# Assessing Lead Content and Lead Isotopic Ratio in Paints from South Africa: Implications for Environmental Health Using ICP-MS Analysis

**[*]S. F. Olukotun[1,2], S. O. O. John[1,3], T. Kupi[1], O. F. Oladejo[4], J. Mathuthu[1], H. O. Shittu[5], M. Mathuthu[1].**

[1]Center for Applied Radiation Science and Technology (CARST), North-West University, Mahikeng Campus, South Africa
[2]Department of Physics and Engineering Physics, Obafemi Awolowo University, Ile-Ife 220282, Nigeria
[3]Department of Physics, Mewar International University Nigeria (MIUN), Karu, Nasarawa State Nigeria
[4]Department of Physics, Osun State University, Osogbo 210001, Nigeria
[5]Department of Science Infrastructure, National Agency for Science and Engineering Infrastructure (NASENI), Abuja 900104, Nigeria

50129805@mynwu.ac.za; 50129805@mynwu.ac.za; Tebobo.Kupi@nwu.ac.za;

busyofell@gmail.com; mp18797@gmail.com; hammedshittu4luv@yahoo.com; Manny.Mathuthu@nwu.ac.za

[*]Corresponding author

## Abstract

Lead (Pb) is a toxic heavy metal that poses significant risks to human health, particularly when present in high concentrations in the environment. In this study, we will investigate the lead content and lead isotopic ratio in different type of paints used in South Africa using inductively coupled plasma mass spectrometry (ICP-MS). The aim is to assess the potential health hazards associated with lead-based paints and gain insights into their sources and distribution patterns. This research will assist in implementing effective measures to mitigate lead exposure, protect public health, and promote sustainable practices in the paint industry. The adverse effects of lead on human health, especially in children, have diminished the reasons for the widespread use of lead-based paints, such as durability, color stability, and moisture resistance. This has led to regulatory measures aimed at reducing lead exposure. Evaluating the lead content and isotopic composition in paints is

crucial for assessing environmental risks and implementing appropriate remediation strategies. Paint samples commonly used in different regions of South Africa, including urban, industrial, and residential areas, will be collected. The lead content will be determined using ICP-MS, a sensitive analytical technique capable of measuring trace elements with high precision. Furthermore, lead isotopic ratios will be measured to identify potential sources of lead contamination, allowing for the tracing of lead origins in paints and the identification of pollution hotspots. The findings of this study will have significant implications for environmental health in South Africa. It will indicate the potential for lead exposure in paints through various pathways, such as ingestion, inhalation, and dermal contact. Identification of specific lead sources can guide targeted interventions, such as stricter regulations on lead-based paint manufacturing and better monitoring of industrial emissions.

**Keywords:** Lead content, lead isotopic ratio, paints, environmental health, ICP-MS