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Recent advances in unshaped refractories with Nanotechnology: A review
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com Abstract: In recent years, the use of Nano technology (Nano-particles, Nano-material and Nano-additives) has attracted attention of scholars, engineers, and scientists in all scientific fields such as chemistry, medicine, material, agriculture, electric, and etc. The use of Nano technology has also become prevalent in the refractories products. So, some researchers have examined the effect of using different types and contents of Nano-materials (oxides and non-oxides) on the properties of shaped (bricks) and unshaped refractories goods and they have attained very interesting results. One of the most consumable refractory goods in different industries is unshaped refractories, which has been widely used because of their great advantages to the other refractories goods (bricks). Hence, in this research, recent progresses in unshaped refractories by Nano technology are mentioned.

This article can be used as a complete reference and guidance for Scientific's, students and artisans for easy access to experimental research results of the impact of Nano-technology on unshaped refractories. Keywords: Nano-technology, Nano particles, Refractory, unshaped Nanotechnology

The nano-technology phrase originating from two words consist of the Greek numerical prefix nano referring to a billionth and the technology word 1-2. As an outcome, Nano-technology or <https://assignbuster.com/recent-16-20-as-well-as-according-to-the/>

Nano-scaled technology is commonly considered to be at a size under 100 nm (a Nano-meter is 10^{-9} m) 1-2.

Refractories:

: according to the ASTM C 71, the refractories are a “ non-metallic materials having those physical and chemical properties that lead to them applicable for structures or as components of systems that are exposed to environments above 538°C 11, 16. On the other hand, some references defined refractories as nonmetallic and inorganic material with high tolerance at high temperature without changing in their properties (such as physical and chemical) or 11-13, 16-20. As well as, according to the operating situation, they should to have high thermal shock resistant, be chemically inert, and have defined ranges of thermal conductivity and thermal expansion coefficient 11- 21, 22. It is obvious that refractories have an important role in glassmaking, metallurgical, and ceramic crafts, where they are generated into a variety of shapes to line the inside of furnaces or kilns or other tools for producing the materials at high temperatures 23-25. Some of the technological and scientific inventions and advances would not have been possible without refractory materials. Producing 1Kg of any metal without utilize of refractory is almost fully impracticable 26-29. The background of using refractory materials dates back to as mankind begin to progress metallurgical procedure. The first refractor raw material was clay.

Up to the nineteenth century, refractory goods were made of natural ores, such as magnesite, dolomite stones and clay. it was at the end of the eighteenth century and beginning of nineteenth century that the basis of

modern metal beneficiation, the development of Portland cement and of modern glass processes started to inflict higher requirements to the refractory industry 30-34. The main materials used in the producing of refractories are based to Fig.

1 34-36. In recent years, with the changing trends in steelmaking, the high performing shaped refractories are on an increasing request 34-37. The higher campaign lives and the mutability of the newer steelmaking operations are decided by the accessibility and performance of such shaped refractories with superior high temperature mechanical strength, erosion and corrosion resistance the selection of refractories to be utilized is often according to the conditions dominating in the application zone 36-40. How do refreshes be categorized? History of refractories: Historically, it's unclear who the first-time fabrication of refractory materials has been made in and to which country, but it is likely that the Phoenicians or the Chinese will be the founder of this sector of the ceramic industry. According to historical documents, at first, more refractories were used than ordinary clay soils.

From the early nineteenth century, the idea of adding non-plastic materials to raw materials was gradually introduced, which had a significant impact on the final product quality. Hence, better products entered the market over time. The achievement of better and cleaner raw materials and their use in refractory industry was the next step in this way, while improving the construction techniques, which together put together the products that are suitable for other industries, including manufacturing industries Mother, led by, and played a decisive role in the growth of these industries. Over the

past four decades, the pressing need of refrigeration consumers to use new and better products has increased the quantity and quality of the production of a variety of new refrigeration products. The extension of research, combined with advanced scientific-applied studies, led to the emergence of new material science researchers in the refractory industry. The combination of these factors led to a leap in the expansion of refractory industries, especially in several industrialized countries. The refractory industry in Iran is very young in comparison with other industrial countries. For example, the German company Dieter, in 1834, began manufacturing refractories and refractories while the refractory industry in Iran began with the entry of the cement industry to the country, and for the first time in 1318 (1937-1937), a refractory factory Tehran's Amin Abad with a capacity of 5, 000 tons of refractories per day.

With the establishment of Isfahan Iron and Steel Works in 1350, which required a lot of refractory materials to produce steel, the first large-scale and mechanized refractories (refractory factory of Azar) at Isfahan Iron and Steel Works with an initial capacity of 40, 000 tons of bricks and crude per year Launched in 1352. The capacity of refractory production in the country, from about 60 thousand tons in 1357, has grown by more than four times more than before the victory of the Islamic Revolution, increasing by 250 thousand annually. It is worth noting that today the total needs of the country's industries are estimated to be 250, 000 tons of annual refractory products. Despite the import of some refractories, the annual export potential of several thousand tons of refractory products is also provided. Historically, it's unclear who the first-time fabrication of refractory materials

has been made in and to which country, but it is likely that the Phoenicians or the Chinese will be the founder of this sector of the ceramic industry. According to historical documents, at first, more refractories were used than ordinary clay soils. From the early nineteenth century, the idea of adding non-plastic materials to raw materials was gradually introduced, which had a significant impact on the final product quality. Hence, better products entered the market over time.

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