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Synthesis of ultramarine pigment from the mudstone of kutingkeng formation and the improvement of its refractory properties

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Ultramarine ($\text{Na}_{8-x}[\text{SiAlO}_4]_6[\text{S}_2\text{S}_3\text{SO}_4\text{Cl}]_{2-x}$) is an inorganic nontoxic blue pigment, consists of an aluminosilicate framework, constructed from sodalite cages (β type). In this study, the mudstone from Kutingkeng Formation exposed in Southern Taiwan was used as the raw material to synthesize ultramarine pigment via a traditional solid state reaction route. The mudstone was first hydraulically classified to collect the $<2\ \mu\text{m}$ part. The $<2\ \mu\text{m}$ part was mixed with sodium carbonate, sulfur and active carbon, formed into agglomerates and calcined at 800°C for 8 hr. The color characteristics of the products were measured by the CIE $L^*a^*b^*$ system. The best hue, lightness and chroma obtained are 289° , 30.6 and 66.8, respectively. Due to the poor high temperature stability of the ultramarine, further studies of coating a silica film on the ultramarine particles were performed. The results showed that the coated ultramarine can tolerate temperatures as high as 1000°C . This may create a new application of ultramarine as a glaze pigment.

Biography

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