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Preparation of ground calcium carbonate-based TiO₂ pigment by a two-step coating method

Yanru Chen ^a, Haijun Yu ^b, Lingyun Yi ^c, Yue Liu ^{a,d}, Lei Cao ^{a,e}, Kun Cao ^a, Yahui Liu ^a, Wei Zhao ^{a,*}, Tao Qi ^{a,*}

- a, National Engineering Laboratory for Hydrometallurgical Cleaner Production Technology, Institute of Process Engineering, Chinese Academy of Sciences, Beijing 100190, China
- b, Hunan BRUNP Recycling Technology Co.LTD, No.18 Jinsha East Road, Jinzhou New District, Changsha, Hunan, 410600, China
- c, School of minerals processing & bioengineering, Central South University, Changsha, 410083, China
- d, School of Chemistry and Chemical Engineering, Shandong University, Jinan, 250100, China
- e, Faculty of metallurgical and energy engineering, Kunming university of science and technology, Kunming, 650093, China

Abstract: A two-step coating method for preparing ground calcium carbonate-based TiO₂ pigment (GCTD) was proposed and studied in this paper. The tetraethoxysilane (TEOS, C₈H₂₀O₄Si) was selected as Si source. Aqueous ammonia was used as precipitant in the first coating step while titanyl sulfate (TiOSO₄·2H₂O) was used as Ti source in the second step. The Energy dispersive spectrometer (EDS) and X-ray fluorescence (XRF) results prove that SiO₂ is coated on the surface of ground calcium carbonate (GCC) particles successfully. The X-ray diffraction (XRD) and transmission electron microscopy (TEM) results demonstrate that the coated SiO₂ is in the form of amorphous. The EDS, XRD, TEM and Scanning electron microscope (SEM) results show that TiO₂ is coated on the surface of SiO₂ coated GCC (SiO₂@GCC) and TiO₂ particles are composed of mixed crystal of anatase and rutile. The hiding power of obtained GCTD is significantly improved compared with ordinary composite TiO₂ pigment (CTD) and close to that of anatase TiO₂ (ATD). The whiteness and lightness of this GCTD are just slightly decreased compared to that of CTD and ATD. Nevertheless, its oil absorption value is some higher than that of ATD but lower than that of CTD.

Keywords: Ground calcium carbonate, TiO₂, Pigment

1. Introduction

TiO₂ is an important white pigment. Compared with other traditional white

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