

ELECTROCHEMICAL REDUCTION OF AROMATIC KETONES

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ABSTRACT

Diaryl ketones were studied by cyclic voltammetric technique with and without the presence of an acid. The number of electrons per mole in the presence of an acid were also calculated by performing coulometric experiments, followed by preparative scale electrolyses giving a respective alcohol in high yields.

INTRODUCTION

Diaryl ketones may either be dimerised or reduced to secondary alcohols. Chemically dimerisation may occur by using potassium or zinc metal in the presence of titanium tetrachloride [1], while electrochemically it has been achieved by using Manganese [2] or Chromium [3] chlorides. Photochemically the diaryl ketones may also be pinacolised [4]. Chemically a reduction of aryl ketones to alcohols may be achieved by a majority of reducing reagents [5]. These reducing agents are often highly selective but are developed for a limited number of cases and they are not economical.

Electrochemically a number of studies has been made for the reduction of diaryl ketones to alcohols [6]. These electrochemical reduction methods may be both selective and versatile. These qualities are a consequence of being able to control and vary the reducing power of the electrode by manipulating its potential. Electrochemical methods are relatively cheap compared to using other reducing reagents.

In the present study cyclic voltammetric and coulometric behaviour of three ketones (benzophenone, phenyl p-tolyl ketone and fluorenone) was investigated. Polarographic studies of benzophenone [7], p-methylbenzophenone [8] and fluorenone [9] have been widely reported. Cyclic voltammetric studies of benzophenone [7c] have been reported [with $E_1 = 1.72V$ (rev) and $E_2 = 2.49V$ (quasi rev)] in 0.1M Me₄NBr/DMF system with a scan speed of 0.306Vs⁻¹. Cyclic voltammetry of fluorenone [9d] have also been reported [with $E = -1.1V$ (rev)] in 38% ethanol, 0.08M NaOH and