

Research Title

Preparation of Ceramic Underglaze Pigments  
and Their Applications

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### Abstract

Ceramic underglaze pigments prepared from some chemical agents and used for pottery decoration were studied . The preparation technique was mixing , calcination , grinding and washing . In addition , the influence of some basic glaze which was affected underglaze pigments was investigated .

It was found that the underglaze pigments were fit for lime glaze . The best red pigment was consisted of 40 %  $\text{SnO}_2$ , 40 %  $\text{CaCO}_3$ , 20 %  $\text{SiO}_2$  and 3 %  $\text{K}_2\text{CrO}_4$  and calcined at 1150 °C. The best violet pigment was consisted of 4.7 %  $\text{Cr}_2\text{O}_3$ , 9.4 %  $\text{CaCO}_3$ , 9.4 %  $\text{SiO}_2$  and 76.5 %  $\text{SnO}_2$  and calcined at 1300 °C . The constitute of yellow pigment was 67.2 %  $\text{ZrO}_2$ , 32.8 %  $\text{SiO}_2$ ,

6 %  $\text{Pr}_2\text{O}_3$ , 3 %  $\text{NaF}$ , 4 %  $\text{NH}_4\text{Cl}$  and was calcined at  $1250^\circ\text{C}$ . The composition of orange pigment was 88.5 %  $\text{TiO}_2$ , 8.9 %  $\text{Sb}_2\text{O}_3$ , 2.6 %  $\text{K}_2\text{Cr}_2\text{O}_7$  and was calcined at  $1150 - 1300^\circ\text{C}$ . The blue pigment was consisted of 1 mol  $\text{CoO}$ , 1 mol  $\text{Al}_2\text{O}_3$  and calcined at  $1200^\circ\text{C}$ . The composition of green pigment was 33.3 %  $\text{TiO}_2$ , 33.3 %  $\text{Sb}_2\text{O}_3$ , 33.4 %  $\text{Cr}_2\text{O}_3$  and was calcined at  $1150^\circ\text{C}$ . The constitute of light blue pigment was 67 %  $\text{ZrO}_2$ , 33 %  $\text{SiO}_2$ , 3 %  $\text{V}_2\text{O}_5$ , 12 %  $\text{NaCl}$ , 6 %  $\text{NH}_4\text{Cl}$  and was calcined at  $1250-1300^\circ\text{C}$ . The brown pigment was consised of 34 %  $\text{Fe}_2\text{O}_3$ , 34 %  $\text{Cr}_2\text{O}_3$ , 32 %  $\text{ZnO}$  and calcined at  $800-1300^\circ\text{C}$ .