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RICE SHELL WITH THERMAL TREATMENT METHOD OBTAINING SILICON OXIDE

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Annotation
Rice husk is a by-product of the rice production process. It was determined that rice husk ash mass containing about 20% of SiO_2 by the burning method is quite clean.
Key words: Rice, temperature, carbon, silica gel, SiO 2
Аннотация
Рисовая шелуха является побочным продуктом процесса производства риса. Установлено, что зольная масса рисовой шелухи, содержащая около 20 % SiO2, методом обжига является достаточно чистой.
Ключевые слова: Рис, температура, углерод, силикагель, SiO 2

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Rice husks are generally considered waste products and are produced in large quantities in rice-growing countries, including Uzbekistan. Although used as a composite material in ceramics [1], millions of tons of rice husks are not recycled worldwide. Rice husk can also be considered as an energy source in rice growing countries [2]. When heated to a sufficiently high temperature, the remaining carbon in the composition can be removed from the ash, which also leads to the crystallization of the SiO 2 phase into cristobalite or tridymite [3]. At a lower temperature, amorphous silicon oxide is formed. [4]. The most common silica gel is quartz. However, most studies have focused on the formation of cristobalite and tridymite. Many methods of obtaining SiO 2 from rice husk ash have been developed [5]. In this process, not only valuable silicon oxide powder can be obtained, but also by processing agricultural waste into a useful product, it helps to reduce the problem of pollution. There are many methods of obtaining silica gel from rice husk, but this method determines the purity of the silica before heating and the resulting silica . Silicon oxide (SiO 2) is in its hydrated amorphous form [7].

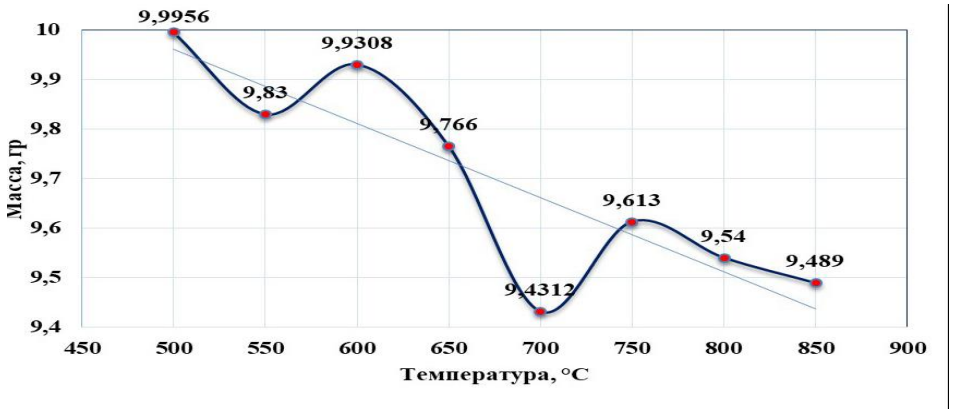
Experimental part. To begin with, rice husks grown in Muzrabot district were washed several times with distilled water to remove dust. After washing, the rice husk was dried in a drying cabinet at

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120°C for 12 hours. After drying, 50 grams were weighed and fired in a muffle furnace at 500, 550, 600, 650, 700, 750, 800, and 850°C (Table 1). Each annealing process was left at this temperature for 4 hours and then cooled to room temperature. The mass of ash formed was between ~9.98 - 9.46 grams depending on the temperature.

Table 1 shows the sample preparation data of RSH and exit ZRSh after heat treatment. Figure 1 shows that ash RH output decreases and increases with increasing temperature. Due to this, it can be called ZRSh at high temperature and it is clean, that is, the remaining carbon in the atmosphere burns completely at high temperature, but at the same time, at 650 - 700 ° C, silicon oxide begins to form and develops a crystalline structure. Similarly, in the muffle furnace, the time dependence of experiments was noted temperature change and RSS color. For example, at 500 - 550 ° C, the color of ZRSh becomes yellow - gray, at 600 - 650°C, the color of ZRSh becomes white, and at 700 °C and above, the color becomes gray.



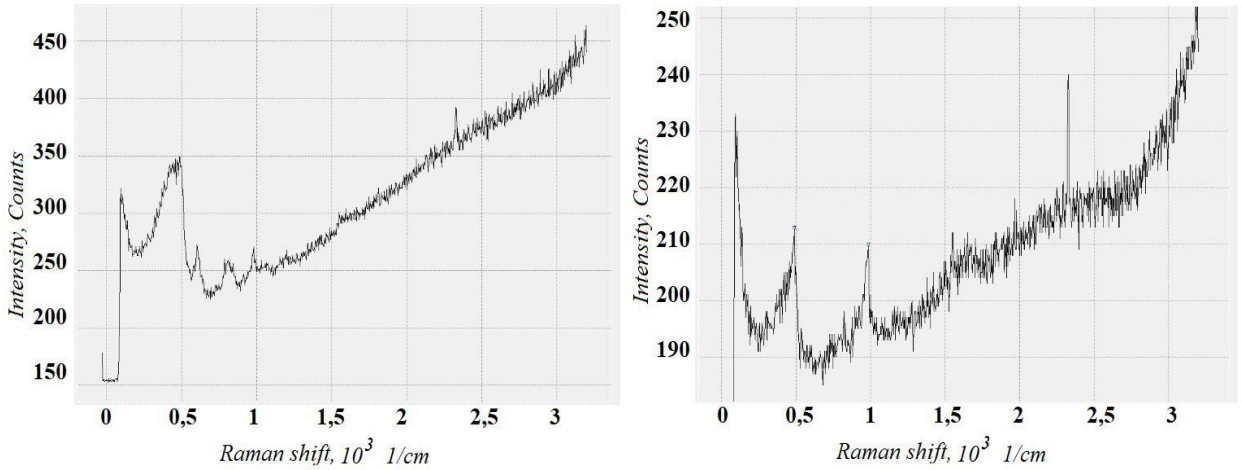
Rice. 1. Release of ZRSh by temperature after heat treatment

Table 1
Pyrotechnics experimental data on determining the temperature and burning rate of the media

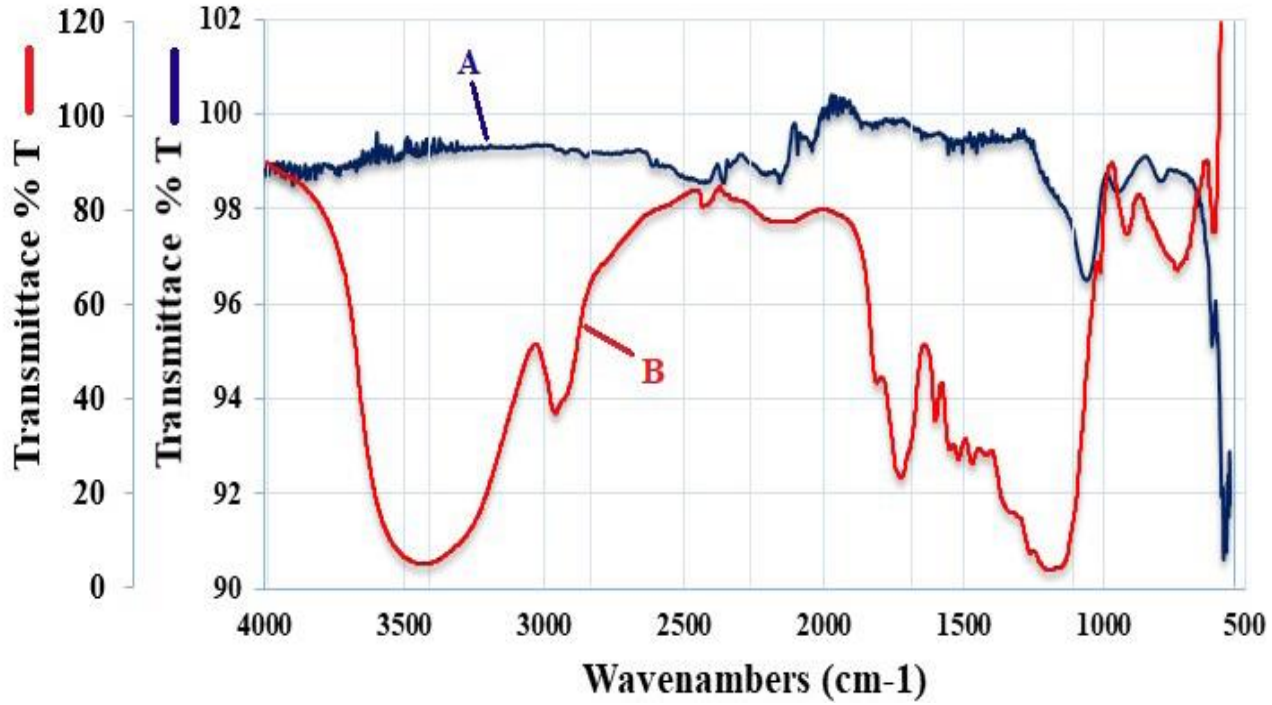
View (large)	Drying t, ch-T, °C	RSH before washing m, gr	T, °C 4 hours	ZRSh, after annealing, m, gr
	12-120	50.1282	500	9.9956
RSH	12-120	50.8516	550	9,830
RSH	12-120	50,1291	600	9.9308
RSH	12-120	50.0264	650	9,766
RSH	12-120	50.0943	700	9.4312
RSH	12-120	50.0729	750	9,613
RSH	12-120	49.0614	800	9.5400
RSH	12-120	50.0910	850	9,489
RSH				

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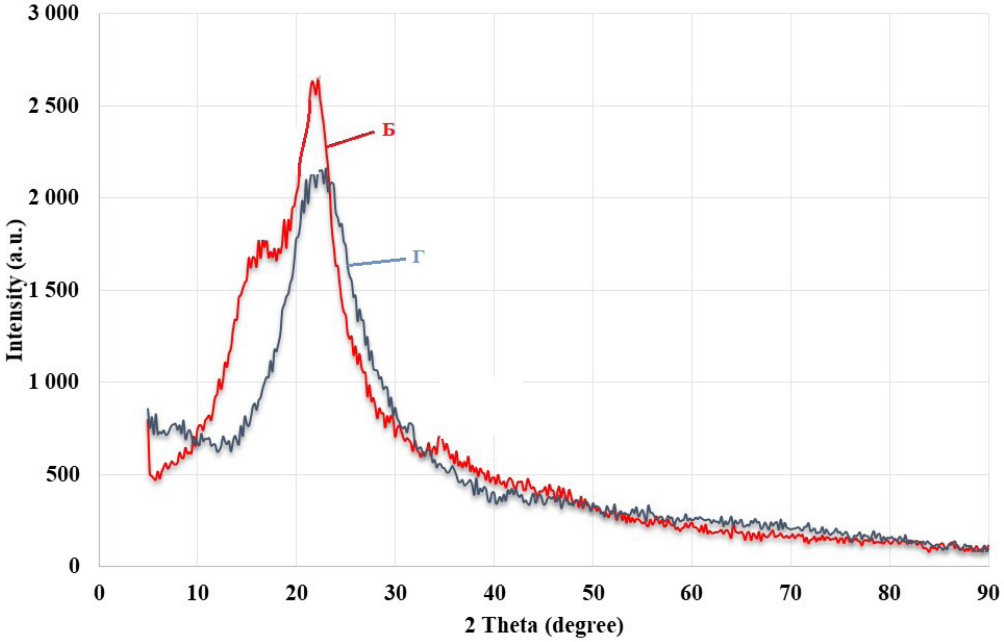
Rice. 3. (a) Raman SRS spectrum and (b) Raman SiO_2 spectrum

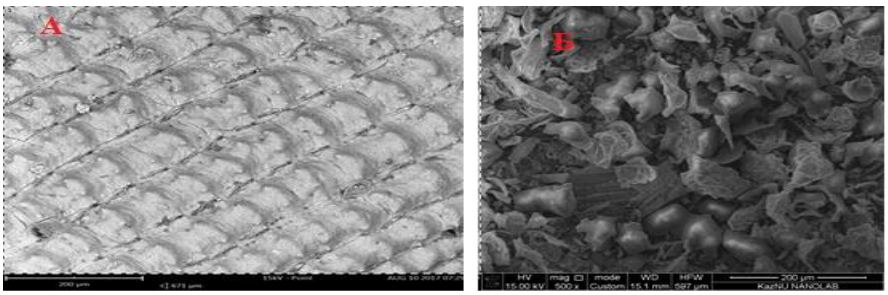


Rice. Figure 4. FT-IR spectrum of rice husk (A), XRD spectrum of RSS (B), FT-IR spectrum of SiO2 (C), XRD spectrum of SiO_2 (D)

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Summary

The percentage of silica obtained reached 93% Silica during our study at 600 °C for 4 hours. Analyzes were also conducted SiO_2 powder obtained from silicon dioxide. BET showed that the specific surface area is 627 m^2/g. The obtained SiO_2 nanoporous structure (from the pore volume of SiO_2

10–40 nm), which is in the range confirmed by SEM images.

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