



Gaseous Elemental Mercury (GEM) in Ambient Air in Malaysia and its Health Risk Assessment

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Abstract Mercury (Hg) is a global pollutant that poses significant risks to human health and ecosystems. In its dominant atmospheric form, gaseous elemental mercury (GEM), it can travel long distances, contributing to widespread environmental contamination. This study investigates GEM levels in ambient air across urban, suburban, rural, and industrial areas in Peninsular Malaysia using both in situ and continuous measurement methods. Results show GEM concentrations ranging from a minimum of 4.8 to a maximum of 28.9 ng m⁻³, with the highest levels observed in industrial areas such as Pasir Gudang (28.9 ng m⁻³) and Shah Alam (18.6 ng m⁻³). Health risk assessments (HRA), conducted for different age groups, indicated that GEM concentrations were below the threshold for non-carcinogenic health risks (HQ < 1). These findings highlight the urgent need

for long-term monitoring to assess mercury pollution and inform Malaysia's commitment to the Minamata Convention. The study underscores the importance of continuous GEM monitoring to bridge knowledge gaps in mercury's spatial and temporal distribution, especially in tropical regions.

Keywords Gaseous elemental mercury · Ambient air · Health risk assessment · Peninsular Malaysia · Minamata Convention

1 Introduction

Air quality monitoring plays a crucial role in addressing global environmental health challenges, with mercury (Hg) emerging as a critical pollutant due to

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