# BLUE COLOUR INORGANIC SURFACE COATING FOR ALUMINIUM SHEETS USING α-TITANIUM PHOSPHATE DERIVED FROM ILMENITE BEACH SAND

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The development of durable and environmentally friendly protective coatings for aluminium surfaces is important for improving their resistance to weathering and corrosion in outdoor applications. This study aimed to develop a weather resistant blue inorganic surface coating for aluminium sheets using α-titanium phosphate synthesized from Sri Lankan ilmenite beach sand as a value-added mineral resource. α-titanium phosphate was synthesized through phosphoric acid digestion of ilmenite followed by repeated washing and drying. The synthesized material was characterized using X-ray diffraction (XRD), which confirmed the successful formation of crystalline α-titanium phosphate. Before coating the paint application, aluminium sheets were mechanically roughened using sand paper and it promotes coating adhesion with Al sheets so it balances the effect of corrosion of Al sheets and chemically pre-treated by forming the phosphate layer on Al sheets to enhance coating adhesion. The coating formulation was prepared using α-titanium phosphate, cobalt (II) acetate tetrahydrate, phosphoric acid, tetraethyl silicate, and chromium (III) chloride hexahydrate. After the application and heat treatment, a stable slate blue coloured inorganic coating was produced. The performance of the developed coating was evaluated under exposure to HCl, NaOH, H2SO4, HNO3, distilled water, seawater, rainwater, and ultraviolet radiation. The coating exhibited good resistance to HCl and excellent stability in distilled water, seawater, rainwater, and ultraviolet exposure, with minimal changes in appearance. However, low stability was observed under strongly alkaline conditions and concentrated acidic environments. In this stage coating morphology, was observed by visual observation and it should be observed using Scanning electron microscope SEM and coating composition should characterized using X – ray diffraction (XRD) in future. The results demonstrate that α-titanium phosphate derived from Sri Lankan ilmenite can be successfully utilized as a functional inorganic coating material with promising weather resistant properties. The coating exhibited good resistance to different condition that are the evidence of weather resistance. The α-titanium phosphate has previously been used as an inorganic coating for ceramic coating but it has not previously been used as an inorganic coating for Al sheets. The existing inorganic coatings for aluminium are high cost but using the Ilmenite in Sri Lanka, it is a good cost-effective inorganic coating for Aluminium. How the developed coating differs from existing inorganic coatings for aluminium This study highlights the potential of utilizing locally available mineral resources to produce sustainable, value added coating materials for outdoor aluminium applications and other weather exposed metallic surfaces.

**Keywords:** aluminium coating, ilmenite derived material, inorganic pigment, surface protection