



Enthalpies of solution of lithium perchlorate and Reichardt' dye in some organic solvents

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Received 24 April 1997; accepted 20 August 1997

Abstract

Enthalpies of a solution, at 298 K, of lithium perchlorate and Reichardt' dye were determined in diethyl ether (–26.0; 23), acetonitrile (–38.3; 10), acetone (–66.3; 0), dimethyl sulfoxide (–75.3; –16), tetrahydrofuran (–49.0; 7.5), nitromethane (–62.0; 0), ethyl acetate (–37.2; 13) and methanol (–51.9; –33 kJ mol^{–1}), respectively. For lithium perchlorate, a sharp dependence on integral enthalpy of solution was observed in diethyl ether and nitromethane in the range of low concentration. © 1997 Elsevier Science B.V.

Keywords: Enthalpy of solution; Calorimetry; Lithium perchlorate; Reichardt' dye

1. Introduction

For the Diels–Alder reaction with normal electronic demand (diene – donor, dienophile – acceptor), the acceleration effects in the presence of AlBr₃, AlCl₃, GaCl₃ and BCl₃ were nearly independent of the structure of reagents, and 10⁶, 10⁵, 10⁴ and 10³ times, respectively [1]. However, some reagents (cyclopentadiene, furan, vinyl ethers etc.) are unstable in the presence of even trace quantity of these Lewis acids, but are stable in solution of lithium perchlorate in diethyl ether (LPDE) [2]. Large promotion effect for a number of reactions in LPDE medium has been intensively studied during the last decade [3]. Our kinetic data for the (4 + 2)-, (3 + 2)- and (2 + 2)-cycloaddition reactions in LPDE medium showed that

rate constants can be increased up to 10³–10⁴ times for some reactions, unchanged or even decreased for others [4]. The acceleration effect is usually larger in solution of LiClO₄ in diethyl ether, and in polar solution this effect, as a rule, reduces with the exception of nitromethane [5].

2. Experimental

The enthalpies of solution were measured at 298 K in differential calorimeter, as previously reported [6]. Samples were weighed in a small cylinder made of stainless steel, both sides of which were covered by thin (0.1 mm) ring of Teflon seal. Zero effect of cutting Teflon seal was obtained when sample of the solvent was dissolved in the same solvent (working volume 180 cm³), but cutting of the empty container gave the endo-effect, the greatest for diethyl ether, determined

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