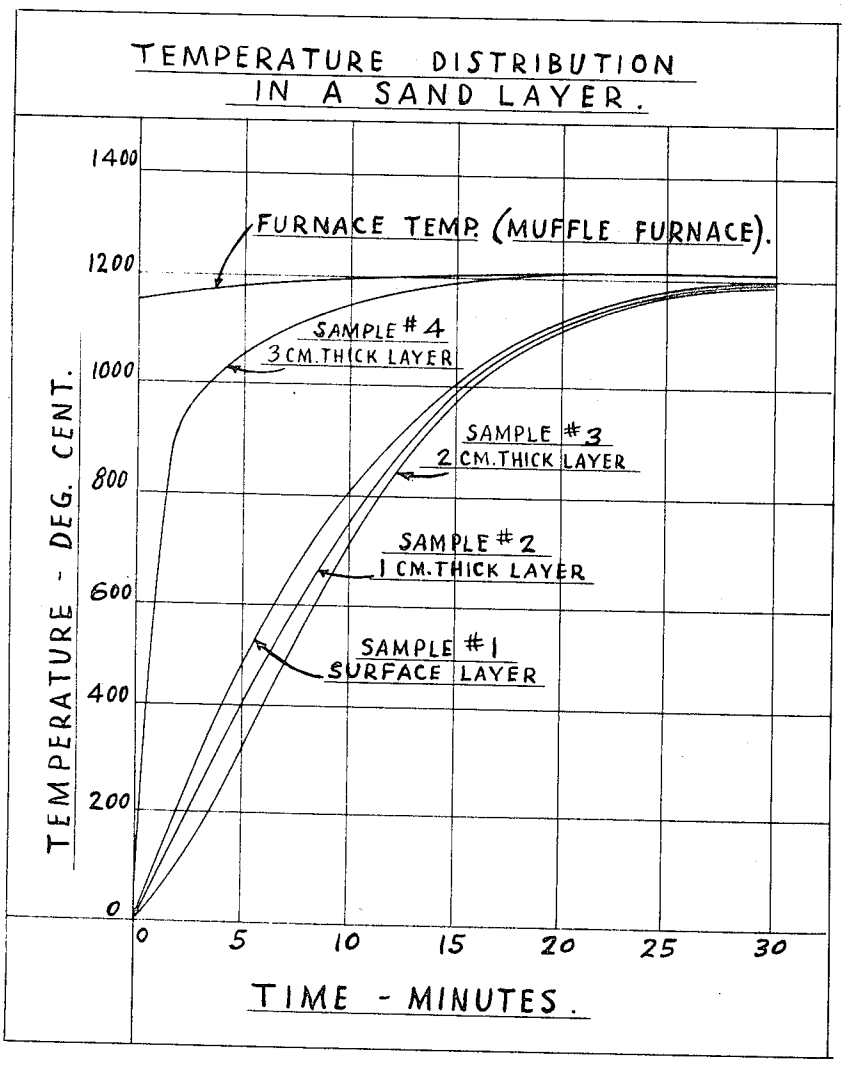
April 8, 1969 E. SCHNEIDER ET AL 3,437,501

PROCESS FOR THE MANUFACTURE OF WHITE QUARTZ POWDER

Filed April 18, 1968



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United States Patent Office 3,437,501 Patented Apr. 8, 1969

3,437,501

PROCESS FOR THE MANUFACTURE OF WHITE QUARTZ POWDER

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Continuation-in-part of application Ser. No. 533,413, Mar. 11, 1966. This application Apr. 18, 1968, Ser. No. 722,434
Claims priority, application Germany, Mar. 18, 1965, W 38,789; Jan. 7, 1966, W 40,673
Int. Cl. C09c 1/28
U.S. Cl. 106—288 5 Claims

ABSTRACT OF THE DISCLOSURE

A method for the manufacture of white quartz powder from quartz-containing sands which includes the steps of mixing a quantity of quartz-containing sand with about 1% of its weight of water and about 1% of its weight of an alkali metal salt, forming the mixture into a layer of about 3 centimeters uniform depth, inserting the mixture into an oven maintained at about 1200° C., heating the mixture while it is in a static condition to substantially said temperature, then grinding it.

This is a continuation-in-part of U.S. application Ser. No. 533,413, entitled, "Process for the Manufacture of White Quartz Powder," filed Mar. 11, 1966.

Background of the invention

This invention relates to the manufacture of white quartz powder from quartz-containing sands and is based on a process in which these quartz-containing sands are mixed with an alkali metal salt and water, heated at about 1,200° C. to glowing point and subsequently ground up.

When the process is conducted in this manner the untreated initial sand has a mean white-content of 56 which is increased by grinding in the known manner to approximately 83. It is already known to admix the alkali metal salt to the glowing sand in the form of an aqueous solution. The white-content then reaches values of about 85 after grinding. The white-content of the quartz powder may be increased to approximately 89 by appropriately choosing these alkali metal salts.

There is a former known process for manufacturing white quartz powder from quartz-containing sands by thermic treatment with metal salts which form white SiO_2 compounds, in which the metal salts are added in the hottest part of the combustion-and-reaction-chamber.

It has been maintained that the white-content of the ground powder obtained by this process is increased to approximately 94.

In practice this process is carried out in a rotary furnace, in which the burners in the hottest part are fed with a mixture of fuel, and pulverized metal salt.

A process for purifying finely distributed mineral silicic acid is further described in the British patent specification No. 877,890, in which process 1 to 5% by weight of a colourless oxide, hydroxide, carbonate or dicarbonate of a metal or Group I or II of the periodic system is added to the mineral silica and the mixture is heated to a temperature of betwen 1,000 and 1,700° C. for a period of ten minutes to one hour.

The present invention puts forward a process which makes it possible to obtain a white-content of at least 94, or even greater, from ground quartz sand. The expression "white-content" is to be taken as meaning the "relative value A of brightness," which according to the German

Industrial Standards No. 5033 may be determined with the Elrepho instrument of Messrs. Zeiss.

Summary of the invention

According to the invention there is provided a method for the production of white quartz powder from quartz containing sands comprising the steps of mixing quartz containing sand with about 1 percent of its weight of water and with about 1 percent of its weight of an alkali metal salt, forming the mixtures into a layer of about 3 centimeters uniform depth, inserting the mixture at substantially ambient temperature into a heating oven which is maintained at about 1200° C., heating the mixture while it is in a static condition to substantially said temperature and grinding the heated mixture.

In a preferred embodiment the sand is dampened with approximately 1% of its weight of water; the dampened sand is then mixed with the salt and finally this mixture is heated in a static condition and at a 3 centimeter uniform depth.

The process in accordance with the invention may be carried out in a particularly simple manner in that the sand, the salt and the water can be mixed at normal room or ambient temperature. It is therefore not necessary to subject the salt to any kind of burners or to convey it into a hot environment with resultant sealing difficulties and signs of wear arising from this.

The mixing may be completed with the aid of ordinary weighing and mixing devices, without the need for trained labor or the constant surveillance of comparatively complicated apparatus. The correct mixing ratio is always guaranteed because of the extraordinarily simple mixing process. The mixture may be poured without difficulty, for example into ordinary trays, whereby care has only to be taken that a uniform pouring depth is maintained.

While all alkali metal salts are operable in the method of the invention, preferred salts are sodium carbonate, sodium chloride, potassium carbonate and potassium chloride. These salts are preferred for economic reason.

It is essential that the mixture be formed into a layer of 3 centimeters depth in order for optimum results to be obtained. This is demonstrated in Example 1 below.

EXAMPLE 1

A composition was prepared by mixing a quantity of quartz containing sand with 1% of its weight of water, and 1% of its weight of sodium carbonate. The mixture was then divided into four portions or samples. Each sample was spread out in a tray in a layer of uniform depth.

The first sample was spread out in a zero (0) thickness layer, i.e. it was spread out on the surface of the tray in a layer having essentially no thickness. The second sample was formed into a layer having a uniform depth of 1 centimeter, the third sample into a layer having a uniform depth of 2 centimeters and the fourth sample into a layer having a uniform depth of 3 centimeters.

Each sample was then inserted into a muffle furnace maintained at approximately 1200° C., and the time-temperature values during the time it took for each sample to reach a temperature of 1200° C. were observed.

The results are shown in the drawing, where it will be observed that Sample 4 having the 3 centimeter depth layer reached the 1200° C. temperature sooner, and at a much faster rate than the other samples.

The net result is that white quartz powder can be produced at a faster and more economical rate, when a layer having a uniform depth of 3 centimeters is being processed, as compared to layers having other depths. In addition a product having a greater white content is achieved. Thus the depth of the layer is shown to be critical.

Optimum results are also achieved when the static mixture is exposed substantially instantaneously to the temperature of the heating oven, i.e. it should be inserted directly into the heated chamber, maintained at 1200° C., rather than being gradually heated to that temperature.

The surprising factor in the process in accordance with the invention is that unexpectedly high white-contents of the ground powder are obtained even when considerable impurities were originally present in the sand. Example 2, showing the results of experiments based on the proposal in accordance with the invention clearly shows this.

The experiments were carried out such that further Fe_2O_3 was intentionally added to a generally used quartz sand already having an iron content of 0.04% Fe_2O_3, so that the white-content of the ground powder dropped correspondingly. It was also evident with regard to the expected white-content of the impure quartz sands that the completed end product had the stated high white-content of 94 and more.

EXAMPLE 2

Sand	Fe_2O_3 content (percent wt.)	White content	
		Ground without treatment in accordance with the invention	Ground with the treatment in accordance with the invention [1]
I	0.04	86	96
II	0.12	67	95
III	9.21	61	94

[1] The sand was mixed with 1% of its weight of water and 1% of its weight of sodium carbonate, and processed in accordance with the method of the invention.

The experiments were carried out in a chamber oven in burning trays. In commercial processes a tunnel oven is used with a load of the material in question on the burning trays. It is self-evident that any other form of oven may be used as long as the mixture remains static, since the process according to the present invention is concerned not with the oven but with the preparatory operations before the prepared mixture is inserted into the oven, and with the feature that while being heated the mixture is in a static condition and is of even depth of 3 centimeters.

What we claim is:

1. A method for the production of white quartz powder from quartz containing sands comprising the steps of mixing the sand with about 1 percent of its weight of water and with about 1 percent of its weight of an alkali metal salt, forming the mixture into a layer of uniform depth of about 3 centimeters, inserting the mixture which is at ambient temperature into a heating oven which is maintained at about 1200° C., heating the mixture while it is in a static condition to said temperature and grinding the heated mixture.

2. The method of claim 1 wherein the alkali metal salt is selected from the group consisting of sodium carbonate, potassium carbonate, sodium chloride, or potassium chloride.

3. The method of claim 2 wherein the alkali metal salt is sodium carbonate.

4. The method of claim 2 wherein the alkali metal salt is sodium chloride.

5. A method for the production of white quartz powder from quartz containing sands comprising the steps of dampening the sand with about 1 percent of its weight of water, mixing the dampened sand with about 1 percent of its weight with an alkali metal salt, forming the mixture into a layer of uniform depth of about 3 centimeters, inserting the mixture while it is at ambient temperature into a heating oven which is maintained at about 1200° C., heating the mixture while it is in a static condition to said temperature and grinding the heated mixture.

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JAMES E. POER, *Primary Examiner.*

U.S. Cl. X.R.

106—309; 23—182