

## PHASE EQUILIBRIUM OF SELECTED VOLATILE ORGANIC COMPOUNDS IN POLYDIMETHYLSILOXANE DERIVED FROM SIMPLE STATIC HEADSPACE CHROMATOGRAPHIC MEASUREMENTS

E. MUZENDA

### Abstract

In this paper, Henry's law constants ( $H$ ) and infinite dilution activity coefficients ( $\gamma^\infty$ ) of 13 volatile organic compounds (VOCs) of environmental importance namely pentane, hexane, heptane, triethylamine, toluene, xylene, cyclohexane, butylacetate, diethylether, chloroform, acetone, ethylmethylketone and isobutylmethylketone in silicon oil are presented, determined by the simple headspace chromatographic method. A detailed investigation of vapour – liquid equilibrium (VLE) data was carried out in order to determine thermodynamic data of the VOCs in silicon oil chemically known as polydimethylsiloxane and to study the effect of liquid depth and shaking time on equilibrium establishment. The relationship between VOC concentration (mole fraction) and temperature using the Van't Hoff relationship is also presented. Measurements were done at different temperatures to permit transport calculations for different seasons and also to allow temperature variation of the physical properties of the organic compounds to be evaluated. Great effort was taken to ensure best possible accuracy, trace and rectify possible sources of error. The results compare very well to those obtained using the dynamic gas liquid chromatographic technique by the same authors and those found in literature. This study provides a fast and cheap simple static headspace method for measuring phase equilibrium at infinite dilution. This is an innovative practical technique which can be applied in solving environmental engineering problems in particular the abatement of volatile organic compounds.

-----  
**Keywords:** Henry's law constants; infinite dilution activity coefficients; environmental importance; transport calculations; static headspace; volatile organic compounds.