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# Electrochemical study of ketones as organic phases for the establishment of micro-liquid/liquid interfaces

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## Abstract

The electrochemical behaviors of ten derivatives of ketone as the organic phases for the establishment of liquid/liquid interfaces were investigated by cyclic voltammetry and micropipettes. The ionic species limiting the potential window were determined, and relationships between the structure of solvents and the potential window were evaluated. For heptanones and nonanones, the limits of the potential window were affected by the places of carbonyl and the branched structures in carbon chains. We have found that the water/2,6-dimethyl-4-heptanone interface has the widest potential window among these ten ketone derivatives. Simple ion transfers of  $\text{TPAs}^+$ ,  $\text{TBA}^+$ ,  $\text{BF}_4^-$ ,  $\text{IO}_4^-$  and  $\text{ClO}_4^-$  were observed at the water/2,6-dimethyl-4-heptanone interface with BTPPATPBCl and LiCl as the respective organic and aqueous supporting electrolytes, and their thermodynamic data were calculated.

*Keywords:* liquid/liquid interfaces, ketones, micropipette, ion transfers

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## 1. Introduction

Since Gavach et al. observed that a liquid/liquid (water/oil) interface could be polarized by externally applied potentials in the 1960s [1], electrochemistry at the interface between two immiscible electrolyte solutions (ITIES) has developed rapidly over the past several decades. It uses the liquid/liquid interface as the working electrode to implement many applications including the study of charge (electron and ion) transfer processes, detection of ionic species, and fabrication of chemical sensors [2-8]. Compared with a solid/liquid interface, a liquid/liquid interface could automatically form a smooth area between two phases. This

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