

# Development of Fe (II) PP Oscillometry A Technical Estimation Method Based on Peak Potentials of Chemical Oscillations

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## Abstract

*The linear relationship between oscillator concentration and peak potential (pp) in the bromate-oscillator-acetylacetone Belousov-Zhabotinsky chemical oscillation system formed a basis for determination of Fe II as  $\text{Fe}(\text{phen})_3^{2+}$  (Ferroun) oscillator. The method was named Fe II pp oscillometry and was proved to be useful for rough estimations of Fe II.*

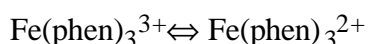
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## Introduction

Belousov-Zhabotinsky oscillations consist of bromate, an organic component containing an active methylene group such as acetylacetone, and an oscillator such as ferroun which flip-flops or oscillates between the reduced state  $\text{Fe}(\text{phen})_3^{2+}$  (Ferroun) and the oxidized state  $\text{Fe}(\text{phen})_3^{3+}$  (Ferriin) (Win and Win 1985). Continuous alternate oxidation and reduction, caused by the following two reactions occurring repeatedly in turn, one after the other, result in the oscillations:

- (1) Bromate acting on reduced oscillator producing the oxidized oscillator (oxidation).
- (2) Acetylacetone acting on oxidized oscillator producing the reduced oscillator (reduction)

Oxidized form  $\rightleftharpoons$  reduced form



These oscillations are accompanied by potential changes, which may be followed via an appropriate electrode system, such as SCE-Pt or SCE-Cu (Win *et al.* 2002), giving temporal electrode potential variations or oscillation traces.

The induction period (ip), the time taken for the onset of oscillations, the peak height (known as the peak potential) (pp), the time between two consecutive peaks (known as the oscillation period) (tos), and the time from start of oscillations to the die-off of oscillations (known as the total oscillation time) (tot), were the major oscillation characteristics (Than *et al.* 2001). Of these, peak potential (pp) and oscillation period (tos) are fairly reproducible (Win *et al.* 2002). If these are linearly related to oscillator concentrations, then a method for estimation of cation oscillators may be established (Si 1992).

The present work involves development of a method for the estimation of Fe II as  $\text{Fe}(\text{phen})_3^{2+}$ .

Peak potentials and oscillation periods are also linearly related to bromate or acetylacetone concentrations. Thus bromate and acetylacetone or similar organic compounds, containing an active methylene group may also be estimated by oscillometry.

Present interest in the B-Z system is seen in the recent publications where alternative electrodes were examined (Win *et al.* 2002); where three-dimensional oscillation

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