

# Effect of Dielectric Constant of Substituted Dihydropyrimidinone by pH -Metrically

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**Abstract:** *To Studies on pH metry by using dihydropyrimidinone has been regarded as a sensitive tool for understanding various effect of dielectric constant of dihydropyrimidinone by evaluating the log k & pk value of 5-ethoxy carbonyl 1-4-(4-methoxy-phenyl)-6 methyl 1,3,4-dihydropyrimidin-2-(1H)- one by keeping ionic strength 0.1M constant at temperature 40<sup>0</sup> C study the dielectric constant. Log k values increased with the increases in percentage of organic solvents. This phenomenon was elucidated by using well characterized films especially prepared for the purpose.*

**Keywords:** Dihydropyrimidinone, Dioxane, DMF, DMSO, Dielectric constant

## I. INTRODUCTION

Dielectric constant is one of the characteristics of liquid. Dielectric constant of great importance in determining the solvent potentialities of a solvent. Forces leading the ions of a molecule are electrical in origin, they are diminished when a substance of high inductive capacity surrounds the molecules. To separate the ions, it is necessary to interpose between them or to surround one or both of the ions by a solvent layer so as to reduce their attraction for each other. Proton ligand & Metal ligand are stability constants are strongly affected by the dielectric constant of medium because of the fact that at least one of the constituents is charged & the other is either charged or has a dipole moment. Specific variations in relative strength of acids & bases, with changing solvents should be the functions of the charge, the radices of ions & they separate contribution of an individual constituent in mixed solvents particularly, at higher percentages of the organic solvents, where it is not known to H<sup>+</sup> ions are solvated. An Understanding of the influence of medium on reactivity is therefore difficult even at a qualitative level. It has been reported that an acid in solvents of dielectric constant exhibits different strengths eg. Dissociation of substituted dihydropyrimidinone & aqueous dioxane with identical dielectric constant, is different<sup>1</sup>

Solvent effect is quantitatively interpreted in terms of the decrease of dielectric constants of the solvent & decrease of water which solvates the proton released in dissociation<sup>2</sup>GostaAkerl of have studied dielectric constant of some organic solvent – water mixture at various temperatures he found that in very dilute solutions of dielectric constant of pure solvent is used for limitation law<sup>3</sup>Rahul Kaur et.al.<sup>4</sup> have studied the effect of dielectric constant on reactivity like hardness chemical potential by taking into consideration of protic or aprotic solvent. pH metry can be used to evaluatedihydropyrimidinone by analytical method using Calvin Bjerrum<sup>5</sup> process.

K.T. Kirnapure<sup>6</sup> et al have studied the effect of dielectric constant of methanol- water & acetone – water mixtures. K.P. Kakade et.al.<sup>7</sup> have studied the effect of dielectric constant of medium on stability constant of substituted Chaloneimine pH Metrically.

## II. EXPERIMENTAL

### 2.1 Synthesis of ligands

Synthesis of dihydropyrimidine by the condensation of diketoester, aldehydes & urea are synthesized by using general claiswnschichometry method. For evaluating the stability constant the very pure & double distilled water is used. The solutions of ligands were prepared in purified 70% Dioxane -water, DMF – water, DMSO – water mixture & Standardized by pH metric technique. Systronicmicro processor based instrument with accuracy. ± 0.01 units with glass

& Saturated Calomel electrode used for the titrations. It was calibrated by buffer solution of pH 7.00 & 9.20 at  $40 \pm 0.1^\circ\text{C}$ , before processing the titrations. Titrations were carried out in an inert atmosphere by bubbling a constant flow of nitrogen gas.

1. Ligands used for study of dielectric constant.
2. L1 = 5-ethoxy carbonyl 1-4-(4-methoxy-phenyl)-6 methyl 1,3,4-dihydropyrimidin-2-(1H)- one

### III. OBSERVATIONS

The present study deals with the study of the influence of dielectric constants of Dioxane -water, DMF -water & DMSO-water mixtures following systems have been investigated in the present work for studying the influence of dielectric constant of different percentage of Dioxane-water, DMF-water & DMSO-water mixtures.

#### A. PK - values of

1. (L1) (Dioxane-water)
2. (L1) (DMF-water)
3. (L1) (DMSO-water)

#### B. Log K values of

1. (L1) (Dioxane-water)
2. (L1) (DMF-water)
3. (L1) (DMSO-water)

**Table 1:** Proton-ligand stability constant (pk) of 5-ethoxy carbonyl 1-4-(4-methoxy-phenyl)-6 methyl 1,3,4-dihydropyrimidin-2-(1H)- one (L1) in different percentage of Dioxane- water at 0.1M ionic strength.

% of Dioxane	Dielectric Constant (D)	1/D	Mole fraction	pK
70	10.80	0.09259	0.09259	7.6270
65	14.30	0.06993	0.06993	5.0697
60	17.59	0.05685	0.05685	3.3658

**Table 2:** Proton-ligand stability constant (pk) of 5-ethoxy carbonyl 1-4-(4-methoxy-phenyl)-6 methyl 1,3,4-dihydropyrimidin-2-(1H)- one (L1) in different percentage of DMF- water at 0.1M ionic strength.

% of DMF	Dielectric Constant (D)	1/D	Mole fraction	pK
70	29.50	0.03389	0.4841	4.9784
65	27.72	0.03607	0.4130	5.6843
60	25.67	0.03895	0.3537	6.4389

**Table 3:** Proton-ligand stability constant (pk) of 5-ethoxy carbonyl 1-4-(4-methoxy-phenyl)-6 methyl 1,3,4-dihydropyrimidin-2-(1H)- one (L1) in different percentage of DMSO- water at 0.1M ionic strength.

% of DMSO	Dielectric Constant (D)	1/D	Mole fraction	pK
70	69.79	0.01432	0.5038	5.7595
65	70.39	0.01420	0.4322	5.3250
60	71.07	0.01407	0.3719	4.2586

**Table 4:** Metal-ligand stability constant (log k) of 5-ethoxy carbonyl 1-4-(4-methoxy-phenyl)-6 methyl 1,3,4-dihydropyrimidin-2-(1H)- one (L1) in different percentage of Dioxane- water at 0.1M ionic strength.

% of Dioxane	Dielectric Constant (D)	1/D	Mole fraction	Log K <sub>1</sub>	Log K <sub>2</sub>	Log K <sub>1</sub> - LogK <sub>2</sub>
70	10.80	0.09259	0.09259	8.7882	7.5452	1.243

65	14.30	0.06993	0.06993	5.6001	4.3291	1.271
60	17.59	0.05685	0.05685	4.7451	3.2740	1.471

**Table 5:** Metal-ligand stability constant (log k) of 5-ethoxy carbonyl 1-4-(4-methoxy-phenyl)-6 methyl 1,3,4-dihydropyrimidin-2-(1H)- one (L1) in different percentage of DMF- water at 0.1M ionic strength.

% of DMF	Dielectric Constant (D)	1/D	Mole fraction	Log K <sub>1</sub>	Log K <sub>2</sub>	log K <sub>1</sub> - logK <sub>2</sub>
70	29.50	0.03389	0.4841	4.6560	3.4487	1.2073
65	27.72	0.03607	0.4130	3.6892	2.4848	1.2044
60	25.67	0.03895	0.3537	2.9741	1.0252	1.9489

**Table 6:** Metal-ligand stability constant (log k) of 5-ethoxy carbonyl 1-4-(4-methoxy-phenyl)-6 methyl 1,3,4-dihydropyrimidin-2-(1H)- one (L1) in different percentage of DMSO- water at 0.1M ionic strength.

% of DMSO	Dielectric Constant (D)	1/D	Mole fraction	Log K <sub>1</sub>	Log K <sub>2</sub>	Log K <sub>1</sub> - LogK <sub>2</sub>
70	69.79	0.01432	0.5038	5.7890	4.1482	1.6408
65	70.39	0.01420	0.4322	5.3756	4.0022	1.3734
60	71.07	0.01407	0.3719	4.4030	3.0700	1.3333

**Table 7:** System:- 5-ethoxy carbonyl 1-4-(4-methoxy-phenyl)-6 methyl 1,3,4-dihydropyrimidin-2-(1H)- one (L1)

% of Dioxane - water	L1 (Log K <sub>1</sub> - LogK <sub>2</sub> )	% of DMF - water	L1(Log K <sub>1</sub> - LogK <sub>2</sub> )	% of DMSO - water	L1(Log K <sub>1</sub> - LogK <sub>2</sub> )
70	1.243	70	1.2073	70	1.6408
65	1.271	65	1.2044	65	1.3734
60	1.471	60	1.9489	60	1.3333

#### IV. RESULT AND DISCUSSION

It could be seen from observation that PK values increased with the increase in the percentage of Dioxane, DMF, DMSO in mixture. The increase in pk value of ligand is due to the presence of group attached to phenyl ring is a electron withdrawing group. The difference between log K<sub>1</sub>&log K<sub>2</sub>is greater than 1(>1) which shows the formation of simultaneous complex. It could be seen from Table 7 that the difference between log K<sub>1</sub>&log K<sub>2</sub> continuously decrease with the increase in the percentage of Dioxane, Dioxane & DMF this increased dielectric constant would decreases the electrostatic forces of attraction between metal ion & negatively charged ligand to form 1:1 complex. The formation of 1:2 complex on the other hand is due to the reaction between similarly charged ions. This would probably explain the observed behavior.

#### V. CONCLUSION

From above observation it is concluded that the difference between log K<sub>1</sub>&log K<sub>2</sub> greater than 1 this indicate that the concentration of dihydropyrimidinone.

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