

EQUILIBRIUM STUDY ON BINARY AND TERNARY COMPLEXES OF Pb (II) WITH COMMONLY USED DRUGS AND DIETARY LIGANDS UNDER PHYSIOLOGICAL CONDITIONS

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Introduction

Toxic metal ions can enter the human body through various means such as air, drinking water and food *etc.* Lead, cadmium, mercury, copper and arsenic are some of the common toxic metals. If the body's detoxification pathways of these toxic metal ions are not fast enough, they can accumulate in the body tissues and cause many health problems. They can be harmful even at low concentration levels. Urinary and fecal excretion by chelation therapy using synthetic or natural chelators is the only treatment to remove such heavy metals from the body (Laurie, 1975). Due to high usage of lead in industry, burning of coal and petroleum, and incineration of waste materials, lead is considered as the most widely distributed toxic metal. As a result of very high usage of motor vehicles, industrialisation, use of large amounts of pesticides on fruits and vegetables, and consumption of various types of canned foods and beverages Sri Lankans are also exposed to high levels of lead.

This study focused on the determination of formation constants of Pb(II)-binary and Pb(II)-mixed ligand (ternary) systems by mimicking *in vitro* conditions (physiological conditions). The objective of this research is to study the interaction between lead and some common

drugs; ascorbic acid (AsC), salicylic acid (Sali) and Paracetamol (Para), dietary ligands; citric acid (Cit), caffeine (Caf) and nucleic acid uracil (Ura) using the Kelvin type pH titration method.

Materials and Methods

All reagents used were in analytical grade. Active ingredients of pharmaceuticals were obtained from State Pharmaceuticals Manufacturing Corporation. NaOH and HNO₃ solutions were standardised with primary standard potassium hydrogen phthalate (KHP) and anhydrous sodium carbonate (Na₂CO₃) solutions respectively. Temperature and ionic strength of each reaction mixture were maintained at 37.0 +/- 0.2 °C and at 0.15 M NaNO₃, respectively. Further, nitrogen gas was purged to avoid interference from CO₂ in the atmosphere. The pH measurements were taken with a temperature controlled digital pH meter (MARTINI, MI151).

Formation constants of both systems were calculated using Irving –Rossotti equations. (Irving *et al.*, 1954). Stability of ternary systems over binary systems was statistically calculated.

For any two ligands A, B forming complexes with a metal ion Mⁿ⁺

