovite, and coarse crystalline kaolinite. The residues in the elutriation cans were coarse crystalline kaolinite. The fraction obtained in the overflow contained some fine-grained kaolinite in addition to the coarse crystalline kaolinite. The minor mineral was tourmaline. All fractions on burning at 1,000° C. were discolored due to brown kaolinite particles.

Sample 1.62 from the Miner-Edgar Co. deposit at Saylorsburg, Pa.

For a description of this property, see United States Geological Survey Bulletin 708, pages 111 and 112.

The company reported in 1923 that the deposit was exhausted.

The fractions from sample 1.62 obtained on the sieves and in the elutriation cans were coarse crystalline kaolinite, with some fine-grained kaolinite. The fraction in the overflow contained more of the fine-grained kaolinite than of the coarse crystalline. Minor accessory minerals were quartz, biotite, tourmaline, and muscovite. All fractions on burning at 1,000° C. were discolored due to brown kaolinite particles or black mica. The fraction in the overflow on burning showed no color.

Sample No. 1.68 from the Products Sales Co. deposit at Cold Spring, Va.

For a description of this property and for the physical and fire tests of its product, see United States Geological Survey Bulletin 708, pages 101 and 102.

The fractions obtained from sample 1.68 on the sieve and in the elutriation tests were coarse crystalline kaolinite, with some fine-grained kaolinite, and with muscovite and quartz as minor accessory minerals. All fractions on burning at 1,000° C. were discolored, due to brown kaolinite particles.

V. DEPOSITS IN NORTH CAROLINA AND SOUTH CAROLINA

The numbers of the samples taken from the various deposits in North Carolina and South Carolina, together with location and the name of the organization operating the deposit, are given in Table 9.

Samples Nos. 1.03 and 1.07 from the Harris Clay Co. deposit at Cullowhee, N. C.

The occurrence is a dike on the southwest slope of a knoll above Cullowhee Creek. It has a maximum width of 75 feet with a north-northwest strike. This deposit is intruded with numerous lenses. At present the kaolin being mined has a face of about 30 feet and is of a fair plasticity and color. The dike strikes into a slope, and its continuation, as well as the content of the plastic material, is uncertain. The present average production will not exceed 12 tons per day with a force of about 15 men. A haul of about 6 miles to the railroad makes production especially uncertain in winter.

In the screening and elutriation tests it was found that the material obtained on the sieves and in the cans was crystalline kaolinite, with muscovite, quartz, and feldspar as minor minerals. In the overflow there was very largely fine-grained kaolinite. The samples on the sieves showed a silver color due to the mica on burning at 1,000° C. The fractions from sample 1.07 obtained on the sieve and in the cans were coarse crystalline kaolinite. That in the overflow contained considerable quantities of fine-grained kaolinite in addition. The minor accessory minerals were quartz, muscovite, zircon, biotite, and feldspar. All of the samples on burning at 1,000° C. were discolored due to the presence of mica and other colored impurities.

Sample No. 1.04 from the Harris Clay Co. Sparks mine deposit at Spruce Pine, N. C.

For a description of this property and for the physical and fire tests of its product, see United States Geological Survey Bulletin 708, pages 39 to 41.

The fractions obtained in the sieving and elutriation tests on the 100 and coarser sieves were largely quartz, spar, and muscovite. That passing this sieve and retained in the cans was largely coarse crystalline kaolinite. The overflow contained some fine-grained kaolinite in addition. The minor accessory minerals were muscovite, quartz, and biotite. Due to the presence of brown kaolinite all fractions on firing at 1,000° C. were specked.

Samples Nos. 1.05 and 1.06 from the Harris Clay Co. deposit at Spruce Pine, N. C.

The mine is three-fourths mile southeast of Spruce Pine, in Mitchell County. For a description of this property and for physical and fire tests of two samples of its product, see United States Geological Survey Bulletin 708, pages 30 to 39.

The fractions from sample 1.05 obtained on the 20 and 65 sieves were coarse crystalline kaolinite. That obtained on the 100 and 200 sieves was largely quartz. The fractions obtained in the cans and overflow were coarse crystalline kaolinite, with some aggregates of the fine-grained kaolinite. The minor accessory minerals were muscovite and feldspar. Due to the stained condition of the kaolinite all fractions on burning at 1,000° C. were discolored. The fractions from sample 1.06 obtained on the sieves and in the first can were coarse crystalline kaolinite. That obtained in the other cans and the overflow contained, in addition, some fine-grained kaolinite. The minor accessory minerals were muscovite, quartz, and feldspar. All fractions retained on the sieves were discolored, due to stained kaolinite particles. The fractions in the cans were characterized by the absence of colored particles while that in the overflow was discolored, due to the stained kaolinite.

Sample No. 1.41 from the Harris Clay Co. Hog Rock mine deposit at Dillsboro, N. C.

The Hog Rock mine is about 4 miles southeast of Dillsboro, in Jackson County. For a description of this property and for physical and fire tests of the clay, see Bureau of Mines Bulletin 53, pages 129 to 131, and United States Geological Survey Bulletin 708, pages 28 to 30.

The fractions obtained in the sieving and elutriating tests were composed of coarse crystalline kaolinite, with some quartz, excepting that obtained in the overflow, where some fine-grained kaolinite was noted. The minor accessory minerals were biotite, quartz, feldspar, and muscovite. All the fractions on burning at 1,000° C. were discolored due to biotite and brown kaolinite.

Sample No. 1.14 from the Immaculate Kaolin Co. deposit at Langley, S. C.

For a description of this property and for the physical and fire tests of its product, both as received and when made up into a porcelain body, see United States Geological Survey Bulletin 708, pages 182 to 184.

In the elutriation tests the fractions were found to be fine-grained kaolinite, with some coarse crystalline kaolinite, excepting in the overflow, which was largely the fine-grained kaolinite. The minor accessory minerals were quartz, muscovite, zircon, and rutile. All fractions on burning at 1,000° C. were discolored either due to the mica or brown kaolinite.

Samples Nos. 1.15, 1.16, 1.17, and 1.19 from the Peerless Clay Co. deposit at Langley, S. C.

For a description of this property and for the physical and fire tests of four of its products, both as received and when made up into porcelain bodies, see United States Geological Survey Bulletin 708, pages 177 to 181.

The fractions obtained in the cans in the elutriation tests of sample 1.15 were largely fine-grained kaolinite, with some coarse crystalline kaolinite. Quartz was the only accessory mineral. All fractions on burning at 1,000° C. were discolored due to brown kaolinite. The fractions which were obtained from sample 1.16 were largely fine-grained kaolinite, with some coarse crystalline kaolinite. The overflow, however, was characterized by the absence of the coarse material. The accessory minerals were quartz, muscovite, and tourmaline. All fractions on burning at 1,000° C. were discolored due to stained kaolinite. All the fractions obtained from sample 1.17 were fine-grained kaolinite, and all on burning at 1,000° C. were discolored due to stained kaolinite particles. The fractions from sample 1.19 were fine-grained kaolinite aggregates, with some coarse crystalline kaolinite, excepting the overflow, which was largely fine-grained kaolinite. Due to the discolored condition of the kaolinite, all fractions on burning at 1,000° C. were discolored.

Sample No. 1.18 from the South Carolina Clay Co. deposit at Langley, S. C.

For a description of this property and for the physical and fire tests of the clay as received and when made up into a porcelain body, see United States Geological Survey Bulletin 708, pages 171 to 174.

In the elutriation tests of sample 1.18 it was found that fractions on the sieves were fine-grained kaolinite aggregates, with some muscovite and coarse crystalline kaolinite. That obtained in the first three cans was largely coarse crystalline kaolinite and aggregates of fine kaolinite, while the fractions in the last can and the overflow were largely fine-grained kaolinite, with some coarse crystalline kaolinite. The minor accessory minerals were muscovite, tourmaline, biotite, and rutile. All fractions on burning at 1,000° C., on the sieves and in the first three cans, were slightly discolored due to the mica or brown kaolinite. The fractions in can 4 and the overflow were characterized by the absence of color.

Samples Nos. 1.20 (No. 2 grade top and bottom strata) and 1.21 (No. 1 grade middle stratum) from the Paragon Kaolin Co. deposit at Langley, S. C.

For a description of this property and for the physical and fire tests of two of its products, both as received and when made up into a porcelain body, see United States Geological Survey Bulletin 708, pages 174 to 177.

In the elutriation tests of sample 1.20 the fractions were largely fine-grained kaolinite aggregates with some coarse crystalline kaolinite. The minor accessory minerals were rutile, zircon, muscovite, biotite, and tourmaline. All fractions on burning at 1,000° C. were more or less discolored, due to brown kaolinite particles. In fractioning sample 1.21 it was found that the portions retained on the sieves were largely fine-grained kaolinite aggregates. That obtained in the cans was largely coarse crystalline kaolinite. Material in the overflow was largely fine-grained kaolinite aggregate, with some coarse crystalline kaolinite. The minor accessory minerals were muscovite, quartz, biotite, tourmaline, and rutile. All of the fractions on burning at 1,000° C. were discolored, due to the brown kaolinite, excepting that in the last can and the overflow, which were characterized by the absence of color.

Sample No. 1.22 from the Parker Kaolin Co. deposit at Warrenville, S. C.

For a description of this property and for the physical and fire tests of its product, both as received and when made up into a porcelain body, see United States Geological Survey Bulletin 708, pages 211 to 213.

Material from sample 1.22 on the sieves was largely quartz. That in the cans and the overflow was largely fine-grained kaolinite aggregate, with some coarse crystalline kaolinite. Accessory minerals were zircon, quartz, muscovite, tourmaline, and biotite. On burning at 1,000° C. the portions that had been retained on the sieves were characterized by the absence of color. Those retained in the cans contained a few black particles, while that in the overflow was characterized by the absence of color.

Samples Nos. 1.45 and 1.70 from the Interstate Clay Co. deposit at Horrell Hill, S. C.

For a description of this property and for the physical and fire tests of its crude and washed products, both as received and when made up into a porcelain body, see United States Geological Survey Bulletin 708, pages 215 and 219.

The fractions obtained on the sieve and in the cans were largely fine-grained kaolinite aggregates, with some coarse crystalline kaolinite. The minor accessory minerals were muscovite, quartz, and zircon. All fractions on burning at 1,000° C. were discolored, due to brown mica. The fractions obtained from sample 1.70 were composed of fine-grained kaolinite and coarse crystalline kaolinite. Quartz and muscovite were the minor accessory minerals. On burning at 1,000° C. all fractions were free of discoloration.

Sample No. 1.36 from the Hand Clay Co. deposit at Canton, N. C.

For a description of this property and for physical and fire tests of its product, see United States Geological Survey Bulletin 708, pages 31 to 34.

The fractions obtained on the sieves and the first three cans were coarse crystalline kaolinite. In the fourth can and the overflow the major portion was fine-grained kaolinite and the minor portion coarse crystalline kaolinite. The accessory minerals were tourmaline, biotite, quartz, and muscovite. All fractions on burning at 1,000° C. were discolored, either by the biotite or brown kaolinite.

38891°—27——3

Sample No. 1.53 from the Edisto Kaolin Co. deposit at Rayflin, S. C.

For a description of this property and for the physical and fire tests of its product, both as received and when made up into a porcelain body, see United States Geological Survey Bulletin 708, pages 213 to 215.

The fractions obtained on the sieve and the first four cans were largely coarse crystalline kaolinite, with some fine-grained kaolinite aggregates. The relative portions of these two materials were reversed in the overflow. The minor accessory minerals were muscovite, zircon, biotite, and rutile. Excepting the last can and the overflow, which were free of color, all fractions on burning at 1,000° C. were discolored, due to rutile and biotite.

Sample No. 1.57 from the J. A. & W. E. Hill deposit at Abbeyville, S. C.

For a description of this property and for the physical and fire tests of its product, both as received and when made up into a porcelain body, see United States Geological Survey Bulletin 708, pages 230 to 233.

The fractions obtained on 20 and 65 mesh sieves from sample 1.57 were largely quartz. Those obtained on the other sieves and in the cans showed decreasing amounts of quartz, with increasing amounts of coarse crystalline kaolinite. The overflow was largely coarse crystalline kaolinite, with some fine-grained kaolinite. The minor accessory minerals were zircon and feldspar. On burning at 1,000° C. all fractions, except those in the last can and the overflow, which were characterized by the absence of color, showed discoloration, due to brown kaolinite.

Samples Nos. 1.65 and 1.66 from the McNamee Kaolin Co. deposit at Bath, S. C.

For a description of this property and for the physical and fire tests of two of its products, both as received and when made up into a porcelain body, see United States Geological Survey Bulletin 708, pages 168 to 171.

The fractions obtained in the elutriation tests of 1.65 and 1.66 were found to be fine-grained kaolinite, with some coarse crystalline particles of the same. Only traces of accessory minerals were noticed. On firing at 1,000° C. all fractions were characterized by the absence of color.

Sample No. 1.69 from the Columbia Mineral Products Co. deposit at Columbia, S. C.

For a description of this property and for the physical and fire tests of its product, both as received and when made up into porcelain bodies, see United States Geological Survey Bulletin 708, pages 219 and 220.

In the sieving and elutriation tests of this sample all fractions were found to be fine-grained kaolinite aggregates, with some coarse crystalline particles of the same. Minor accessory minerals were quartz and muscovite. The fractions obtained on the sieves on burning at 1,000° C. were discolored by brown kaolinite, while all other fractions were characterized by the absence of color.

VI. DEPOSITS IN GEORGIA

In Table 10 are given the numbers of the samples taken from the various deposits in Georgia, together with the location and the name of the organization operating the deposit.

Sample No. 1.10 from the Republic Mining & Milling Co. deposit at McIntyre, Ga.

This deposit is worked for bauxite, although a stratum of white kaolin has been reported at various times as underlying the bauxite deposit. A careful investigation disclosed the fact that at a depth of about 6 feet the bauxite deposit runs into a kaolin of variable color, but often white. This stratum never exceeds 2 feet in thickness before it shows a distinct stain or red color. The operators claim that the proportion of white clay is not sufficient to justify giving it any attention.

In the elutriation and screening tests it was found that the material obtained on the sieves consisted mostly of coarse crystalline kaolinite and fine-grained kaolinite. There were considerable amounts of muscovite and quartz. The material obtained in the cans was similar in nature, while the material obtained in the overflow was largely fine-grained kaolinite. The discoloration obtained in firing the different fractions of the clay at 1,000° C. was due to black and brown mica particles.

Sample No. 1.12 from the Houston Kaolin Co. deposit at Perry, Ga.

The mine is 4 miles northwest of Perry, Ga., on a private switch of the Perry division of the Central of Georgia Railway, and is secondary in nature. It has been opened on the north slope for about 400 feet. The original scheme for opening the deposit was apparently an east and west cut, but the drying plant was placed on the south side of the deposit, and the mining has progressed in that direction until the face of the pit is almost to the plant walls. An effort to tunnel has yielded much kaolin, but the expense is necessarily much greater than open cutting. Some water was encountered. The kaolin exposed appears good. The evidence of fresh and weathered pyrites is noted in the entrance to tunnels. A cave-in prevented inspection to any considerable depth.

The property was not operated in 1918 and has not been operated since. The drying plant should be moved before successful operation could be resumed.

In the elutriation and screening tests it was found that the material obtained on the sieves was largely fine-grained kaolinite aggregates, with some coarse crystalline kaolinite. That obtained in the first three cans was coarse crystalline kaolinite and fine-grained kaolinite particles. That obtained in can No. 4 and the overflow was largely fine-grained kaolinite aggregates, with some coarse crystalline kaolinite. The fractions obtained on the sieves contained no colored particles when burned at 1,000° C. That obtained in the first three cans after burning at 1,000° C. contained a few brown rutile and mica particle specks, while that obtained in can 4 and the overflow was characterized by the absence of the colored specks.

Sample No. 1.13 from the J. D. Fagan property deposit at Fort Valley, Ga.

This property is 2½ miles southeast of Fort Valley, Ga., near the Perry branch of the Central of Georgia Railway. This is only a prospect, but was included because of its having been frequently referred to in reference to Georgia kaolins. The deposit is exposed in a gulley along the railroad and also outcrops in the adjoining fields in numerous places. The clay, which is secondary, seems very plastic and has resisted disintegration. The sample was taken along the railroad and was somewhat stained.

The material obtained on the sieves was largely quartz, with considerable coarse crystalline kaolinite and muscovite. Traces of biotite were noted. In cans 1 and 2 were obtained quartz and coarse crystalline kaolinite, whereas quartz was absent in can 3. In can 4 the material contained, in addition to the coarse crystalline kaolinite, fine-grained kaolinite, and the overflow contained largely fine-grained kaolinite. Traces of zircon were noted in cans 1, 2, and 3. When the products obtained on the sieves and in cans 1 and 2 were burned at 1,000° C. they were discolored with brown mica and brown kaolinite particles. The other fractions were discolored, due to brown kaolinite particles.

Samples Nos. 1.23 (top stratum) and 1.24 (lower stratum) from the Golding Sons Co. deposit at Butler, Ga.

The mine is located 2½ miles west of Butler, Ga., and 1 mile south of the Columbus division of the Central of Georgia Railway. The kaolin here is distinctly secondary. The deposit occurs in a basin which has been opened over an area of about 1½ acres. The company has made drillings which prove the presence of kaolin extending over about 15 acres, but the property has never been fully developed. There are, therefore, very large reserves. The overburden of red sandy loam varies from 4 to 16 feet in thickness. Below this is the top stratum of clay, 4 to 12 feet thick, the lowest foot of which carries considerable sand. Below this are 4 to 6 feet of white sand and 2 feet of red sand. Below the red sand is the bottom stratum of clay, which varies from 4 to 6 feet thick. Below this is a very coarse white sand.

The deposit as now opened shows a promising quality of material. Each stratum runs reasonably true over a considerable area. Drillings indicate that in other parts of the deposit, particularly toward the north, the intermediate layer of sand decreases in thickness.

Crude clay, air-dried, is the only form marketed. In 1918 the output was about 25 tons per day, but an increase to 50 tons was contemplated. The company states that they marketed 3,000 tons in 1922 and employed 15 men.

For the physical and fire tests of the top stratum samples, see United States Geological Survey Bulletin 708, page 199.

In sample 1.23 the material obtained on the sieves was largely fine-grained kaolinite, with some coarse crystalline kaolinite, together with muscovite and considerable amounts of quartz. The material obtained in the cans and the overflow was largely fine-grained kaolinite, with coarse crystalline kaolinite. Rutile, zircon, and tourmaline were present in very small amounts. The material obtained on the sieves and can 1 and burned to 1,000° C. was colored, due to brown biotite particles. That obtained in can 2 was characterized by the absence of colored particles, whereas that obtained in cans 3 and 4 and the overflow was discolored, due to particles of brown-stained kaolinite. The material obtained from sample 1.24 on the sieves was largely fine-grained kaolinite, with some coarse crystalline kaolinite. That obtained in the first 3 cans was coarse crystalline kaolinite, with some fine-grained kaolinite. That obtained in can 4 and the overflow was largely fine-grained kaolinite aggregates. The clay obtained on the sieves when burned at 1,000° C. was discolored by particles of brown-stained kaolinite, while that obtained in the cans and the overflow was free from colored particles.

Samples Nos. 1.30 (bottom stratum), 1.25 (middle stratum), 1.26 (top stratum), and. 1.75 (washed product) from the Savannah Kaolin Co. deposit at Gordon, Ga.

The mine is located 1 mile south of Gordon Station and the refining plant on a private switch at Gordon. The deposit is on an elevation about 70 feet higher than the main line of the railroad and consists of an overburden from 6 to 15 feet thick, then about 10 feet of hard clay with a greenish cast. Below this are 12 feet of a soft cream-colored clay, and below this about 20 feet of a bluish clay. This clay, on drying, has a fine white color.

The overburden is removed by steam shovel and the clay mined by blasting and conveyed by narrow-gauge steam railroad to the plant. The two upper strata were blended to make the washed product. The lowest stratum was not mined. This mine closed in December, 1920. In July, 1922, a new mine was opened, the clay from which, the company states, has entirely different properties from that previously marketed. Reserves are estimated by the owners at 150,000 tons of material equal to that at present being shipped.

The washing plant, which remains as it was in 1918, consists of 2 disintegrators; 2 washers of the paddle type; 2 centrifugal pumps; 2 sets of mica troughs, one 700 and one 900 feet long; 2 revolving screens covered with 120-mesh brass lawn; 2 large and 1 small concentrating tanks; 15 filter presses; and 2 large drying sheds. One of these has steam heat and can produce 50 tons daily. There is also an air-drying shed with a capacity of 500 tons.

The company employs about 30 men in mining and 50 in other work and has an output of about 50 tons per day.

The fractions obtained in sieving and elutriating sample 1.30 were found to be fine-grained kaolinite aggregates and coarse crystalline kaolinite, with traces of biotite and zircon. Considerable amounts of a black unknown mineral were found on the sieves and in the first three cans and to a minor degree in can 4 and the overflow. All fractions on burning were specked due to brown-stained kaolinite and the black unknown mineral. The fractions of sample 1.25 on the sieve and the cans were fine-grained kaolinite aggregates and coarse crystalline kaolinite. Tourmaline and zircon were present in traces in the coarser fractions and quartz and zircon in cans 2, 3, and 4. The fraction obtained on the sieve on burning at 1,000° C. showed discoloration due to the brown zircon. All other fractions were free of colored particles. In the elutriation of sample 1.26 the material obtained in the cans was coarse crystalline kaolinite and fine-grained kaolinite particles. That in the overflow was largely fine-grained kaolinite. Biotite, rutile, zircon, quartz, and the black unknown mineral were accessory minerals present in small amounts to traces. The clay obtained in the first three cans was discolored due to the biotite and a black unknown mineral. The clay from can 4 on burning was free from colored specks. The fractions obtained on the sieves and in the first three cans of sample 1.75 were coarse crystalline kaolinite, and fine-grained kaolinite, with quartz, muscovite, tourmaline, zircon, and bauxite present as accessory minerals. The clay in can 4 and the overflow was fine-grained kaolinite and some coarse crystalline kaolinite. All fractions on burning at 1,000° C. showed discoloration due to brown bauxite particles.

Sample No. 1.27 from the Albion Kaolin Co. deposit at Hephzibah, Ga.

This property is 1½ miles southwest of Hephzibah on a private switch. The company owns 1,300 acres, which is unofficially reported as being underlaid throughout with kaolin.

The 1918 operation consisted of a large open pit which was being worked along a face of about 80 feet. Present mining is about one-eighth mile from the old pit. There is an average overburden of 20 feet of reddish soil underlaid by stained clay. The stained clay is 10 or 12 feet thick at the northeast, diminishing to almost nothing at the southwest end. Below this occur 7 to 10 feet of a white sandy material which contains about 20 per cent kaolin of good quality. Below this there are 10 to 13 feet of No. 1 grade white clay. Sample No. 1.27 represents this. It is at present being mined by pick and shovel and dried. It is shipped crude for paper filler. There are very large reserves.

Below this kaolin is another deposit of kaolin reported to be 9 to 10 feet thick, but this is not open at present. The proprietor says that it does not work up with water as readily as the white clay now being shipped and for that reason has never been worked. The condition of the mine when visited did not make it possible to take a sample of this clay.

The proprietor stated that the normal labor force was 120 men, producing 60 tons daily. In 1918, 40 men were employed, and the output did not exceed 20 tons per day. During 1922 there were 80 men employed on mining and 20 at other work. On account of car shortages and strikes the production for the year was only 10,000 tons. No changes have been decided on for the future.

The clay obtained on the sieves was largely fine-grained kaolinite aggregates. That obtained in the first four cans showed, in addition to the fine-grained kaolinite aggregates, coarse crystalline kaolinite. The overflow was largely fine-grained kaolinite. The fractions on the sieve and in the first two cans were discolored due to iron-stained kaolinite. That obtained in cans 3 and 4 on burning at 1,000° C. showed a bluish tinge due to translucent crystalline kaolinite, while that in the overflow had a buff tinge due to iron-stained kaolinite.

Samples Nos. 1.28 (lower stratum), 1.35 (top stratum), and 1.76 (washed product) from the Columbia Kaolin & Aluminum Co. deposit at Gordon, Ga.

This mine is located 3 miles south-southwest of Gordon, and the refining plant is on a private switch at Gordon. The mine is about 2 miles from that of the Savannah Kaolin Co. and is an open cut on a west slope and about 50 feet higher than a neighboring stream. The overburden is a bauxitic clay which was formerly worked for bauxite. The top stratum, which was being worked in 1918, was exposed for 200 feet and is from 12 to 15 feet thick. This is a soft cream-colored clay, apparently very uniform. Under this is a 5-foot band of bauxitic kaolin, not sufficiently rich in bauxite to justify its extraction. Under this are at least 20 feet of a hard clay of greenish cast. This is at present the source of crude material.

Mining is done by pick and shovel, with the aid of dynamite. The clay is hauled to the washing plant on a narrow-gauge steam railroad.

The washing plant consists of a crusher, one smooth and one corrugated roll, a washer, a centrifugal pump, floating troughs, a revolving screen, and settling tanks. From this, two pumps feed 12 filter presses. The pressed clay is dried by hot air in 12 tunnels equipped with fans. Capacity of the plant, 80 tons per day with 35 workmen. In 1918 the output was 35 to 40 tons per day with 20 men.

This plant ceased operations in December, 1920. It was leased by the Savannah Kaolin Co. and reopened in December, 1922. The lower stratum is now being worked exclusively.

The clays obtained on the sieves and the cans of sample 1.28 were coarse crystalline kaolinite and fine-grained kaolinite aggregates. That in the overflow was fine-grained kaolinite aggregates. The fractions on the first three sieves on burning at 1,000° C. were discolored due to brown-stained kaolinite. That obtained on the 200 sieve and in the first four cans was characterized by the absence of colored particles, while the overflow was characterized by brown-stained kaolinite. The clay obtained on the sieve and the first four cans was largely coarse crystalline kaolinite and fine-grained kaolinite aggregates. The accessory minerals were muscovite, zircon, biotite, rutile, and a black unknown mineral. The overflow was composed of fine-grained kaolinite aggregates, with some coarse crystalline kaolinite. The clay obtained on the sieve and in the first three cans was discolored due to brown-stained kaolinite and the black unknown mineral. Clays in can 4 and the overflow on burning were characterized by the absence of color. The fractions of 1.76 on the sieve and in the cans were found to be coarse crystalline kaolinite and fine-grained kaolinite aggregates. In the overflow the fine-grained kaolinite aggregates predominated over the coarse crystalline kaolinite. On burning the fractions at 1,000° C. all were discolored due to brown kaolinite, except the overflow, which was free of colored particles.

Samples Nos. 1.33 (upper stratum), 1.61 (lower stratum), and 1.73 (washed product) from the Kaolin Mining Co. deposit at Claymont, Ga.

The deposit is located 5 miles east of Gordon and consists of 5 to 15 feet of overburden, then 11 to 20 feet of a sandy clay with nodules of material resembling bauxite. The clay is cream-colored and washes very easily. Below this is a streak of very sandy clay about 2 feet thick. Under this are 12 feet of a dense clay of good white color with a slight greenish cast. This clay is very compact and washes with difficulty. The two strata are mined separately and mixed in equal proportions before washing, the intermediate layer being removed. Washing is performed in the customary manner, using 100-mesh screen.

The output in 1918 was about 40 tons per day with a force of 15 to 25 men. The property has been acquired by Moore & Munger and is now being operated to capacity.

The fractions of sample 1.33 obtained on the sieve and the first four cans were largely coarse crystalline kaolinite and fine-grained kaolinite aggregates. That in the overflow was largely fine-grained kaolinite. Bauxitic clay, quartz, zircon, biotite, tourmaline, and rutile were the minor accessory minerals. The fractions when burned at 1,000° C. showed discoloration due to the bauxitic clay, rutile, and biotite particles, except those from can 3 and the overflow, which were free of specks. The fractions of sample 1.61 were largely kaolinite. Quartz, zircon, tourmaline, and a black unknown mineral were the minor accessory minerals. All fractions, excepting the overflow, which was free of specks, on burning at 1,000° C. show discoloration due to brown kaolinite, mica, and the unknown mineral. Sample No. 1.73 on separating into various sizes gave fractions composed of fine-grained kaolinite aggregates and coarse crystalline kaolinite. Zircon, biotite, and muscovite were the minor accessory minerals. All fractions on burning at 1,000° C. were discolored by the brown kaolinite and the black biotite particles, excepting the overflow, which was free from any colored specks.

Samples Nos. 1.50 (top stratum) and 1.51 (bottom stratum) from the Edgar Bros. Co. Dedrick mine deposit at McIntyre, Ga.

This mine is about 2 miles west of the McIntyre mine operated by the same company. The overburden is about 25 feet thick. Under this is a stratum of light cream-colored kaolin sloping from 12 feet thick at the east side to nothing at the west. Below this is a band of purple sand from 12 to 16 inches thick and below this about 15 feet of very light blue kaolin. The two strata are mixed after mining.

The portions of sample 1.50 were largely quartz, muscovite, and some fine-grained kaolinite aggregates. That obtained in the cans was largely coarse crystalline kaolinite and fine-grained kaolinite aggregates. That obtained in the overflow was fine-grained kaolinite, with some coarse crystalline kaolinite. All fractions on burning at 1,000° C. were discolored due to brown kaolinite particles, excepting the overflow, which was free from colored specks. The residues on the several sieves of sample 1.51 were largely muscovite and quartz, with fine-grained kaolinite aggregates next in abundance. The fractions obtained in cans 1 and 2 were coarse crystalline kaolinite and fine-grained kaolinite aggregates. That obtained in cans 3 and 4 and the overflow was largely fine-grained kaolinite aggregates, with some coarse crystalline kaolinite. The accessory minerals were biotite, quartz, and muscovite. All fractions on burning at 1,000° C. were discolored by mica particles.

Sample No. 1.52 from the Edgar Bros. Co. McIntyre mine deposit at McIntyre, Ga.

The mine is about one-half mile west of McIntyre. It is an open cut into the north slope of a hill and does not have natural drainage. Six to ten feet of overburden are followed by 10 to 14 feet of sandy micaceous clay, then a thin streak of a hard sandy rock, then 25 to 30 feet of white clay. When damp this clay has a slight blue cast, but on drying it is a very good white.

No data were obtainable in regard to washing process or output either in 1918 or in 1923.

The residues of sample 1.52 on the 20 and 65 mesh sieve were quartz and muscovite, with considerable amounts of coarse crystalline kaolinite and fine-grained kaolinite aggregates. That obtained on the 100 and 200 mesh sieves as well as that in the cans was largely coarse crystalline kaolinite and fine-grained kaolinite aggregates. That in the overflow was fine-grained kaolinite, with some coarse crystalline kaolinite. Zircon, biotite, tourmaline, and rutile are the minor accessory minerals. All fractions on burning at 1,000° C. were discolored by the brown mica and kaolinite particles, excepting the overflow, which was free of colored specks.

Samples Nos. 1.31 (upper stratum) and 1.40 (lower stratum) from the Georgia Kaolin Co. (Macon, Ga.) deposit at Dry Branch, Ga.

The deposit lies on a slope in a narrow valley, the topography being very irregular. There are three strata of merchantable clay averaging 16 to 25 feet thick in all, exclusive of stained material. Overburden varies from 20 to 60 feet thick. Under this are up to 4 feet of stained sandy kaolin, then 4 to 9 feet of loosely bedded white kaolin, which appears to contain no more sand than the clay below it. This kaolin contains numerous blotches of a faint brown stain; this, however, is not uniform throughout the stratum. Below this there is a variable layer, running from nothing to 3 feet, of hard bone-like kaolin resembling halloycite. It is apparently some other higher grade of silicate of aluminum than kaolin. It breaks into angular fragments, and only after thorough remoistening can it be brought into suspension in water. Even after this treatment the fragments of the disintegrated material contain angular structures. Below this bone-like clay we find 7 to 10 feet or more of a dense white kaolin free from impurities except occasional sand pockets.

The washing plant consists of one roll crusher, two concrete washers fed by an automatic clay feeder, a centrifugal pump, 300 feet of mica troughs, a series of five settling tanks from which the concentrated slip returns to a single storage tank. From this it is pumped into 10 filter presses. The pressed clay is dried in five tunnel driers and eight open-air racks, all steam-heated. The capacity is 50 tons per day with 35 men employed. The company did not answer requests for information in 1923.

In sample 1.31 the portions obtained on the sieve and in the cans were coarse crystalline kaolinite and fine-grained kaolinite aggregates. Muscovite, biotite, feldspar, rutile, and a black unknown mineral were the minor accessory minerals. The overflow was composed of fine-grained kaolinite aggregates and coarse crystalline kaolinite. All fractions on burning at 1,000° C. were discolored by the brown biotite and rutile particles, excepting that from can 4 and the overflow, which was free of colored specks. All the fractions from sample 1.40 were composed of fine-grained kaolinite aggregates and coarse crystalline kaolinite. Bauxitic clay, zircon, biotite, and a black unknown mineral were the minor accessory minerals. All of the fractions on burning at 1,000° C. were discolored due either to the bauxitic clay, biotite, or the black unknown mineral.

Samples Nos. 1.34 (upper stratum) and 1.39 (lower stratum) from the R. H. Jones & Co. deposit at Dry Branch, Ga.

This mine adjoins the property of the Georgia Kaolin Co. and was first started as a tunnel, since the deposit at that point was thin and the overburden 30 feet thick. Tunneling was abandoned, however, because infiltering water caused the clay to slide.

Below the overburden the kaolin occurs as a rather loose bed 5 or 6 feet thick. Sample No. 1.34 was taken from this bed. It closely resembles the top layer of the Georgia Kaolin Co. deposit and has the same peculiar brown blotches. Below this the clay runs directly into the lower stratum, sample No. 1.39, which is about 4 or 5 feet thick and which also closely resembles the lower stratum of the Georgia Kaolin Co. There is no evidence of the streak of bone-like material which is observed there. Reserves are very large.

The chief drawback to the operation of this mine is the location of the company's land. It is very limited in extent and so located that they have little space for disposing of overburden.

The operation consists of a steam shovel, side-dump cars, and a steam hoist—these are used to remove overburden. The clay is mined by pick and shovel and removed by wheelbarrow to the drying shed. The dry clay is crushed to 1-inch diameter and sold unwashed. Hand picking is necessary. In 1918 about 10 men were employed, and output was 3 or 4 tons per day. The company reports 10,000 tons marketed in 1922 and 15 men employed.

All of the residues on the sieve and in the cans from sample 1.34 were composed of coarse crystalline and fine-grained kaolinite aggregates. That obtained in the overflow was largely fine-grained kaolinite, with some coarse crystalline kaolinite. While minor quantities of quartz, zircon, biotite, and tourmaline were present, all fractions on burning at 1,000° C. were free of colored specks. The residues from sample 1.39 obtained on the sieve and in the cans were coarse crystalline kaolinite and fine-grained kaolinite aggregates. The clay in the overflow was fine-grained kaolinite, with some coarse crystalline kaolinite. Biotite, rutile, zircon, muscovite, and bauxitic clay were minor accessory minerals. All fractions on burning at 1,000° C. were discolored due either to the biotite, rutile, or bauxitic clay.

Samples Nos. 1.29 (top stratum), 1.67 (lower stratum), and 1.32 (top clay) from the American Clay Co. deposit at Dry Branch, Ga.

The works are located along the line of the Macon, Dublin & Savannah Railroad, on the slope of a ridge. The deposit had been stripped in 1918 over an area of 1,200 feet long and 500 feet wide. In 1923 they were working within 150 yards of the same place, had uncovered 40,000 tons, and estimated reserves at 500,000 to 1,000,000 tons.

The overburden varies from 8 to 10 feet in depth. The clay for 3 feet below this is rejected, being stained. Below this are 6 feet of top clay, sample No. 1.32. This has been mined over most of the area and marketed crude as a paper clay. Below this there are 6 feet of white kaolin, sample No. 1.29, resembling the top stratum of the Georgia Kaolin Co. deposit, but more closely bedded. The same peculiar blotches of brownish hue are noted in this material. The discoloration is hardly apparent, since the property is remarkably well drained.

Below this there is a high-grade crude clay about 4 feet thick and apparently closely resembling the lower stratum in other deposits in this district; it is sample No. 1.67. These lower strata were just being opened in 1918. The bed was then 500 feet long and 60 feet wide.

The company has a washing plant and is mining and washing these two strata together. The kaolin is broken down by dynamite and removed by aerial tramway to an inclined railroad where it is carried to the washing plant. This consists of a roll crusher, two washers, 500 feet of mica troughs, and a series of large settling tanks, from which the excess water is drawn off and used again. The clay is pumped into eight filter presses. The water and slip from these and the overflow from the pumps is run directly into the tanks and is not rewashed. One steam drier rack and two open driers are used. Handling is largely by gravity.

The capacity in 1918 was about 25 tons per day of washed clay, and about 35 men were employed. The company reports 22,000 tons shipped in 1922, when they employed 15 to 20 men in mining and 30 to 40 in other operations. They contemplate an increase in crude-clay production in 1923.

The residue from sample 1.29 on the sieves and in cans 1 and 2 was largely muscovite, with coarse crystalline kaolinite and fine-grained kaolinite aggregates. The clay in cans 3 and 4 and the overflow was largely fine-grained kaolinite aggregates and coarse crystalline kaolinite. A black, unknown mineral, muscovite, zircon, and rutile, were the minor aecessory minerals. All fractions on burning at 1,000° C. were colored by particles of the black unknown mineral or by the muscovite. The clay from the overflow was free of specks. Sample 1.67 on fractioning gave on the sieves and in the cans coarse crystalline kaolinite and fine-grained kaolinite aggregates. The overflow was largely fine-grained kaolinite, with some coarse crystalline kaolinite. Accessory minerals were quartz, a black unknown mineral, and biotite. These discolored all fractions on burning at 1,000° C., excepting the overflow, which was free of color. All fractions from sample 1.32 were largely coarse crystalline kaolinite, with fine-grained kaolinite aggregates, excepting the overflow, in which the fine-grained kaolinite predominated. The accessory minerals were bauxitic clay, hydrated silica, rutile, and muscovite. All fractions after burning at 1,000° C. were discolored, due to the bauxitic clay or the rutile.

Samples Nos. 1.37 (lower stratum) and 1.38 (top stratum) from the John Sant & Sons Co. deposit at Dry Branch, Ga.

This property is 2½ miles south of Dry Branch by road and off the railroad. The pit is about 500 feet long, and a 200-foot exposed face is being worked. The overburden varies from 15 to 20 feet in thickness. Below this is about 1 foot of stained material and then about 5 feet of a clay of good color, but of a peculiar bone-like nature and conchoidal fracture. Below this are 3 feet of clay containing fine specks of iron oxide which have caused blotched stains. Below this there are about 6 feet of a soapy plastic kaolin with very little evidence of bedding or stratification. The mine is worked by pick and shovel without explosives. The intermediate stratum is discarded. The clean clay is removed by tramway and dried, pulverized, and screened. It is hauled by wagon to the railway.

A force of about 12 men was producing about 15 tons per day in 1918. No information could be obtained in 1923.

The portions of sample 1.37 obtained in the cans were largely coarse crystalline kaolinite, with fine-grained kaolinite aggregates. In the overflow the relative proportion of these two was reversed. The minor accessory minerals were muscovite, quartz, zircon, and rutile. All fractions after burning at 1,000° C. were discolored due to the brown kaolinite or rutile. The portions of sample 1.38 obtained on all the sieves excepting the 200 mesh were largely quartz and fine-grained kaolinite aggregates. All the other fractions were largely fine-grained kaolinite aggregates, with some coarse crystalline kaolinite. Bauxitic clay, muscovite, biotite, zircon, rutile, and tourmaline were the accessory minerals present in minor quantities. All portions, after burning at 1,000° C., were discolored, due either to the brown quartz, bauxitic clay, or mica particles.

Table 1.—*Elutriation tests of clays from Pennsylvania, Delaware, Maryland, and Virginia*

Sieve or can No.	Sample 1.44	Sample 1.46	Sample 1.47	Sample 1.49	Sample 1.63
20 mesh:					
Separated ... per cent	7.3	18.7	4.1	0	18.4
Diameter ... mm	2.0000	2.0000	2.0000	0	2.0000
Surface factor	3.6	9.4	2.1	0	9.2
Color at 1,000° C	Tinge of pinkish buff, Pl. XXIX, 17″, O.Y., d.	Tinge of flame scarlet, Pl. 11, 9. OR-O.	White with cream tinge.	...	White with pale salmon color specks, Pl. XIV, 9′, OR-O, f.
20–65 mesh:					
Separated ... per cent	14.6	12.4	20.2	0.3	22.0
Diameter ... mm	.5662	.5662	.5662	.5662	.5662
Surface factor	2.6	37.8	35.7	.6	38.9
Color at 1,000° C	As above.	As above.	As above.	Pale ochraceous buff, Pl. XV, 15′, Y-O, f.	As above.
65–100 mesh:					
Separated ... per cent	2.5	2.9	2.4	.3	2.5
Diameter ... mm	.1778	.1778	.1778	.1778	.1778
Surface factor	13.9	16.4	13.5	2.0	14.3
Color at 1,000° C	As above.	As above.	As above.	As above.	As above.
100–200 mesh:					
Separated ... per cent	7.6	4.9	4.7	3.0	6.2
Diameter ... mm	.1142	.1142	.1142	.1142	.1142
Surface factor	52.8	43.0	32.5	26.3	54.7
Color at 1,000° C	As above.	As above.	As above.	As above.	Pale salmon color, Pl. XIV, 9′, OR-O, f.
Can 1:					
Separated ... per cent	22.9	9.2	10.3	16.9	0.8
Diameter ... mm	.0368	.0376	.0376	.0351	.0364
Surface factor	622.3	245.2	273.5	483.8	268.7
Color at 1,000° C	White with cream tinge.	Capucine buff, Pl. III, 13. OY-O, f.	As above.	As above.	As above.
Can 2:					
Separated ... per cent	30.5	5.4	2.3	5.9	4.8
Diameter ... mm	.0167	.0238	.0244	.0119	.0235
Surface factor	1,826.0	229.0	92.6	493.3	205.1
Color at 1,000° C	As above.	As above.	As above.	As above.	As above.
Can 3:					
Separated ... per cent	2.6	9.8	11.9	12.2	7.6
Diameter ... mm	.0087	.0164	.0140	.0087	.0144
Surface factor	297.1	597.0	847.2	1,404.6	532.9
Color at 1,000° C	White.	As above.	As above.	As above.	As above.
Can 4:					
Separated ... per cent	5.4	8.7	13.6	9.5	7.7
Diameter ... mm	.0045	.0113	.0065	.0041	.0061
Surface factor	1,194.0	774.3	2,086.0	2,326.8	1,265.0
Color at 1,000° C	As above.	As above.	White with green tinge.	As above.	Pale flesh color. Pl. XIV, 7′, R-O, f.
Overflow:					
Separated ... per cent	6.7	18.0	30.6	52.0	21.0
Diameter ... mm	.0019	.0017	.0057	.0024	.0021
Surface factor	3,537.0	10,588.0	5,312.0	21,708.0	10,020.0
Color at 1,000° C	As above.	As above.	White.	As above.	As above.
Clay-like substance ... per cent	13.95	22.19	43.49	72.89	28.50
Surface factor of crude clay	7,549	12,540	8,695	26,445	12,409
Surface factor of clay through 100 mesh.	9,860	22,229	11,889	26,524	21,569
NaOH for maximum deflocculation ... per cent	.20	.18	.12	.22	.12

TABLE 1.—*Elutriation tests of clays from Pennsylvania, Delaware, Maryland, and Virginia*—Continued

Sieve or can No.	Sample 1.64	Sample 1.54	Sample 1.56	Sample 1.48	Sample 1.55	Sample 1.74
20 mesh:						
Separated ... per cent	12.8	0.6	0.9	0	0.5	0
Diameter ... mm	2.0000	2.0000	2.0000	0	2.0000	0
Surface factor	6.4	.3	.5	0	.2	0
Color at 1,000° C	White with pale pinkish buff specks, Pl. XXIX, 17″, O-Y, f.	Specks of pale salmon Pl. XIV, 9′, OR-O f.	Tinge of marguerite yellow, Pl. XXX, 23″, yellow, f.	------	White with brown specks.	------
20-65 mesh:						
Separated ... per cent	22.6	3.5	5.9	0	8.1	0
Diameter ... mm	.5662	.5662	.5662	0	.5662	0
Surface factor	40.0	6.2	10.4	0	14.2	0
Color at 1,000° C	As above.	As above.	As above.	------	Smoke gray Pl. XLVI, 21″″, O-YY, d.	
65-100 mesh:						
Separated ... per cent	6.4	1.3	2.9	0	2.3	0
Diameter ... mm	.1778	.1778	.1778	0	.1778	0
Surface factor	36.0	7.4	16.3	0	12.9	0
Color at 1,000° C	As above.	As above.	As above.	------	As above.	------
100-200 mesh:						
Separated ... per cent	7.9	11.5	7.6	0.2	4.6	0.4
Diameter ... mm	.1142	.1142	.1142	.1142	.1142	.1142
Surface factor	69.1	100.9	66.7	1.8	31.6	3.3
Color at 1,000° C	As above.	As above.	As above.	Tinge of cartridge buff, Pl. XXX, 19″, YO-Y, f.	As above.	Light mouse gray, Pl. LI, 15‴′ 6.
Can 1:						
Separated ... per cent	8.8	11.0	12.2	15.4	2.3	10.1
Diameter ... mm	.0391	.0435	.0296	.0300	.0434	.0284
Surface factor	225.6	252.0	414.0	512.7	53.0	354.2
Color at 1,000° C	Pale pinkish buff, Pl. XXIX, 17″, O-Y, f.	Tinge of pale salmon, Pl. XIV, 9′, OR-O, f.	As above.	As above.	Drab gray, Pl. XLVI 17″″ O-Y, d.	As above.
Can 2:						
Separated ... per cent	6.1	33.7	28.5	5.0	14.7	8.0
Diameter ... mm	.0224	.0130	.0213	.0250	.0208	.0195
Surface factor	271.9	2,600.0	1,338.0	200.0	705.8	314.2
Color at 1,000° C	As above.	As above.	As above.	As above.	Pale smoke gray, Pl. XLVI, 21″″, O-YY, f.	Pale olive buff tinge, Pl. XL, 21‴′, F.
Can 3:						
Separated ... per cent	7.2	10.5	14.2	22.6	9.4	13.4
Diameter ... mm	.0137	.0077	.0058	.0093	.0154	.0086
Surface factor	528.5	1,359.0	2,453.4	2,426.9	611.7	1,564.0
Color at 1,000° C	As above.	As above.	As above.	As above.	As above.	As above.
Can 4:						
Separated ... per cent	6.8	11.4	12.6	25.7	11.8	19.6
Diameter ... mm	.0068	.0040	.0024	.0047	.0068	.0040
Surface factor	1,000.0	2,845.0	5,241.7	5,461.7	1,764.0	4,895.0
Color at 1,000° C	As above.	As above.	As above.	As above.	Tinge of pale smoke gray, Pl. XLVI, 21″″, O-YY, f.	Tilleul buff tinge, Pl. XL, 17‴′, f.
Overflow:						
Separated ... per cent	21.3	16.4	15.2	31.2	46.4	48.5
Diameter ... mm	.0015	.0013	.0016	.0020	.0016	.0025
Surface factor	14,230.0	12,646.0	9,506.3	15,605.0	29,000.0	19,400.0
Color at 1,000° C	Pale cinnamon pink, Pl. XXIX, 13″, OY-O, f.	As above.	As above.	As above.	Pale pinkish buff, Pl. XXIX, 17″, O-Y.	------
Clay-like substance ... per cent	27.91	37.87	37.68	67.83	56.33	76.54
Surface factor of crude clay	16,407	19,817	19,045	24,208	32,194	26,628
Surface factor of clay through 100 mesh	28,052	20,951	21,044	24,208	36,014	26,628
NaOH for maximum deflocculation ... per cent	.20	.18	.10	.20	.10	.10

TABLE 1.—*Elutriation tests of clays from Pennsylvania, Delaware, Maryland, and Virginia*—Continued

Sieve or can No.	Sample 1.58A	Sample 1.58B	Sample 1.59	Sample 1.60	Sample 1.62	Sample 1.68
20 mesh:						
Separated ... per cent	14.5	26.0	12.7	12.0	0	0
Diameter ... mm	2.0000	2.0000	2.0000	2.0000	0	0
Surface factor	7.2	13.0	6.3	6.0	0	0
Color at 1,000° C	White with pale salmon color specks, Pl. XIV, 9′, OR-O f.	Tinge of pink.	White with light ochraceous salmon, Pl. XV, 13′, OY-O, d.	White with specks of buff pink, Pl. XXVIII, 11″, orange, d.	-----	-----
20–65 mesh:						
Separated ... per cent	14.4	11.3	12.6	12.3	0.9	0
Diameter ... mm	.5662	.5662	.5662	.5662	.5662	0
Surface factor	25.4	20.0	22.3	21.8	1.6	0
Color at 1,000° C	As above.	As above.	As above.	As above.	Light mouse gray, Pl. LI, 15‴, b.	-----
65–100 mesh:						
Separated ... per cent	2.1	1.5	2.4	1.4	.7	0
Diameter ... mm	.1778	.1778	.1778	.1778	.1778	0
Surface factor	10.7	11.7	13.6	8.3	3.7	0
Color at 1,000° C	As above.	Buff.	As above.	As above.	As above.	-----
100–200 mesh:						
Separated ... per cent	3.9	3.0	4.2	3.2	4.2	0.3
Diameter ... mm	.1142	.1142	.1142	.1142	.1142	.1142
Surface factor	31.5	26.3	37.4	28.1	37.2	2.9
Color at 1,000° C	As above.	Light buff, Pl. XV, 17′, f.	As above.	As above.	Smoke gray, Pl. XLVI, 21‴, d.	Cream tinge with brown speck.
Can 1:						
Separated ... per cent	10.9	4.6	11.5	10.4	2.6	43.7
Diameter ... mm	.0280	.0309	.0373	.0372	.0325	.0070
Surface factor	388.6	150.5	308.3	279.6	80.6	6,243.0
Color at 1,000° C	Pale salmon color, Pl. XIV, 9′, Or-O, f.	As above.	Light ochraceous salmon, Pl. XV, 13′, OY-O, d.	Buff pink, Pl. XXVIII, 11″, Orange, d	Tilleul buff, Pl. XL, 17‴, f.	Pale pinkish cinnamon, Pl. XXIX, 15″, Y-O, f.
Can 2:						
Separated ... per cent	5.6	13.6	7.0	7.3	2.9	50.1
Diameter ... mm	.0187	.0157	.0248	.0238	.0228	.0053
Surface factor	299.5	868.2	248.3	308.0	129.0	9,350.0
Color at 1,000° C	As above.	As above.	As above.	As above.	Pale olive buff, Pl. XL, 21‴, d.	As above.
Can 3:						
Separated ... per cent	10.9	34.9	11.0	10.3	10.5	1.9
Diameter ... mm	.0111	.0116	.0145	.0167	.0121	.0039
Surface factor	986.5	3,008.6	993.2	610.7	867.9	497.0
Color at 1,000° C	As above.	As above.	As above.	As above.	Cartridge buff, Pl. XXX, 19″, f.	As above.
Can 4:						
Separated ... per cent	16.9	1.2	12.4	10.3	14.1	1.4
Diameter ... mm	.0077	.0086	.0081	.0106	.0062	.0030
Surface factor	2,195.0	145.3	155.2	981.0	2,227.0	470.0
Color at 1,000° C	As above.	As above.	As above.	As above.	As above.	As above.
Overflow:						
Separated ... per cent	20.7	3.8	25.6	32.7	64.4	2.4
Diameter ... mm	.0033	.0036	.0020	.0017	.0012	.0012
Surface factor	-----	1,069.4	12,800.0	19,235.0	53,670.0	2,000.0
Color at 1,000° C	As above.	As above.	As above.	As above.	White.	As above.
Clay-like substance ... per cent	39.79	5.10	35.45	38.05	83.35	61.77
Surface factor of crude clay	7,850	5,313	16,017	21,478	56,974	18,672
Surface factor of clay through 100 mesh	14,758	8,595	21,873	28,901	57,742	18,672
NaOH for maximum deflocculation ... per cent	.10	.10	.04	.04	.12	.39

TABLE 2.—*Elutriation tests of clays from North Carolina and South Carolina*

Sieve or can No.	Sample 1.03	Sample 1.04	Sample 1.05	Sample 1.06	Sample 1.07
20 mesh:					
Separated ... per cent	21.8	0	21.1	21.6	0
Diameter ... mm	2.0000	0	2.0000	2.0000	0
Surface factor	10.9	0	10.6	10.8	0
Color at 1,000° C	White with silver specks.	----	White with brown specks.	White with brown specks.	----
20–65 mesh:					
Separated ... per cent	9.6	0	29.8	17.4	0
Diameter ... mm	.5662	0	.5662	.5662	0
Surface factor	17.0	0	53.3	30.0	0
Color at 1,000° C	As above.	----	As above.	As above.	----
65–100 mesh:					
Separated ... per cent	1.2	0	2.3	1.2	0
Diameter ... mm	.1778	0	.1778	.1778	0
Surface factor	6.7	0	12.8	6.5	0
Color at 1,000° C	As above.	----	As above.	As above.	----
100–200 mesh:					
Separated ... per cent	4.4	2.9	4.8	1.9	1.7
Diameter ... mm	.1142	.1142	.1142	.1142	.1142
Surface factor	38.6	25.6	42.2	17.1	15.3
Color at 1,000° C	As above.	White with brown specks.	As above.	As above.	White with brown specks.
Can 1:					
Separated ... per cent	12.6	24.0	12.2	17.4	12.0
Diameter ... mm	.0386	.0367	.0234	.0359	.0343
Surface factor	326.4	654.0	520.0	48.6	349.5
Color at 1,000° C	White.	Tinge of pale cinnamon pink, Pl. XXIX, 13″, OY-O, f.	Tinge of pale pinkish cinnamon, Pl. XXIX, 15″, Y-O, f.	White.	Tinge of tilleul buff Pl. XL, 17, ″ ′f.
Can 2:					
Separated ... per cent	9.0	13.8	8.4	8.4	15.3
Diameter ... mm	.0214	.0245	.0197	.0238	.0207
Surface factor	419.6	564.0	427.0	352.1	738.6
Color at 1,000° C	As above.	As above.	As above.	As above.	As above.
Can 3:					
Separated ... per cent	12.8	16.0	6.3	9.2	18.9
Diameter ... mm	.0149	.0157	.0117	.0147	.0120
Surface factor	857.7	1,006.0	542.0	628.6	1,577.0
Color at 1,000° C	As above.	As above.	As above.	As above.	As above.
Can 4:					
Separated ... per cent	6.7	9.0	5.1	5.6	12.2
Diameter ... mm	.0070	.0065	.0054	.0076	.0076
Surface factor	960.0	1,390.0	952.0	739.5	1,612.0
Color at 1,000° C	----	As above.	As above.	As above.	As above.
Overflow:					
Separated ... per cent	22.0	34.2	10.3	17.3	39.8
Diameter ... mm	.0021	.0027	.0033	.0015	.0034
Surface factor	10,260.0	12,850.0	3,071.0	11,505.0	11,710.0
Color at 1,000° C	Tinge of shell pink Pl. XXXIII, 11″ Orange f.	Pale cinnamon pink Pl. XXIX, 13″ OY-O, f.	As above.	Tinge of pale pinkish cinnamon, Pl. XXIX, 15″, Y-O, f.	As above.
Claylike substance ... per cent	27.73	41.70	16.07	21.94	59.93
Surface factor of crude clay	12,896.9	16,490	5,631	13,338	16,003
Surface factor of clay through 100 mesh	19,362	16,490	11,885	22,997	16,003
NaOH for maximum deflocculation ... per cent	.20	.20	.20	.20	.20

TABLE 2.—*Elutriation tests of clays from North Carolina and South Carolina*—Continued

Sieve or can No.	Sample 1.41	Sample 1.14	Sample 1.15	Sample 1.16	Sample 1.17	Sample 1.19
20 mesh:						
Separated .... per cent	38.6	0	0	0	0	0
Diameter .... mm	2.0000	0	0	0	0	0
Surface factor	19.3	0	0	0	0	0
Color at 1,000° C						
20–65 mesh:						
Separated .... per cent	7.1	0	0	0	0	3.8
Diameter .... mm	.5662	0	0	0	0	.5662
Surface factor	12.5	0	0	0	0	67.1
Color at 1,000° C						Tinge of maize yellow, Pl. IV, 19, YO-Y, f.
65–100 mesh:						
Separated .... per cent	.6	0	0	.2	0	2.7
Diameter .... mm	.1778	0	0	.1778	0	.1778
Surface factor	3.6	0	0	1.1	0	14.9
Color at 1,000° C	Buff pink, Pl. XXVIII, 11″ Orange, d.			Tinge of maize yellow, Pl. IV, 19, YO-Y, f.		As above.
100–200 mesh:						
Separated .... per cent	5.8	0	0	.9	0	3.7
Diameter .... mm	.1142	0	0	.1142	0	.1142
Surface factor	30.9	0	0	7.9	0	32.4
Color at 1,000° C	As above.			As above.		As above.
Can 1:						
Separated .... per cent	11.9	12.0	10.5	4.5	0	1.8
Diameter .... mm	.0315	.0176	.0345	.0276	0	.0330
Surface factor	349.0	684.7	304.4	162.3	0	57.0
Color at 1,000° C	Tinge of buff pink, Pl. XXVIII, 11″ orange, d.	Tinge of tilleul buff, Pl. XL, 17″′, f.	Tinge of seafoam yellow, Pl. XXXI, 25″, YG-Y, f.	As above.		As above
Can 2:						
Separated .... per cent	5.8	7.4	8.6	1.7	0	4.2
Diameter .... mm	.0210	.0134	.0263	.0217	0	.0241
Surface factor	375.2	552.3	328.2	77.9	0	172.6
Color at 1,000° C	As above.	As above.	As above.	As above.		As above.
Can 3:						
Separated .... per cent	7.9	1.7	10.5	3.7	1.7	1.9
Diameter .... mm	.0112	.0100	.0127	.0208	.0041	.0174
Surface factor	708.9	165.0	820.3	176.0	406.8	109.5
Color at 1,000° C	As above.	As above.	As above.	Tinge of drab gray, Pl. XLVI, 17″″′, O, Y, d.	Pale pinkish cinnamon, Pl. XXIX, 15″, Y-O, f.	As above
Can 4:						
Separated .... per cent	5.7	10.9	6.3	32.3	5.6	12.5
Diameter .... mm	.0070	.0062	.0090	.0073	.0031	.0063
Surface factor	812.4	1,758.0	715.9	4,425.0	1,781.0	1,997.0
Color at 1,000° C	As above.	As above.	Tinge of pale olive gray, Pl. LI, 23″″′, yellow, f.	As above.	As above.	As above.
Overflow:						
Separated .... per cent	17.2	68.0	64.1	56.8	92.7	69.4
Diameter .... mm	.0044	.0043	.0055	.0046	.0026	.0017
Surface factor	3,898.0	15,820.0	10,630.0	12,347.8	35,660.0	40,120.0
Color at 1,000° C	Buff pink, Pl. XXVIII, 11″, orange, d.	As above.	As above.	As above.	As above.	As above.
Claylike substance .. per cent	24.35	80.11	68.0	73.14	100	70.98
Surface factor of crude clay	6,210	10,980	12,798	17,196.5	37,847.8	42,510
Surface factor of clay through 100 mesh	11,285	10,980	12,798	17,196.5	37,847.8	46,195
NaOH for maximum deflocculation .... per cent	.18	.18	.28	.34	.40	.22

TABLE 2.—*Elutriation tests of clays from North Carolina and South Carolina*—Continued

Sieve or can No.	Sample 1.18	Sample 1.20	Sample 1.21	Sample 1.22	Sample 1.45	Sample 1.70
20 mesh:						
Separated........per cent..	0	0	0	0	0	0
Diameter............mm..	0	0	0	0	0	0
Surface factor.............	0	0	0	0	0	0
Color at 1,000° C...........	....	....	....	....	....	....
20–65 mesh:						
Separated........per cent..	0.5	0	0.6	0.2	0	0
Diameter............mm..	.5662	0	.5662	.5662	0	0
Surface factor.............	.9	0	1.0	1.7	0	0
Color at 1,000° C...........	White with cream tinge.	....	Cream tint.	White.	....	....
65–100 mesh:						
Separated........per cent..	.7	0	.3	0.3	0	0
Diameter............mm..	.1778	0	.1778	.1778	0	0
Surface factor.............	3.8	0	1.7	.4	0	0
Color at 1,000° C...........	White.	....	As above.	As above.	....	....
100–200 mesh:						
Separated........per cent..	2.6	1.0	.5	1.8	0.4	0.2
Diameter............mm..	.1142	.1142	.1142	.1142	.1142	.1142
Surface factor.............	18.2	8.7	3.5	12.5	3.5	1.8
Color at 1,000° C...........	As above.	White with gray tinge.	As above.	As above.	White with cream tinge.	White.
Can 1:						
Separated........per cent..	2.5	2.6	3.1	7.9	34.1	10.7
Diameter............mm..	.0336	.0269	.0341	.0213	.0327	.0069
Surface factor.............	73.8	97.8	90.9	363.1	1,043.0	1,518.0
Color at 1,000° C...........	As above.	White, very good.	As above.	As above.	Tinge of pale king's blue, Pl. XXII, 47, G-BB, f.	As above.
Can 2.						
Separated........per cent..	8.4	11.2	1.4	26.5	43.0	21.3
Diameter............mm..	.0230	.0176	.0225	.0158	.0202	.0059
Surface factor.............	563.5	636.9	63.0	1,675.0	2,129.0	3,610.0
Color at 1,000° C...........	As above.	White, best color.	As above.	As above.	As above.	As above.
Can 3:						
Separated........per cent..	8.5	22.7	13.5	6.5	4.1	47.5
Diameter............mm..	.0151	.0083	.0121	.0112	.0145	.0028
Surface factor.............	560.3	2,740.0	1,029.0	582.2	284.8	16,960.0
Color at 1,000° C...........	As above.	White, very good.	As above.	As above.	As above.	As above.
Can 4:						
Separated........per cent..	12.5	24.4	18.0	11.0	4.6	3.7
Diameter............mm..	.0049	.0048	.0103	.0070	.0076	.0025
Surface factor.............	2,545.0	5,079.0	1,748.0	1,467.0	627.0	1,484.0
Color at 1,000° C...........	As above.	As above.	White.	As above.	As above.	As above.
Overflow:						
Separated........per cent..	64.4	38.9	62.4	45.5	13.7	17.2
Diameter............mm..	.0013	.0024	.0047	.0015	.0022	.0016
Surface factor.............	49,540.0	16,190.0	13,280.0	30,350.0	6,236.0	10,780.0
Color at 1,000° C...........	As above.	Light vinaceous fawn, Pl. XL, 13''', d.	As above.	As above.	As above.	As above.
Claylike substance..per cent..	76.90	79.04	62.44	60.50	17.67	91.22
Surface factor of crude clay....	53,305	24,752	16,217	34,451.9	10,323	34,395
Surface factor of clay through 100 mesh..................	53,734	24,752	16,382	34,735.14	10,323	34,395
NaOH for maximum deflocculation..........per cent..	.24	.26	.18	.20	.20	.24

TABLE 2.—*Elutriation tests of clays from North Carolina and South Carolina*—Continued

Sieve or can No.	Sample 1.36	Sample 1.53	Sample 1.57	Sample 1.65	Sample 1.66	Sample 1.69
20 mesh:						
Separated .... per cent	0	0	0.9	0	0	7.8
Diameter .... mm	0	0	2.0000	0	0	2.0000
Surface factor	0	0	.5	0	0	3.9
Color at 1,000° C	----------	----------	Tinge of cartridge buff, Pl. XXX, 19″, OY-Y, f.	----------	----------	White with cream specks.
20–65 mesh:						
Separated .... per cent	0	0	3.4	0	0	2.4
Diameter .... mm	0	0	.5662	0	0	.5662
Surface factor	0	0	5.9	0	0	4.2
Color at 1,000° C	----------	----------	As above.	----------	----------	As above.
65–100 mesh:						
Separated .... per cent	0	0	2.5	0	0	2.8
Diameter .... mm	0	0	.1778	0	0	.1778
Surface factor	0	0	14.2	0	0	15.6
Color at 1,000° C	----------	----------	As above.	----------	----------	As above.
100–200 mesh:						
Separated .... per cent	.6	.4	18.2	0	0	3.1
Diameter .... mm	.1142	.1142	.1142	0	0	.1142
Surface factor	5.3	3.5	159.6	0	0	27.6
Color at 1,000° C	Tinge of pale cinnamon pink, Pl. XXIX, 13″, OY-O, f.	Gray.	As above.	----------	----------	As above.
Can 1:						
Separated .... per cent	30.0	1.1	8.7	10.1	8.9	30.1
Diameter .... mm	.0354	.0374	.0319	.0338	.0098	.0377
Surface factor	847.4	30.0	273.4	300.0	903.0	798.4
Color at 1,000° C	White with tinge of pale cinnamon pink, Pl. XXIX, 13″, OY-O, f.	White with cream tinge.	As above.	White.	White.	White.
Can 2:						
Separated .... per cent	10.9	6.0	6.2	6.7	39.4	20.7
Diameter .... mm	.0238	.0245	.0270	.0246	.0046	.0229
Surface factor	456.3	244.1	230.4	282.0	8,554.0	903.1
Color at 1,000° C	As above.	As above.	As above.	As above.	As above.	As above
Can 3:						
Separated .... per cent	17.0	8.2	11.1	13.4	39.1	2.5
Diameter .... mm	.0154	.0102	.0184	.0119	.0032	.0121
Surface factor	1,103.0	798.0	604.3	1,122.0	12,234.0	203.3
Color at 1,000° C	As above.	As above.	As above.	As above.	As above.	As above.
Can 4:						
Separated .... per cent	14.3	19.9	10.1	31.6	4.2	9.5
Diameter .... mm	.0079	.0057	.0083	.0082	.0021	.0069
Surface factor	1,919.0	3,520.0	1,255.5	3,830.0	2,000.0	1,374.0
Color at 1,000° C	As above.	White.	White.	As above.	As above.	As above.
Overflow:						
Separated .... per cent	27.4	64.4	38.6	38.7	8.5	21.1
Diameter .... mm	.0019	.0040	.0024	.0020	.0010	.0015
Surface	14,400.0	16,100.0	15,740.0	19,080.0	8,450.0	14,050.0
Color at 1,000° C	As above.	As above.	As above.	As above.	As above.	As above.
Claylike substance .. per cent	38.71	87.71	44.68	69.76	100	31.63
Surface factor of crude clay	18,744	20,673	18,283	24,630	3,214.1	17,380
Surface factor of clay through 100 mesh	18,744	20,673	19,333	24,630	3,214.1	19,961
NaOH for maximum deflocculation .... per cent	.20	.20	.18	.32	.20	.20

TABLE 3.—*Elutriation tests of clays from Georgia*

Sieve or can No.	Sample 1.10	Sample 1.12	Sample 1.13	Sample 1.23	Sample 1.24	Sample 1.30
20 mesh:						
Separated...per cent..	0	2.5	0	0	0.1	0
Diameter...mm..	0	2.0000	0	0	2.0000	0
Surface factor...	0	1.2	0	0	0	0
Color at 1,000° C...	----	White.	----	----	White with cream tinge.	----
20–65 mesh:						
Separated...per cent..	0	11.3	.4	.1	.1	.8
Diameter...mm..	0	.5662	.5662	.5662	.5662	.5662
Surface factor...	0	19.9	----	.2	.2	1.4
Color at 1,000° C...	----	White.	White with brown specks.	White with buff specks.	As above.	Black and brown specks.
65–100 mesh:						
Separated...per cent..	0	2.8	.4	0	.2	.2
Diameter...mm..	0	.1778	.1778	0	.1778	.1778
Surface factor...	0	15.8	----	0	.9	1.1
Color at 1,000° C...	----	White.	As above.	----	As above.	As above.
100–200 mesh:						
Separated...per cent..	0	5.0	1.0	1.0	.3	2.7
Diameter...mm..	0	.1442	.1442	.1442	.1442	.1442
Surface factor...	0	43.9	----	8.4	2.63	25.0
Color at 1,000° C...	----	As above.	As above.	As above.	As above.	As above.
Can 1:						
Separated...per cent..	0	2.3	2.5	6.3	22.0	16.2
Diameter...mm..	0	.0365	.0346	.0348	.0336	.0448
Surface factor...	0	65.2	----	181.0	653.6	362.5
Color at 1,000° C...	----	As above.	Pale drab gray, Pl. XLVI, 17'''', O-Y, f.	Tinge of ivory yellow, Pl. XXX, 21', f.	White.	Tilleul buff, Pl. XL, 17''', O-f.
Can 2:						
Separated...per cent..	.6	2.5	9.4	37.9	19.0	8.4
Diameter...mm..	.0248	.0238	.0233	.0099	.0180	.0216
Surface factor...	22.6	104.2	----	3,808.0	1,053.0	387.0
Color at 1,000° C...	Tinge of pallid neutral gray, Pl. LIII, f.	As above.	As above.	White, best color.	As above.	Gray.
Can 3:						
Separated...per cent..	8.3	6.1	11.7	6.9	6.6	12.9
Diameter...mm..	.0168	.0156	.0158	.0064	.0102	.0128
Surface factor...	491.7	389.7	----	1,080.0	649.0	1,010.0
Color at 1,000° C...	As above.	As above.	As above.	Tinge of pale vinaceous fawn, Pl. XL, 13''', f.	As above.	As above.
Can 4:						
Separated...per cent..	10.7	23.7	11.5	4.4	18.5	10.9
Diameter...mm..	.0104	.0061	.0076	.0038	.0067	.0069
Surface factor...	1,027.0	3,847.0	----	1,163.0	2,761.6	1,574.0
Color at 1,000° C...	As above.	As above.	As above.	As above.	As above.	As above.
Overflow:						
Separated...per cent..	80.1	43.7	61.5	43.4	33.3	47.8
Diameter...mm..	.0019	.0015	.0016	.0024	.0018	.0009
Surface factor...	4,237.0	28,210.0	----	18,080.0	18,516.0	53,111.0
Color at 1,000° C...	Tinge of pale pinkish cinnamon, Pl. XXIX, 15'', Y-O, f.	As above.	Shell pink, Pl. XXVIII, 11'', orange, f.	As above.	----	Tinge of pale vinaceous pink, Pl. XXVIII, 9'', ORO, f.
Claylike substance..per cent..	82.45	64.71	70.24	68.35	55.69	64.58
Surface factor of crude clay...	439,911	32,699	41,183	24,332	23,606	56,472
Surface factor of clay through 100 mesh...	439,911	40,347	42,153	24,345	23,705	57,011
NaOH for maximum deflocculation...per cent..	.20	.20	.06	.14	.20	.18

TABLE 3.—*Elutriation test of clays from Georgia*—Continued

Sieve or can No.	Sample 1.25	Sample 1.26	Sample 1.75	Sample 1.27	Sample 1.28	Sample 1.35
20-mesh:						
Separated.........per cent..	0	0	0	1.1	10.0	0
Diameter...............mm..	0	0	0	2.0000	2.0000	0
Surface factor..............	0	0	0	0.6	5.0	0
Color at 1,000° C..........	....	....	....	White with brown specks.	White with brown specks.	....
20–65 mesh:						
Separated.........per cent..	0	0	0	10.5	19.6	0
Diameter...............mm..	0	0	0	.5662	.5662	0
Surface factor..............	0	0	0	18.6	35.4	0
Color at 1,000° C..........	....	....	....	As above.	As above.	....
65–100 mesh:						
Separated.........per cent..	0	0	0	2.1	2.8	0
Diameter...............mm..	0	0	0	.1778	.1778	0
Surface factor..............	0	0	0	12.3	15.7	0
Color at 1,000° C..........	....	....	....	As above.	As above.	....
100–200 mesh:						
Separated.........per cent..	1.1	0	.5	2.9	4.8	1.8
Diameter...............mm..	.1442	0	.1442	.1442	.1442	.1442
Surface factor..............	9.7	0	4.4	25.8	42.1	7.4
Color at 1,000° C..........	White with specks.	....	White with brown specks.	As above.	White.	Gray and tan color.
Can 1:						
Separated.........per cent..	4.8	.4	1.7	2.7	11.5	1.9
Diameter...............mm..	.0098	.0373	.0376	.0380	.0355	.0420
Surface factor..............	490.0	11.3	46.3	72.4	325.0	44.8
Color at 1,000° C..........	White.	Tilleul buff, Pl. XL, 17''', O-Y, f.	Tinge of buff.	White, with a few brown specks.	As above.	Gray.
Can 2:						
Separated.........per cent..	9.4	.6	1.0	2.4	5.0	1.0
Diameter...............mm..	.0049	.0266	.0246	.0275	.0242	.0158
Surface factor..............	1,908.2	23.3	40.4	88.4	205.0	66.5
Color at 1,000° C..........	As above.	As above.	As above.	White, with a brown tinge.	As above.	As above.
Can 3:						
Separated.........per cent..	8.5	4.2	6.6	10.3	7.4	13.1
Diameter...............mm..	.0031	.0170	.0176	.0163	.0139	.0091
Surface factor..............	2,700.0	249.4	375.0	631.9	529.0	1,438.5
Color at 1,000° C..........	As above.	As above.	As above.	White, with a bluish tinge.	As above.	Gray to cream.
Can 4:						
Separated.........per cent..	20.7	5.1	8.3	10.2	7.9	31.4
Diameter...............mm..	.0021	.0087	.0086	.0089	.0076	.0044
Surface factor..............	9,857.0	581.6	969.8	1,151.0	1,030.0	7,143.2
Color at 1,000° C..........	As above.	White, very good.	As above.	As above.	As above.	White.
Overflow:						
Separated.........per cent..	55.6	89.7	81.3	57.6	31.0	51.6
Diameter...............mm..	.0015	.0019	.0016	.0018	.0016	.0019
Surface factor..............	37,066.0	47,190.0	50,812.5	31,977.0	18,670.0	27,184.2
Color at 1,000° C..........	As above.	....	Tinge of salmon buff, Pl. XIV, 11', orange, d.	White, with buff tinge.	Tinge of pale pinkish buff, Pl. XXIX, 17'', O-Y.	As above.
Claylike substance..per cent..	94.83	92.83	86.40	64.15	38.90	92.79
Surface factor of crude clay...	52,030	48,055	52,248	33,978	20,857	35,884
Surface factor of clay through 100 mesh..................	52,030	48,455	52,248	39,387	31,837	35,884
NaOH for maximum deflocculation..........per cent..	.16	.22	.24	.12	.20	.06

TABLE 3.—*Elutriation tests of clays from Georgia*—Continued

Sieve or can No.	Sample 1.76	Sample 1.33	Sample 1.61	Sample 1.73	Sample 1.50	Sample 1.51
20 mesh:						
Separated ---- per cent--	0	0	0.6	0	24.9	0
Diameter ---- mm--	0	0	2.0000	0	2.0000	0
Surface factor ----	0	0	.3	0	12.5	0
Color at 1,000° C ----	----	----	White with brown specks.	----	Tinge of pale cinnamon pink, Pl. XXIX, 13″, OY-O, f.	----
20–65 mesh:						
Separated ---- per cent--	0	0	2.0	0	21.2	0
Diameter ---- mm--	0	0	.5662	0	.5662	0
Surface factor ----	0	0	3.5	0	37.4	0
Color at 1,000° C ----	----	----	As above.	----	Tinge of pinkish buff, Pl. XXIX, 17″, OY, d.	----
65–100 mesh:						
Separated ---- per cent--	0	0	.2	0	5.6	.2
Diameter ---- mm--	0	0	.1778	0	.1778	.1778
Surface factor ----	0	0	.9	0	31.3	1.1
Color at 1,000° C ----	----	----	As above.	----	As above.	White with brown specks.
100–200 mesh:						
Separated ---- per cent--	1.2	.7	.4	.7	5.5	2.0
Diameter ---- mm--	.1442	.1442	.1442	.1442	.1442	.1442
Surface factor ----	10.4	1.8	3.5	4.6	48.2	13.9
Color at 1,000° C ----	White with brown specks.	Tilleul buff, Pl. XL, 17″′, f.	As above.	White with brown and black specks.	As above.	As above.
Can 1:						
Separated ---- per cent--	3.7	6.8	4.3	4.6	1.5	4.0
Diameter ---- mm--	.0405	.0267	.0088	.0374	.0366	.0298
Surface factor ----	92.8	1,518.0	491.0	122.4	42.1	133.9
Color at 1,000° C ----	Light buff tinge.	As above.	Tilleul buff, Pl. XL, 17″′, f.	Tinge of cream.	Tinge of pallid neutral gray, Pl. LIII, f.	Ivory yellow, Pl. XXX, 21″, O-YY, f.
Can 2:						
Separated ---- per cent--	3.1	2.2	15.9	3.6	1.5	11.2
Diameter ---- mm--	.0210	.0175	.0056	.0241	.0229	.0212
Surface factor ----	150.0	3,610.0	2,839.2	151.0	63.8	526.4
Color at 1,000° C ----	As above.	As above.	Pale olive buff, Pl. XL, 21″′, f.	As above.	As above.	As above.
Can 3:						
Separated ---- per cent--	7.7	10.7	67.7	11.0	5.3	12.8
Diameter ---- mm--	.0116	.0098	.0037	.0156	.0154	.0147
Surface factor ----	666.0	16,960.0	18,300.0	707.7	46.1	966.9
Color at 1,000° C ----	As above.	White.	Tinge of cartridge buff, Pl. XXX, 19″, f.	As above.	As above.	Colonial buff, Pl. XXX, 21″, O-YY, d.
Can 4:						
Separated ---- per cent--	14.2	22.6	2.0	11.7	4.7	13.0
Diameter ---- mm--	.0060	.0037	.0028	.0071	.0093	.0089
Surface factor ----	2,370.0	1,080.0	700.0	1,634.0	503.2	1,461.0
Color at 1,000° C ----	As above.	Tinge of tilleul buff, Pl. XL, 17″′, f.	As above.	As above.	As above.	As above.
Overflow:						
Separated ---- per cent--	70.0	57.0	6.7	68.4	29.6	56.9
Diameter ---- mm--	.0033	.0023	.0012	.0012	.0013	.0022
Surface factor ----	21,212.0	10,780.0	5,750.0	56,530.0	22,770.0	25,854.5
Color at 1,000° C ----	White.	White.	White.	White.	White.	As above.
Claylike substance -- per cent--	71.36	86.65	93.08	77.97	32.74	66.12
Surface factor of crude clay ----	24,499	32,368	28,088	59,632	23,820	28,861
Surface factor of clay through 100 mesh ----	24,499	32,368	28,879	59,632	49,407	28,573
NaOH for maximum deflocculation ---- per cent--	.22	.18	.20	.18	.36	.18

TABLE 3.—*Elutriation test of clays from Georgia*—Continued

Sieve or can No.	Sample 1.52	Sample 1.31	Sample 1.40	Sample 1.34	Sample 1.39
20 mesh:					
Separated ..... per cent	0	0	0	0	0
Diameter ..... mm	0	0	0	0	0
Surface factor	0	0	0	0	0
20–65 mesh:					
Separated ..... per cent	.6	0	0	2.9	0
Diameter ..... mm	.5662	0	0	.5662	0
Surface factor	1.1	0	0	5.1	0
Color at 1,000° C	Cream.	.....	.....	White.	.....
65–100 mesh:					
Separated ..... per cent	.4	0	0	.6	0
Diameter ..... mm	.1778	0	0	.1778	0
Surface factor	2.4	0	0	3.6	0
Color at 1,000° C	As above.	.....	.....	As above.	.....
100–200 mesh:					
Separated ..... per cent	.8	.2	0	1.5	.1
Diameter ..... mm	.1442	.1442	0	.1442	.1442
Surface factor	5.6	2.0	0	13.2	1.0
Color at 1,000° C	As above.	Marguerite yellow, Pl. XXX, 23″, f.	.....	As above.	White with brown specks.
Can 1:					
Separated ..... per cent	1.3	7.5	10.9	5.5	.5
Diameter ..... mm	.0357	.0140	.0274	.0365	.0289
Surface factor	35.6	537.6	396.0	150.7	16.3
Color at 1,000° C	As above.	White, with with a cream tinge.	Tinge of marguerite yellow, Pl. XXX, 23″, f.	As above.	Tinge of cartridge buff, Pl. XXX, 19″, f.
Can 2:					
Separated ..... per cent	2.2	7.4	5.7	3.8	1.3
Diameter ..... mm	.0237	.0079	.0238	.0237	.0214
Surface factor	92.8	939.2	237.4	160.3	60.8
Color at 1,000° C	As above.	As above.	As above.	As above.	As above.
Can 3:					
Separated ..... per cent	17.0	13.7	10.9	10.0	9.2
Diameter ..... mm	.0113	.0059	.0125	.0179	.0099
Surface factor	1,494.0	2,317.0	868.0	556.5	933.3
Color at 1,000° C	As above.	As above.	Tinge of pale olive buff, Pl. XL, 21‴, f.	As above.	Tinge of tilleul buff, Pl. XL, 17‴, f.
Can 4:					
Separated ..... per cent	16.0	19.9	8.1	16.8	13.6
Diameter ..... mm	.0076	.0053	.0078	.0083	.0055
Surface factor	2,108.0	3,754.7	1,032.0	1,909.0	2,480.0
Color at 1,000° C	As above.	White, good color.	White, with tinge of pale olive buff, Pl. XL, 21‴, f.	As above.	Tinge of pale olive, Pl. XL, 21‴, f.
Overflow:					
Separated ..... per cent	61.6	51.3	64.6	58.8	75.4
Diameter ..... mm	.0041	.0027	.0049	.0017	.0035
Surface factor	15,020.0	19,000.0	13,183.7	34,793.0	21,530.0
Color at 1,000° C	White.	As above.	As above.	As above.	As above.
Claylike substance ..... per cent	83.68	91.77	72.43	68.75	88.99
Surface factor of crude clay	18,759	26,551	15,607	37,591	25,020
Surface factor of clay through 100 mesh	18,987	26,551	15,607	38,788	25,020
NaOH for maximum deflocculation ..... per cent	.12	.22	.00	.14	.22

TABLE 3.—*Elutriation test of clays from Georgia*—Continued

Sieve or can No.	Sample 1.29	Sample 1.67	Sample 1.32	Sample 1.37	Sample 1.38
20 mesh:					
Separated .... per cent..	0	0	0	0	37.2
Diameter .... mm..	0	0	0	0	2.0000
Surface factor	0	0	0	0	8.6
Color at 1,000° C					Red and green particles.
20-65 mesh:					
Separated .... per cent..	0	.2	.2	0	4.0
Diameter .... mm..	0	.5662	.5662	0	.5662
Surface factor	0	.4	.4	0	7.0
Color at 1,000° C		White with specks of pallid neutral gray, Pl. LIII, Neutral gray, f.	White with cream tinge.		As above.
65-100 mesh:					
Separated .... per cent..	.1	.6	.4	0	1.7
Diameter .... mm..	.1778	.1778	.1778	0	.1778
Surface factor	5.6	3.4	2.3	0	9.6
Color at 1,000° C	White with cream and black particles.	As above.	As above.		Brown and green particles.
100-200 mesh:					
Separated .... per cent..	1.7	3.0	1.8	0	5.5
Diameter .... mm..	.1442	.1442	.1442	0	.1442
Surface factor	14.9	26.5	15.9	0	48.1
Color at 1,000° C	As above.	As above.	As above.		As above.
Can 1:					
Separated .... per cent..	8.8	3.8	1.1	6.0	3.7
Diameter .... mm..	.0348	.0381	.0393	.0367	.0236
Surface factor	251.7	152.5	28.8	162.1	155.9
Color at 1,000° C	Gray.	Tinge of pallid neutral gray, Pl. LIII, neutral gray, f.	Tinge of pale gull gray, Pl. LIII, carbon gray, o.	Tinge of cartridge buff, Pl. XXX, 19'', f.	Pale vinaceous fawn, Pl. XL, 13''', f.
Can 2:					
Separated .... per cent..	4.5	3.3	3.7	2.6	2.0
Diameter .... mm..	.0170	.0238	.0296	.0243	.0139
Surface factor	262.0	139.6	124.3	105.4	143.9
Color at 1,000° C	Grayish tinge.	As above.	As above.	Tinge of pale vinaceous fawn, Pl. XL, 13''' f.	Tinge of tilleul buff, Pl. XL, 17''', f.
Can 3:					
Separated .... per cent..	20.6	12.2	6.8	6.6	3.8
Diameter .... mm..	.0140	.0145	.0190	.0155	.0072
Surface factor	1,471.4	844.2	356.8	425.8	529.2
Color at 1,000° C	White.	As above.	As above.	Tilleul buff, Pl. XL, 17''', f.	Pale olive buff, Pl. XL, 21''', f.
Can 4:					
Separated .... per cent..	32.1	16.3	11.1	10.4	12.6
Diameter .... mm..	.0050	.0065	.0090	.0057	.0048
Surface factor	6,551.0	2,512.0	1,121.2	1,816.0	2,625.0
Color at 1,000° C	As above.	As above.	As above.	White, good color.	Pale olive buff, Pl. LI, 23'''', f.
Overflow:					
Separated .... per cent..	32.3	58.4	74.8	74.5	29.4
Diameter .... mm..	.0019	.0018	.0014	.0017	.0030
Surface factor	17,922.0	32,625.0	53,457.0	43,823.0	9,819.0
Color at 1,000° C	As above.	White.	Tinge of cinnamon pink, Pl. XXIX, 13'', OY-O, f.	As above.	Tinge of pale olive buff, Pl. LI, 23'''', f.
Claylike substance ..... per cent..	75.57	73.46	80.89	86.68	45.57
Surface factor of crude clay	26,479	26,304	55,130	46,334	13,344
Surface factor of clay through 100 mesh	26,749	37,118	55,457	46,334	23,346
NaOH for maximum deflocculation .... per cent..	.18	.20	.16	.20	.12

TABLE 4.—*Properties of the clays from Pennsylvania, Delaware, Maryland, and Virginia*

Sample No.	Tempering water [1]	Volume shrinkage [1]	Workability	Deformation is cone		Burned at— 1,190° C.	1,250° C.	1,310° C.	1,370° C.	1,410° C.
	Per cent	*Per cent*								
1.44	35.03	4.48	Fair; cracks slightly	23	Porosity [2] ... per cent	30.58	26.0	21.25	9.41	0.62
					Volume shrinkage [2] ... do	18.73	27.4	28.31	34.44	38.6
					Color	Cartridge buff.	Clear light buff.	Same.	Buff with very light gray spots.	Same.
1.46	44.2	11.40	Very short; gritty	32	Porosity ... per cent	46.8	43.3	40.3	38.71	39.9
					Volume shrinkage ... do	15.6	22.7	21.4	25.41	29.1
					Color	Good white.	Same.	Same.	Same.	Same.
1.47	40.67	16.9	Fat	31	Porosity ... per cent	42.6	42.3	39.11	39.51	36.7
					Volume shrinkage ... do	11.7	14.6	14.56	16.65	19.9
					Color	Very good white.	Same.	Same.	Same.	Same.
1.49	31.4	23.22	Very plastic	23	Porosity ... per cent	8.58	4.3	2.22	4.99	-----
					Volume shrinkage ... do	21.5	21.9	23.63	10.00	-----
					Color	Pink-brown.	Same.	Brown.	Same.	-----
1.64	37.70	16.73	Gritty	32	Porosity ... per cent	33.1	32.9	29.13	19.9	9.2
					Volume shrinkage ... do	20.1	26.6	28.13	32.1	35.1
					Color	Light buff.	Very light buff.	Same.	Same.	Same, with gray spots.
1.54	32.52	3.56	Fairly plastic	30	Porosity ... per cent	46.64	47.4	52.10	43.86	40.1
					Volume shrinkage ... do	7.11	11.3	23.66	13.01	13.4
					Color	White.	Same.	Same.	Same.	Ivory yellow.
1.56	38.23	11.38	Plastic	28½	Porosity ... per cent	22.3	16.53	12.00	.95	.3
					Volume shrinkage ... do	31.1	36.5	37.90	41.66	39.3
					Color	Ivory yellow.	Light buff.	Cartridge buff.	Pale gray.	Gray.
1.48	39.6	10.91	Fairly plastic	27	Porosity ... per cent	15.1	17.9	3.75	.69	.17
					Volume shrinkage ... do	40.7	41.0	44.52	44.98	38.7
					Color	Light buff with light gray spots.	Cartridge buff.	Pale gray.	Same.	Same.
1.55	37.70	11.24	Plasticity low	18	Porosity ... per cent	1.2	.18	.0	4.75	-----
					Volume shrinkage ... do	36.4	36.2	31.48	13.39	-----
					Color	Smoke gray.	Same.	Pale olive gray.	Same.	-----
1.74	35.13	14.80	Fairly plastic	18	Porosity ... per cent	2.2	.7	.0	1.4	-----
					Volume shrinkage ... do	37.3	37.9	31.32	14.9	-----
					Color	Smoke gray.	Light olive gray.	Pale gray.	Same.	-----

1.58	41.46	18.17	do	32½	Porosity per cent	40.9	41.7	37.88	36.2	28.4
					Volume shrinkage do	14.3	16.5	18.15	23.3	30.3
					Color	Very good white.	Same.	Same.	Same.	Same.
1.59	36.2	7.97	Not very plastic	34	Porosity per cent	43.4	43.15	40.69	38.5	32.1
					Volume shrinkage do	9.9	12.8	14.57	18.5	24.7
					Color	Very good white.	Same.	Same.	Same.	Same.
1.60	36.88		Very short	33	Porosity per cent	39.4	39.7	36.61	33.8	15.5
					Volume shrinkage do	13.2	16.7	16.62	23.0	39.4
					Color	Very good white.	Same.	Same.	Same.	White.
1.62	33.7	7.60	Fairly plastic	17	Porosity per cent	.3	.4	.0	1.9	
					Volume shrinkage do	35.04	37.8	28.17	10.5	
					Color	Light drab.	Light grayish olive.	Pale olive gray.	Pale gray.	

[1] In terms of dry clay. [2] In terms of burned volume. [3] In terms of dry volume.

TABLE 5.—*Properties of the clays from Georgia and North Carolina*

Sample No.	Tempering water [1]	Volume shrinkage [1]	Workability	Deformation is cone		Burned at— 1,190° C.	1,250° C.	1,310° C.	1,370° C.	1,410° C.
	Per cent	*Per cent*								
1.10	48.23	29.91	Fairly plastic	34	Porosity [2] per cent	27.4	24.14	11.69	2.21	1.6
					Volume shrinkage [3] do	34.0	34.5	44.7	48.9	50.3
					Color	Flat grayish white.	White; very pale buff tinge.	Very light buff.	Pale olive buff spotted.	Pale olive buff.
1.24	84.2	12.93	Plastic	34	Porosity per cent	55.55	39.4	32.01	25.96	13.1
					Volume shrinkage do	18.9	23.0	25.9	28.9	38.0
					Color	Good white.	Same.	Same.	Same.	Same.
1.30	32.97	12.78	Good	34	Porosity per cent	41.1	39.3	39.55	36.35	26.83
					Volume shrinkage do	17.3	20.1	22.60	23.92	33.3
					Color	Very good white	Same.	Same.	Same.	Same.
1.25	40.88	16.13	Fairly fat	34	Porosity per cent	45.4		39.44	32.05	30.7
					Volume shrinkage do	18.2		25.54	34.58	43.2
					Color	Very good white.	Same.	Very good clean white.	Same.	Same.
1.26	35.6	16.98	Very plastic	33	Porosity per cent	29.7	27.9	15.18	4.86	1.3
					Volume shrinkage do	32.4	33.5	42.59	45.73	47.4
					Color	Very light buff.	Same.	Same.	Avellareous.	Cinnamon buff.
1.75	38.70	19.32	Fairly plastic	34	Porosity per cent	37.99	35.5	30.95	25.8	5.5
					Volume shrinkage do	20.30	28.8	29.84	36.0	46.4
					Color	Good white.	Same.	Same.	White.	Same.
1.27	37.70	15.78	do	33½	Porosity per cent	39.6	35.5	35.09	29.71	18.5
					Volume shrinkage do	19.0	24.8	29.63	32.54	40.5
					Color	Very good white.	Same.	Good white.	Very good white.	Same.
1.28	37.73	17.92	Sticky; rather rubbery.	34	Porosity per cent	33.0	32.3	19.12	14.0	3.5
					Volume shrinkage do	23.0	28.9	38.39	41.1	43.9
					Color	Extremely light buff.	Same.	Same.	Same.	Gray and buff spotted.
1.35	41.91	17.70	Fairly fat	33½	Porosity per cent	41.4	36.5	29.88	19.84	13.8
					Volume shrinkage do	20.5	28.4	35.34	41.98	44.1
					Color	Very light buff.	Same.	Same.	Same.	Cartridge buff.
1.76	37.07	16.24	Plastic; sticky	34	Porosity per cent	40.34	39.2	28.78	26.9	7.9
					Volume shrinkage do	22.05	25.4	33.34	36.8	46.7
					Color	Light pink buff.	White.	Same.	Very light buff.	Same.

1.33	39.13	12.20	Works well	33	Porosity, per cent	41.4	36.9	36.42	27.5	5.6
					Volume shrinkage, do	20.4	27.3	30.80	37.14	46.7
					Color	White.	Same.	Same.	Same.	Pale cartridge buff.
1.61	40.72	19.16	Good	34	Porosity, per cent	32.9	26.5	17.4	16.5	2.7
					Volume shrinkage, do	28.5	34.0	39.8	41.9	47.3
					Color	Very pale pink buff.	White; very light buff tinged.	Light buff.	Same.	Pale gull gray.
1.73	42.64	17.82	Very plastic	33½	Porosity, per cent	35.5	36.42	24.06	19.3	7.2
					Volume shrinkage, do	25.9	28.3	36.64	41.3	46.6
					Color	Fair white.	Same.	Very light cartridge buff.	Same.	Same.
1.50	42.73	15.10	Fairly plastic	34	Porosity, per cent	40.9	38.4	32.65	24.24	12.3
					Volume shrinkage, do	20.8	25.3	31.56	39.68	45.5
					Color	Good white.	Same.	Same.	White.	Very light buffish white.
1.51	44.9	22.73	Very plastic	34	Porosity, per cent	41.23	41.2	34.10	23.58	12.7
					Volume shrinkage, do	19.3	21.7	30.29	38.09	43.1
					Color	White.	Same.	Good white.	White.	Ivory yellow.
1.52			do	34	Porosity, per cent	38.6	35.9	29.87	26.3	14.9
					Volume shrinkage, do	20.7	26.1	30.51	35.2	43.2
					Color	White spotted black.	Same.	Same.	White	Same.
1.31	37.3	21.45	Fairly plastic	33½	Porosity, per cent	34.37	32.9	31.47	20.06	9.83
					Volume shrinkage, do	21.78	26.3	28.56	37.60	41.3
					Color	Very good white.	Same.	White.	Same.	Same.
1.40	44.4	36.69	do	33½	Porosity, per cent	27.0	25.1	24.28	1.39	1.4
					Volume shrinkage, do	25.9	29.5	31.32	40.70	42.6
					Color	Very good white.	Same.	Same.	Same.	Pale olive gray.
1.34	36.29	9.59	Good	34	Porosity, per cent	41.8	38.0	37.97	34.53	26.7
					Volume shrinkage, do	18.2	26.5	27.10	29.29	37.6
					Color	Good white.	Same.	Same.	Same.	Same.
1.39	36.5	10.86	Fairly plastic	33½	Porosity, per cent	41.9	38.2	36.46	31.71	21.5
					Volume shrinkage, do	19.7	27.5	27.14	32.96	41.3
					Color	Very good white.	Same.	Same.	Same.	Same.
1.29	30.78	10.6	do	33	Porosity, per cent	34.4	33.2	31.94	27.90	16.0
					Volume shrinkage, do	20.5	23.5	25.80	29.12	38.1
					Color	White.	Same.	Same.	Same.	Same.
1.67	39.86	24.87	Very plastic	33	Porosity, per cent	34.4	32.2	27.29	19.5	6.2
					Volume shrinkage, do	21.4	25.0	27.89	35.4	40.3
					Color	Good white.	Same.	Same.	Same.	Light buff.

[1] In terms of dry clay.

[2] In terms of burned volume.

[3] In terms of dry volume.

TABLE 5.—*Properties of the clays from Georgia and North Carolina*—Continued

Sample No.	Tempering water	Volume shrinkage	Workability	Deformation is cone		Burned at— 1,190° C.	1,250° C.	1,310° C.	1,370° C.	1,410° C.
	Per cent	*Per cent*								
1.32	35.3	15.71	Fairly plastic	33	Porosity, per cent	37.9	34.9	33.30	23.73	11.3
					Volume shrinkage, do	18.0	21.5	25.76	34.96	41.2
					Color	White.	Same.	Good white.	Same.	Same.
1.37	33.9		Not very plastic	33½	Porosity, per cent	36.48	33.1	31.17	18.60	8.0
					Volume shrinkage, do	19.89	26.0	26.48	39.30	42.1
					Color	White.	Same.	Good white.	Same.	Same.
1.38	38.7	30.15	Fairly plastic	33½	Porosity, per cent	31.2	27.0	25.26	9.10	2.0
					Volume shrinkage, do	23.9	27.2	28.85	40.43	45.2
					Color	Good white.	Same.	Same.	Same.	Very light pearl gray.
1.03	41.59	23.47	do	34	Porosity, per cent	34.55	34.60	32.22	28.29	21.63
					Volume shrinkage, do	18.29	20.9	22.14	25.33	30.5
					Color	Very good white.	Good white; silvery from mica flakes.	Very good white; silvery.	Same.	Same.
1.07	46.51	23.23	Fair; gritty	35	Porosity, per cent	37.17	35.8	36.36	33.44	23.6
					Volume shrinkage, do	20.56	21.6	21.6	25.94	33.1
					Color	Very good white.	Same.	White.	Same.	Same.

TABLE 6.—*Properties of porcelain made from clays from Pennsylvania, Delaware, Maryland, and Virginia*

Sample No.	Tempering water [1]	Volume shrinkage [1]	Modulus of rupture [2]		Burned at— 1,190° C.	1,250° C.	1,310° C.	1,370° C.	1,410° C.
	Per cent	*Per cent*	*Lbs./in.²*						
1.44	30.07	14.58	113.4	Porosity [3], per cent	14.55	6.46	0.0	3.16	
				Volume shrinkage [4], do	26.7	28.05	33.63	25.10	
				Modulus of rupture	3,971	6,831	8,267	4,222	
				Color	Cartridge buff.	Pale olive buff.	Same.	Same.	
1.46	33.63	12.81	143.9	Porosity, per cent	23.2	25.97	23.84	10.71	2.58
				Volume shrinkage, do	21.8	19.60	19.68	29.71	33.96
				Modulus of rupture	2,195	3,369	2,808	3,610	5,306
				Color	Pink.	Cartridge buff.	Same.	Same.	Pale gray.

1.49	25.89	15.77	352.0	Porosity ... per cent	5.8	7.16	.399	3.21	...
				Volume shrinkage ... do	19.8	20.47	22.95	8.30	...
				Modulus of rupture	5,731	7,192	7,243	2,822	...
				Color	Pinkish brown.	Drab gray.	Same.	Pale gray.	...
1.64	28.82	11.00	201.9	Porosity ... per cent	9.9	11.95	3.57	.85	.9
				Volume shrinkage ... do	28.3	29.28	33.96	32.19	23.2
				Modulus of rupture	4,002	5,543	6,268	4,064	4,293
				Color	Light buff.	Same.	Pale gray.	Same.	Light pale gray.
1.54	29.30	11.14	116.4	Porosity ... per cent	28.1	25.2	22.75	6.33	2.31
				Volume shrinkage ... do	13.2	16.5	18.47	28.10	32.3
				Modulus of rupture	2,430	2,574	4,572	4,965	5,368
				Color	Faint light buff.	Same.	Same.	Same.	Pale olive buff.
1.56	30.21	16.88	136.7	Porosity ... per cent	6.1	0.78	.08	.61	...
				Volume shrinkage ... do	29.3	33.30	34.76	28.39	...
				Modulus of rupture	5,585	6,205	6,136	5,650	...
				Color	Buff.	Same.	Pale gray.	Same.	...
1.48	29.10	13.43	133.9	Porosity ... per cent	11.1	7.82	.65	.18	.39
				Volume shrinkage ... do	27.8	31.45	34.81	29.25	21.87
				Modulus of rupture	5,694	7,600	7,852	7,455	4,596
				Color	Cartridge buff.	Ivory yellow.	Neutral gray.	Same.	Same.
1.55	30.89	15.68	173.4	Porosity ... per cent	0.0	.03	0.0	.40	...
				Volume shrinkage ... do	28.5	29.2	20.45	4.29	...
				Modulus of rupture	6,832	8,036	5,432	3,483	...
				Color	Pale gray.	Same.	Same.	Pale olive gray.	...
1.74	29.62	14.70	164.7	Porosity ... per cent	.1	0.0	0.0	.21	...
				Volume shrinkage ... do	30.6	31.17	24.89	6.89	...
				Modulus of rupture	3,699	6,680	5,271	4,451	...
				Color	Drab gray.	Pale olive gray.	Pale gray.	Same.	...
1.62	31.06	15.73	157.8	Porosity ... per cent	.14	0.31	0.0	.54	...
				Volume shrinkage ... do	26.9	30.41	19.83	Overburned.	...
				Modulus of rupture	6,088	5,154	4,864	3,698	...
				Color	Smoke gray.	Same.	Pale olive gray.	Same.	...
1.68	35.22	19.89	133.4	Porosity ... per cent	29.4	32.31	24.41	6.65	.4
				Volume shrinkage ... do	18.1	19.55	23.59	33.89	36.1
				Modulus of rupture	1,951	3,031	3,966	3,490	4,744
				Color	Pinkish buff.	Very light buff.	Same.	Ivory yellow.	Olive buff.

[1] In terms of dry clay. [2] Modulus of rupture of the dry clay. [3] In terms of burned volume. [4] In terms of dry volume.

TABLE 7.—*Properties of porcelain made from clays from Georgia and North Carolina*

Sample No.	Tempering water [1]	Volume shrinkage [1]	Modulus of rupture [2]		Burned at— 1,190° C.	1,250° C.	1,310° C.	1,370° C.	1,410° C.
	Per cent	*Per cent*	*Lbs./in.²*						
1.10	32.61	24.19	276.8	Porosity [3] ... per cent	18.2	16.29	14.32	0.82	0.5
				Volume shrinkage [4] ... do	26.52	28.56	27.43	34.07	33.4
				Modulus of rupture	1,388	3,004	6,223	9,836	7,474
				Color	White, tinted gray.	Same.	Light buff.	Light gray.	Pale gray.
1.24	26.34	10.29	200.2	Porosity ... per cent	25.8	23.50	20.5	7.31	.02
				Volume shrinkage ... do	16.8	19.03	19.8	29.63	34.5
				Modulus of rupture	2,555	3,778	5,207	5,337	6,016
				Color	Class 3.	Class 2.	Class 2.	Class 5.	Pale gray.
1.30	28.85	11.72	131.1	Porosity ... per cent	33.0	30.4	29.35	19.42	.72
				Volume shrinkage ... do	14.2	15.7	16.94	24.99	36.1
				Modulus of rupture	1,739	3,212	2,932	3,677	5,744
				Color	Class 3.	Class 1.	Class 1.	Class 1.	Pale gray.
1.25	28.89	14.39	142.9	Porosity ... per cent	29.5	27.09	24.15	7.54	.2
				Volume shrinkage ... do	17.3	19.20	21.41	31.59	34.63
				Modulus of rupture	2,601	3,129	4,097	4,036	5,169
				Color	Class 3.	Class 1.	Class 1.	Class 1.	Pale gray.
1.26	29.09	14.17	198.4	Porosity ... per cent	20.5	18.55	15.53	.47	.84
				Volume shrinkage ... do	23.0	25.37	27.77	34.92	32.59
				Modulus of rupture	2,905	3,711	5,208	10,390	3.200
				Color	Extremely light buff.	Same.	Very light buff.	Pale gray.	Drab gray.
1.75	29.29	16.49	199.2	Porosity ... per cent	22.0	22.08	17.94	.27	.0
				Volume shrinkage ... do	19.7	20.84	23.79	33.78	34.2
				Modulus of rupture	3,672	5,074	4,798	7,946	7,578
				Color	Class 3.	Class 3.	Class 5.	White, gray spots.	Pale gray.
1.27	28.16	16.46	169.0	Porosity ... per cent	26.5	23.80	22.99	3.60	.59
				Volume shrinkage ... do	16.8	18.37	19.06	31.01	33.24
				Modulus of rupture	3,235	3,745	5,150	4,866	6,877
				Color	Class 2.	White, tinged light buff.	Class 2.	Very light gray.	Light gray.
1.28	14.85	21.84	265.2	Porosity ... per cent	20.9	20.20	14.17	.52	.14
				Volume shrinkage ... do	19.9	23.31	24.38	33.85	33.29
				Modulus of rupture	3,845	3,408	5,649	8,748	7,652
				Color	Very light buff.	Same.	Same.	Spotted gray.	Pale gray.

1.35	29.55	12.50	155.0	Porosity ... per cent	25.7	26.23	19.88	1.88	.70
				Volume shrinkage ... do	18.5	20.28	23.63	33.84	33.54
				Modulus of rupture	2,926	3,630	4,279	7,946	5,742
				Color	Very light buff.	Same.	Same.	Buff, spotted gray.	Pale gray.
1.76	27.03	12.42	184.7	Porosity ... per cent	26.7	26.69	22.34	6.70	.2
				Volume shrinkage ... do	18.3	19.96	21.79	32.05	33.0
				Modulus of rupture	2,447	4,702	3,508	6,362	6,315
				Color	Class 4.	Class 4.	Class 4.	Cartridge buff.	Pale gray.
1.33	28.13	14.40	141.2	Porosity ... per cent	26.8	23.24	19.76	1.64	.09
				Volume shrinkage ... do	16.9	21.13	25.73	34.86	35.20
				Modulus of rupture	1,494	3,520	2,436	3,853	4,658
				Color	Class 4.	Class 4.	Class 2.	Very pale buff.	Light pale buff.
1.61	29.50	14.57	255.4	Porosity ... per cent	20.3	23.25	18.38	.61	.30
				Volume shrinkage ... do	23.22	22.96	24.29	43.64	32.8
				Modulus of rupture	3,430	5,945	4,309	10,191	9,527
				Color	Class 4.	Class 4.	Light ivory yellow.	Light gray.	Same.
1.73	28.85	13.59	167.7	Porosity ... per cent	24.7	24.22	19.05	.90	.3
				Volume shrinkage ... do	21.9	21.30	24.60	34.77	33.0
				Modulus of rupture	3,941	3,472	4,855	7,559	10,031
				Color	Slightly buff.	Same.	Light cartridge buff.	Buff, gray spots.	Olive buff.
1.50	31.74	17.21	166.4	Porosity ... per cent	26.3	24.6	20.96	4.59	.18
				Volume shrinkage ... do	18.5	19.7	23.76	33.19	33.61
				Modulus of rupture	2,979	3,995	4,721	7,354	6,324
				Color	Class 4.	Class 4.	Class 3.	White, light gray spots.	Light pale gray.
1.51	32.51	18.65	183.4	Porosity ... per cent	24.9	25.16	17.98	3.71	.12
				Volume shrinkage ... do	17.7	17.81	24.09	32.85	32.8
				Modulus of rupture	2,897	4,325	3,307	8,429	6,248
				Color	Class 4.	Tinged light buff.	Same.	White, gray spots.	Pale buff.
1.52	27.35	13.72	149.8	Porosity ... per cent	25.4	21.56	20.36	4.84	.04
				Volume shrinkage ... do	18.1	21.14	23.42	31.81	33.40
				Modulus of rupture	1,828	4,505	4,113	7,358	9,656
				Color	Class 4.	Class 2.	Class 5.	Class 5.	Pale gray.
1.31	29.58	15.13	312.1	Porosity ... per cent	26.1	23.0	21.06	5.02	.03
				Volume shrinkage ... do	18.0	18.9	22.26	31.45	33.14
				Modulus of rupture	3,213	4,183	4,601	4,791	8,425
				Color	Class 3.	Class 5.	Class 2.	Class 2.	Pale gray.
1.40	31.18	21.47	1,008.6	Porosity ... per cent	21.2	21.07	16.95	.50	.51
				Volume shrinkage ... do	18.9	21.03	23.70	32.41	32.95
				Modulus of rupture	4,509	3,245	2,757	11,081	7,713
				Color	Class 3.	Class 2.	Class 2.	White spotted, gray.	Pale gray.

[1] In terms of dry clay. [2] Modulus of rupture of the dry clay. [3] In terms of burned volume. [4] In terms of dry volume.

TABLE 7.—*Properties of porcelain made from clays from Georgia and North Carolina*—Continued

Sample No.	Tempering water	Volume shrinkage	Modulus of rupture		Burned at— 1,190° C.	1,250° C.	1,310° C.	1,370° C.	1,410° C.
	Per cent	*Per cent*	*Lbs./in.*²						
1.34	26.70	12.42	136.3	Porosity, per cent	28.6	25.30	22.1	5.44	.24
				Volume shrinkage, do	16.4	19.40	20.3	30.54	35.28
				Modulus of rupture	2,286	3,024	3,420	4.099	3,379
				Color	Class 2.	Class 1.	Class 1.	Very light buff.	Light olive buff.
1.39	30.11	17.31	154.9	Porosity, per cent	27.4	25.48	24.11	7.31	0.39
				Volume shrinkage, do	17.2	19.29	21.21	32.47	33.79
				Modulus of rupture	3,107	3,584	3,945	4,868	5,275
				Color	Class 3.	Class 2.	Class 1.	Class 1.	Very light gray.
1.29	26.21	12.29	195.9	Porosity, per cent	26.5	23.37	21.30	7.29	0.07
				Volume shrinkage, do	13.4	17.87	18.68	27.34	29.53
				Modulus of rupture	3,020	4,585	3,114	4,907	6,088
				Color	Class 2.	Class 2.	Class 2.	Class 2.	Pale buff.
1.67	27.25	7.78	308.9	Porosity, per cent	25.0	25.47	20.61	6.24	0.3
				Volume shrinkage, do	16.4	19.90	19.98	30.22	30.6
				Modulus of rupture	2,188	4,352	4,143	5,328	8,315
				Color	Class 4.	Class 5.	Class 2.	Class 5.	Light gray.
1.32	28.08	12.32	203.4	Porosity, per cent	25.88	25.17	22.29	4.68	0.30
				Volume shrinkage, do	17.7	18.28	20.67	31.21	32.15
				Modulus of rupture	2,474	3,912	3,268	4,398	5,592
				Color	Class 2.	Class 5.	Very light buff.	Light buff.	Pale olive buff.
1.37	24.85	12.45	340.7	Porosity, per cent	23.0	21.46	18.15	1.46	0.11
				Volume shrinkage, do	18.5	19.97	21.80	32.10	32.27
				Modulus of rupture	2,216	4,988	1,916	7,777	1,897
				Color	Class 3.	Class 5.	Slightly ivory yellow.	White, spotted neutral gray.	Pale buff.
1.38	26.02	13.78	464.5	Porosity, per cent	20.5	20.27	18.69	1.60	0.33
				Volume shrinkage, do	19.0	20.39	22.31	28.22	31.72
				Modulus of rupture	1,464	5,073	2,117	8,353	4,471
				Color	Class 2.	Class 5.	Class 2.	White, spotted mouse gray.	Light pearl gray.
1.04	28.50	16.57	221.9	Porosity, per cent	26.2	25.01	20.01	5.08	0.4
				Volume shrinkage, do	15.5	19.63	18.95	29.84	31.4
				Modulus of rupture	2,582	3,282	3,357	6,804	5,236
				Color	White.	White tinged light buff.	White.	Light pearl gray.	Same.

1.05	31.36	15.92	192.1	Porosity per cent	27.0	18.44	15.75	7.43	0.09
				Volume shrinkage do	15.6	21.95	20.0	30.58	31.57
				Modulus of rupture	(No bars.)	3,412	3,917	5,845	5,074
				Color	Pale salmon.	Light buff.	Same.	Pale gray.	Pale buff.
1.06	26.36	12.01	245.0	Porosity per cent	25.2	18.49	10.17	1.33	0.04
				Volume shrinkage do	11.67	23.01	28.53	28.57	41.5
				Modulus of rupture	2,037	4,015	4,238	7,735	6,442
				Color	Good white.	White, tinged buff.	Fair white.	Gray.	Same.
1.41	30.81	16.99	224.1	Porosity per cent	25.7	25.88	20.61	2.49	0.02
				Volume shrinkage do	15.0	16.38	19.22	39.57	32.15
				Modulus of rupture	2,988	3,135	3,405	6,582	4,576
				Color	White, tinted light buff.	Same.	Same.	White, slightly gray.	Same.
1.36	33.41	20.96	231.9	Porosity per cent	27.4	25.43	22.89	4.97	0.05
				Volume shrinkage do	16.1	19.72	17.79	30.48	32.42
				Modulus of rupture	2,359	3,937	3,115	4,316	6,680
				Color	Class 2.	Class 1.	Class 1.	Pale gray.	Same.

Table 8.—*Number, location, and ownership of the Pennsylvania, Delaware, Maryland, and Virginia division*

Sample No.	Located at—	Owned by—
1.44	Mount Holly Springs, Pa	Sandusky Portland Cement Co.
1.46	North East, Md	John A. Russel.
1.47	do	Do.
1.49	Bacon Hill, Md	Bacon Hill Clay Co.
1.63	do	Do.
1.64	do	Do.
1.54	Mount Holly Springs, Pa	Holly Clay Co.
1.56	do	Do.
1.48	do	Do.
1.55	Saylorsburg, Pa	Mount Eaton Clay Co.
1.74	do	Do.
1.58A	Hockessin, Del	Golding Sons Co.
1.58B	do	Do.
1.59	Pleasant Hill, Del	Newark China Clay Co.
1.60	Hockessin, Del	Peach Kaolin Co.
1.62	Saylorsburg, Pa	Miner-Edgar Co.
1.68	Cold Springs, Va	Products Sales Co.

Table 9.—*Number, location, and ownership of the North and South Carolina division*

Sample No.	Located at—	Owned by—
1.03	Cullowhee, N. C	Harris Clay Co.
1.07	do	Do.
1.04	Sparks Mine, Mitchell County, N. C	Do.
1.05	Spruce Pine, N. C	Do.
1.06	do	Do.
1.41	Dillsboro, N. C	Do.
1.14	Langley, S. C	Immaculate Kaolin Co
1.15	do	Peerless Clay Co.
1.16	do	Do.
1.17	do	Do.
1.19	do	Do.
1.18	do	South Carolina Clay Co
1.20	do	Paragon Kaolin Co.
1.21	do	Do.
1.22	Warrenville, S. C	Parker Kaolin Co.
1.45	Horrell Hill, S. C	Interstate Clay Co.
1.70	do	Do.
1.36	Canton, N. C	Hand Clay Co.
1.53	Rayflin, S. C	Edisto Kaolin Co.
1.57	Abbeyville, S. C	J. A. & W. E. Hill.
1.65	Bath, S. C	McNamee Kaolin Co.
1.66	do	Do.
1.69	Columbia, S. C	Columbia Mineral Products Co.

TABLE 10.—*Number, location, and ownership of the Georgia division*

Sample No.	Located at—	Owned by—
1.10	McIntyre	Republic Mining & Milling Co.
1.12	Perry	Houston Kaolin Co.
1.13	Fort Valley	J. D. Fagan property.
1.23	Butler	Golding Sons Co.
1.24	do	Do.
1.30	Gordon	Savannah Kaolin Co.
1.25	do	Do.
1.26	do	Do.
1.75	do	Do.
1.27	Hephzibah	Albion Kaolin Co.
1.28	Gordon	Columbia Kaolin & Aluminum Co.
1.35	do	Do.
1.76	do	Do.
1.33	Claymont	Kaolin Mining Co.
1.61	do	Do.
1.73	do	Do.
1.50	Dedrick mine, McIntyre	Edgar Bros. Co.
1.51	do	Do.
1.52	McIntyre mine, McIntyre	Do.
1.31	Dry Branch	Georgia Kaolin Co.
1.40	do	Do.
1.34	do	R. H. Jones & Co.
1.39	do	Do.
1.29	do	American Clay Co.
1.67	do	Do.
1.32	do	Do.
1.37	do	John Sant & Sons Co.
1.38	do	Do.

VII. SUMMARY

It was felt that a guide should be provided for the industrial application of the foregoing data. Unfortunately there are no standard specifications for ceramic clays. The uses are numerous and varied, and each consumer has his own ideas as to what he wants. Some of the most important characteristics of the clays studied are, therefore, compared in order to help the consumer to find the clay most nearly satisfying his requirements. By referring to Tables 1 to 10, inclusive, it is possible to locate all the data on each clay.

Per Cent of Clay-like Substance.

The per cent of clay-like substance found in the various samples taken varied as follows:

Less than 10 per cent, 1.58b.

10 to 20 per cent, 1.44, 1.45.

20 to 30 per cent, 1.03, 1.05, 1.06, 1.41, 1.46, 1.63, 1.64, 1.67.

30 to 40 per cent, 1.28, 1.36, 1.50, 1.54, 1.56, 1.58A, 1.59, 1.60, 1.69.

40 to 50 per cent, 1.38, 1.47, 1.57.

50 to 60 per cent, 1.07, 1.24, 1.55.

60 to 70 per cent, 1.12, 1.15, 1.16, 1.21, 1.22, 1.23, 1.27, 1.30, 1.34, 1.48, 1.51, 1.65, 1.68.

70 to 80 per cent, 1.13, 1.18, 1.19, 1.20, 1.29, 1.40, 1.49, 1.67, 1.73, 1.74, 1.76.

80 to 90 per cent, 1.10, 1.14, 1.32, 1.33, 1.37, 1.39, 1.52, 1.53, 1.62, 1.75.

90 to 100 per cent, 1.17, 1.25, 1.26, 1.31, 1.35, 1.61, 1.66, 1.70.

Fusion Tests.

The following samples showed high fusion tests, as follows:

Cone 32, 1.05, 1.06, 1.46, 1.58, 1.64, 1.66.

Cone 33, 1.16, 1.17, 1.23, 1.26, 1.27, 1.29, 1.31, 1.32, 1.33, 1.34, 1.35, 1.37, 1.38, 1.39, 1.40, 1.41, 1.60, 1.65, 1.67, 1.69, 1.73.

Cone 34, 1.03, 1.04, 1.10, 1.14, 1.15, 1.18, 1.19, 1.20, 1.21, 1.22, 1.24, 1.25, 1.28, 1.30, 1.36, 1.45, 1.50, 1.51, 1.52, 1.53, 1.59, 1.61, 1.68, 1.70, 1.75, 1.76.

Cone 35, 1.07.

Washing Tests.

In the following samples the clay was off color on firing, and indications were that it would not be improved by washing: 1.04, 1.05, 1.14, 1.15, 1.16, 1.17, 1.19, 1.41, 1.46, 1.48, 1.49, 1.51, 1.54, 1.55, 1.56, 1.58A, 1.58B, 1.68, 1.74.

In the following samples the clay when mixed with feldspar and flint produced a white-burning porcelain body. Washing tests indicated that the color could not be improved by washing: 1.03, 1.07, 1.12, 1.22, 1.23, 1.27, 1.30, 1.32, 1.34, 1.36, 1.39, 1.40, 1.45, 1.47, 1.59, 1.60, 1.65, 1.66, 1.70, 1.75.

In the following samples it appeared that if washing were practiced by the method here used, a white-burning product could be obtained, or one of improved whiteness, with the following yields:

Less than 10 per cent, 1.61.

20 to 50 per cent, 1.50.

40 to 50 per cent, 1.04, 1.57.

50 to 60 per cent, 1.06, 1.38, 1.67.

60 to 70 per cent, 1.20, 1.21, 1.28, 1.33, 1.44, 1.52, 1.62, 1.73, 1.76.

70 to 80 per cent, 1.18, 1.31.

80 to 90 per cent, 1.10, 1.13, 1.24, 1.29, 1.35, 1.37, 1.53, 1.69.

90 to 99 per cent, 1.25, 1.26.

Plasticity.

The following clays are classed as "fat" or "very plastic": 1.14, 1.15, 1.17, 1.26, 1.28, 1.47, 1.49, 1.51, 1.52, 1.65, 1.66, 1.67, 1.70, 1.73.

The following clays are classed as "plastic" or "good": 1.23, 1.24, 1.30, 1.33, 1.34, 1.56, 1.61, 1.76.

The following clays are classed as "fairly plastic": 1.03, 1.07, 1.10, 1.16, 1.18, 1.19, 1.20, 1.21, 1.22, 1.25, 1.27, 1.29, 1.30, 1.31, 1.35, 1.38, 1.39, 1.40, 1.44, 1.45, 1.48, 1.50, 1.53, 1.54, 1.58, 1.62, 1.68, 1.69, 1.74, 1.75.

The following are "not very plastic": 1.36, 1.37, 1.59, 1.64.

The following are "low plasticity": 1.55, 1.57.

The following are "short" or "sandy": 1.04, 1.05, 1.06, 1.41, 1.46, 1.60.

Tempering Water.

The per cent of tempering water needed for neat clay varies as follows:

30 to 35 per cent, 1.20, 1.29, 1.30, 1.37, 1.44, 1.45, 1.49, 1.54, 1.57, 1.62, 1.66, 1.74.

35 to 40 per cent, 1.06, 1.18, 1.21, 1.26, 1.27, 1.28, 1.31, 1.32, 1.33, 1.34, 1.38, 1.39, 1.48, 1.55, 1.56, 1.59, 1.60, 1.64, 1.67, 1.69, 1.70, 1.75, 1.76.

40 to 45 per cent, 1.03, 1.04, 1.05, 1.16, 1.22, 1.23, 1.25, 1.35, 1.40, 1.41, 1.46, 1.47, 1.50, 1.51, 1.53, 1.58, 1.61, 1.65, 1.68, 1.73.

45 to 50 per cent, 1.07, 1.10, 1.14, 1.36.

50 to 55 per cent, 1.15, 1.19.

55 to 60 per cent, 1.17, 1.24.

Volume Shrinkage on Drying.

The per cent of volume shrinkage on drying in terms of dry clay varies as follows:

Less than 10 per cent, 1.34, 1.44, 1.54, 1.59, 1.62.

10 to 15 per cent, 1.05, 1.15, 1.24, 1.29, 1.30, 1.33, 1.39, 1.45, 1.46, 1.48, 1.55, 1.56, 1.57, 1.66, 1.68, 1.69, 1.70, 1.74.

15 to 20 per cent, 1.04, 1.06, 1.14, 1.16, 1.18, 1.20, 1.21, 1.22, 1.25, 1.26, 1.27, 1.28, 1.32, 1.35, 1.47, 1.50, 1.58, 1.61, 1.64, 1.73, 1.75, 1.76.

20 to 25 per cent, 1.03, 1.07, 1.19, 1.23, 1.31, 1.41, 1.49, 1.51, 1.65, 1.67.

25 to 30 per cent, 1.10, 1.17, 1.36.

30 to 35 per cent, 1.38, 1.53.

35 to 40 per cent, 1.40.

Porosity of Clay Fired to Cone 12.

The porosity of the clays after firing to 1,370° C. is as follows:

Less than 5 per cent, 1.10, 1.15, 1.17, 1.19, 1.26, 1.40, 1.48, 1.49, 1.55, 1.56, 1.57, 1.62, 1.74.

5 to 10 per cent, 1.14, 1.38, 1.44.

10 to 15 per cent, 1.16, 1.28, 1.70.

15 to 20 per cent, 1.21, 1.31, 1.35, 1.37, 1.45, 1.53, 1.61, 1.64, 1.67, 1.73.

20 to 25 per cent, 1.18, 1.22, 1.32, 1.50, 1.51, 1.65, 1.66, 1.69.

25 to 30 per cent, 1.03, 1.06, 1.20, 1.23, 1.24, 1.27, 1.29, 1.33, 1.52, 1.75, 1.76, 1.77.

30 to 35 per cent, 1.07, 1.25, 1.34, 1.36, 1.39, 1.41, 1.60, 1.68.

35 to 40 per cent, 1.04, 1.30, 1.46, 1.47, 1.58, 1.59.

40 to 45 per cent, 1.05, 1.54.

Volume Shrinkage of Clay Fired to Cone 12.

The per cent of volume shrinkage in terms of dry volume after firing to 1,370° C. is as follows:

10 to 15 per cent, 1.49, 1.54, 1.55, 1.62, 1.74.

15 to 20 per cent, 1.47, 1.59.

20 to 25 per cent, 1.03, 1.04, 1.05, 1.06, 1.30, 1.41, 1.58, 1.60.

25 to 30 per cent, 1.07, 1.24, 1.29, 1.34, 1.36, 1.46.

30 to 35 per cent, 1.20, 1.21, 1.25, 1.27, 1.32, 1.39, 1.44, 1.57, 1.64.

35 to 40 per cent, 1.18, 1.23, 1.31, 1.33, 1.37, 1.50, 1.51, 1.52, 1.66, 1.67, 1.68, 1.69, 1.75, 1.76.

40 to 45 per cent, 1.16, 1.22, 1.28, 1.35, 1.38, 1.40, 1.45, 1.48, 1.53, 1.56, 1.61, 1.65, 1.70, 1.73.

45 to 50 per cent, 1.10, 1.14, 1.26.

50 to 55 per cent, 1.17, 1.19.

55 to 60 per cent, 1.15.

Plasticity of Porcelain Bodies.

The plasticity of the porcelain bodies, when given, is as follows:

Very plastic, 1.15, 1.17, 1.22.

Plastic, 1.16, 1.18, 1.20, 1.21, 1.23, 1.26, 1.30, 1.31, 1.49, 1.52, 1.56, 1.61, 1.65, 1.66.

Fairly plastic, 1.19, 1.24, 1.25, 1.34, 1.39, 1.48.

Very little plasticity, 1.36.

Short, 1.03, 1.04, 1.05, 1.07, 1.14, 1.41, 1.55, 1.58, 1.60.

Tempering Water for Porcelain Bodies.

The per cent of tempering water needed for the porcelain bodies varies as follows:

Less than 20 per cent, 1.28.

20 to 25 per cent, 1.37.

25 to 30 per cent, 1.04, 1.06, 1.16, 1.20, 1.21, 1.24, 1.25, 1.26, 1.27, 1.29, 1.30, 1.31, 1.32, 1.33, 1.34, 1.35, 1.38, 1.39, 1.44, 1.47, 1.48, 1.49, 1.52, 1.53, 1.54, 1.58, 1.59, 1.60, 1.61, 1.64, 1.66, 1.67, 1.69, 1.70, 1.73, 1.74, 1.75, 1.76.

30 to 35 per cent, 1.03, 1.05, 1.07, 1.10, 1.18, 1.22, 1.23, 1.36, 1.40, 1.41, 1.45, 1.46, 1.50, 1.51, 1.55, 1.56, 1.57, 1.62 1.65.

35 to 40 per cent, 1.14, 1.15, 1.17, 1.19, 1.68.

Shrinkage on Drying of Porcelain Bodies.

The per cent of volume shrinkage in terms of dry clay in the porcelain bodies varied as follows:

5 to 10 per cent, 1.67.

10 to 15 per cent, 1.06, 1.24, 1.25, 1.26, 1.29, 1.30, 1.31, 1.32, 1.33 1.34, 1.35, 1.37, 1.38, 1.44, 1.46, 1.48, 1.52, 1.54, 1.57, 1.59, 1.61, 1.64, 1.66, 1.70, 1.73, 1.74, 176.

15 to 20 per cent, 1.04, 1.05, 1.07, 1.14, 1.16, 1.20, 1.21, 1.22, 1.27, 1.39, 1.41, 1.45, 1.47, 1.49, 1.50, 1.51, 1.53, 1.55, 1.56, 1.58, 1.60, 1.62, 1.65, 1.75.

20 to 25 per cent, 1.03, 1.10, 1.15, 1.17, 1.18, 1.19, 1.28, 1.36, 1.40, 1.68.

25 to 30 per cent, 1.69.

Dry Strength of Porcelain Bodies.

The dry strength of the porcelain bars varied as follows:

100 to 150 pounds, 1.14, 1.16, 1.23, 1.25, 1.30, 1.33, 1.34, 1.44, 1.45, 1.46, 1.48, 1.52, 1.54, 1.56, 1.65, 1.68, 1.69.

150 to 200 pounds, 1.05, 1.17, 1.18, 1.19, 1.20, 1.21, 1.22, 1.26, 1.27, 1.29, 1.35, 1.39, 1.50, 1.51, 1.53, 1.55, 1.57, 1.58, 1.59, 1.60, 1.62, 1.66, 1.73, 1.74, 1.75, 1.76.

200 to 250 pounds, 1.04, 1.06, 1.24, 1.32, 1.36, 1.41, 1.47, 1.64, 1.70.

250 to 300 pounds, 1.07, 1.10, 1.15, 1.28, 1.61.

300 to 350 pounds, 1.03, 1.31, 1.37, 1.67.

350 to 400 pounds, 1.49.

450 to 500 pounds, 1.38.

Over 1,000 pounds,[1] 1.40.

Porosity of Porcelain Bodies Fired to Cone 12.

The porosity of porcelain bodies fired to 1,370° C. varies as follows:

Less than 1 per cent, 1.10, 1.14, 1.15, 1.16, 1.17, 1.19, 1.22, 1.26, 1.28, 1.40, 1.48, 1.53, 1.55, 1.56, 1.61, 1.62, 1.64, 1.73, 1.74, 1.75.

1 to 5 per cent, 1.06, 1.18, 1.21, 1.27, 1.31, 1.32, 1.33, 1.35, 1.36, 1.37, 1.38, 1.41, 1.44, 1.45, 1.49, 1.50, 1.51, 1.52, 1.57, 1.59, 1.60, 1.65, 1.69, 1.70.

5 to 10 per cent, 1.04, 1.05, 1.07, 1.20, 1.23, 1.24, 1.25, 1.29, 1.34, 1.39, 1.54, 1.58, 1.66, 1.67, 1.68, 1.76.

10 to 15 per cent, 1.03, 1.46, 1.47.

15 to 20 per cent, 1.30.

Volume Shrinkage of Porcelain Bodies Fired to Cone 12.

The volume shrinkage of porcelain bodies on firing to 1,370° C. varies as follows:

Less than 10 per cent, 1.49, 1.74.

10 to 25 per cent, 1.30, 1.44, 1.47, 1.57.

25 to 30 per cent, 1.03, 1.04, 1.06, 1.07, 1.20, 1.21, 1.24, 1.29, 1.38, 1.46, 1.48, 1.54, 1.56, 1.58.

30 to 35 per cent, 1.05, 1.10, 1.16, 1.18, 1.22, 1.23, 1.25, 1.26, 1.27, 1.28, 1.31, 1.32, 1.33, 1.34, 1.35, 1.36, 1.37, 1.39, 1.40, 1.45, 1.50, 1.51, 1.52, 1.53, 1.59, 1.60, 1.63, 1.65, 1.66, 1.67, 1.68, 1.69, 1.70, 1.73, 1.75, 1.76.

35 to 40 per cent, 1.14, 1.17, 1.19, 1.41, 1.64.

40 to 45 per cent, 1.15, 1.55, 1.61.

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[1] The value found is the average of 11 determinations.

Strength of Porcelain Bodies Fired to Cone 12.

The modulus of rupture of porcelain bodies fired to 1,370° C. varied as follows:

Less than 3,000 pounds, 1.14, 1.49.

3,000 to 4,000 pounds, 1.03, 1.30, 1.33, 1.46, 1.47, 1.55, 1.60, 1.62, 1.68.

4,000 to 5,000 pounds, 1.15, 1.17, 1.20, 1.23, 1.25, 1.27, 1.29, 1.31, 1.32, 1.34, 1.36, 1.44, 1.53, 1.54, 1.57, 1.58, 1.59, 1.64, 1.74.

5,000 to 6,000 pounds, 1.05, 1.21, 1.24, 1.56, 1.65, 1.66, 1.67.

6,000 to 7,000 pounds, 1.04, 1.07, 1.41, 1.45, 1.69, 1.76.

7,000 to 8,000 pounds, 1.06, 1.18, 1.35, 1.37, 1.48, 1.50, 1.52, 1.73, 1.75.

8,000 to 9,000 pounds, 1.16, 1.28, 1.38, 1.51, 1.70.

9,000 to 10,000 pounds, 1.10, 1.19.

10,000 to 11,000 pounds, 1.22, 1.26, 1.61.

11,000 to 12,000 pounds, 1.40.

WASHINGTON, July 29, 1926.