Potentiometric Study of New Schiff Base Complexes Bearing Morpholine in Ethanol-water Medium with some Metal Ions

Badriah. S. Al-Farhan^{1,*}, Gamal. A. Gouda², O. A. Farghaly² and A.K. EL Khalafawy¹

¹ Chemistry Department, Faculty of Girls for Science, King Khalid University, Abha, King Saudi Arabia, KSA.

² Chemistry Department, Faculty of Science, Al-Azhar University, Assiut Branch, 71524, Assiut, Egypt.

*E-mail: shahd_bb@hotmail.com

doi: 10.20964/2019.04.38

Received: 14 December 2018 / Accepted: 24 January 2019 / Published: 10 March 2019

Acid dissociation constants of 2-[(4-morpholinobenzylidene)amino]phenol (HL) and the equilibrium constants of their metal complexes with Cu^{2+} , Zn^{2+} , Sr^{2+} , Cd^{2+} , Ba^{2+} and Hg^{2+} ions were investigated using a pH metric titration technique in 40 % (v/v) ethanol-water medium and $\mu = 0.5 \text{ M NaClO}_4$. The dissociation constants (pK_a) of HL ligand and the stability constants of the respective complexes ($\log K_i$) were calculated at 298, 308 and 318 K. The values of dissociation constants (pK^{OH} and pK^{NH}) of monoprotic HL were found as 10.36 and 2.95, respectively. The formation constants of the complexes increase in the arrangement of $\text{Sr}^{2+} < \text{Zn}^{2+} < \text{Cd}^{2+} < \text{Hg}^{2+} < \text{Ba}^{2+} < \text{Cu}^{2+}$ ions. The thermodynamic functions for the protonation and the deprotonation process of HL and their metal complex equilibria are derived and discussed. The formation metal complexes of Cu^{2+} , Zn^{2+} , Sr^{2+} , Cd^{2+} , Ba^{2+} and Hg^{2+} h as been found to be endothermic and spontaneous processed. Furthermore, the geometric parameters of the metal-HL complexes were studied according to the density functional theory (DFT) method.

Keywords: pH-Metric, stability constants, thermodynamic, theoretical studies.

[FULL TEXT](#)

© 2019 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).