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"STUDY THE EFFECT OF ADDITION OF SOME SELECTED ELECTROLYTE IN THE CRITICAL SOLUTION TEMPERATURE OF TWO COMPONENT SYSTEM"

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Abstract:
In present study we observed that impurity affect on critical solution temperature of partially miscible system. If impurity (electrolyte) is soluble in one layer then CST is increased and if added impurity is soluble in both the layer (organic and aqueous) CST is decreased. CST is increased by addition of sodium chloride and decreased by addition of succinic acid. In this experiment we have prepared solutions of different proportion of phenol water system and impurity of different concentration was added in the phenol water system which is two component systems and studied their effect on CST at different concentration.
Keywords: critical solution temperature,Impurity,partially miscible system,concentration,solutions,Heterogeneous.

INTRODUCTION

[1]In the heterogeneous system the mutual partial solubility is an important behavior, it changes with addition of impurity and temperature, it has greater application in medicinal and pharmaceutical field .Solubility of medicine with changing temperature is an important factor because solubility affect on absorption of medicine by a body and directly on biochemical reactions.Succinic acid is an intermediate in citric acid cycle of metabolic process it is used in medicine manufacturing process like radiation protective agents,antiulcer drug and micronutrients.The critical solution temperature in partially miscible system has plays an important role,[2]Critical solution temperature is the minimum temperature at which two partially miscible liquids become miscible and corresponding composition of liquids is known as critical solutions. [3]Some systems having lower critical solution temperature (LCST) and some having upper critical solution temperature (UCST) and some system having both LCST and UCST i.e mutual solubility is increases as well as decreases with changing temperature. Critical solution temperature is greatly affect by the melting points of added impurity if added impurity has higher melting points it shift critical solution temperature towards higher value and if having lower melting point, value shifting towards lower.This observation is made by the formation of hydrogen bonding between the two partially immiscible system, added impurity play a role of catalyst in the formation of intermolecular hydrogen bonding and intermolecular hydrogen bonding directly affect on the melting points and hence solubility.

MATERIALS AND METHODOLOGY

Materials: All the chemicals Nacl, Succinic acid, distilled water and experimental assembly thermometer, test tubes hot plates, beakers etc. to perform experiment were easily available in our college laboratory. Chemicals of high graded quality were used to obtain good result.

Methodology: [4]In this experiment impurity for addition was an electrolytes sodium chloride and succinic acid. Experimental assembly is prepared in laboratory which contains thermometer and stirrer is fitted in hard boiling test tube fitted with cork. Test tube is placed in a large glass tube which acts as jacket which is placed in a beaker containing water to perform experiment. Experiment was performed in three steps.

Step 1: [5]In this step we have taken nine test tube and numbered them 1 to 9 and prepared nine solutions by adding 1,2,3,4,5,6,7,8 and 9 gram of pure phenol in tubes respectively and then to complete remaining total volume 10 ml distilled water was added to it .Hence obtain equal volume in each test tubes.

Step 2:[5]Place test tube in the experimental assembly and provide heat with continuous stirring till the turbidity disappears and only one layer is observe and temperature was noted .Stop the heating and cooled the solution to reappear turbidity and again temperature was noted at the turbidity point. Same procedure was repeated for each prepared solutions.

Step 3: In this step to study the effect of addition of impurity on CST 0.2 gm of NaCl added in each test tube of different proportions of phenol and water system and observed the temperature at which turbidity disappear and reappear. Same procedure was repeated for addition of 0.4 gm, 0.6 gm NaCl respectively.

Step 4: To study the effect of addition of succinic acid on CST on phenol water system same procedure was repeated by adding 0.2 gm, 0.4 gm and 0.6 gm of succinic acid in each freshly prepared solution of phenol water system and temperature was noted.

RESULT AND DISCUSSION

Initially critical solution temperature is increased with increasing concentration of phenol up to certain highest value and then it starts to decreased hence obtained parabolic curve from the observations.In comparative study of sodium chloride and succinic acid Critical solution temperature is changes with the change the concentration of impurities**.**

Observed Critical solution temperature

Table 1: Critical solution temperature of different composition of phenol in water

Sr.No	Test tube No	Miscibility Temperature	Turbidity Temperature	Composition of Water + Phenol	Average Miscibility Temperature in degree Celsius (CST)	Average Turbidity Temperature in degree Celsius
1	I	57	50	9 +1	65.87	61.12
2	II	60	54	8+2		
3	III	65	61	7+3		
4	IV	70	66	6+4		
5	V	72	69	5+5		
6	VI	70	65	4+6		
7	VII	68	63	3+7		
8	VIII	65	61	2+8		
9	IX	62	60	1+9		

Table 2: Effect of 0.2 gm NaCl on Critical Solution Temperature in Phenol water system

Sr.No	Test Tube No	Miscibility Temperature	Turbidity Temperature	Composition of Water + Phenol	Average Miscibility Temperature in degree Celsius (CST)	Average Turbidity Temperature in degree Celsius
1	**I**	58	55	9 +1	66.11	63.22
2	**II**	61	58	8+2		
3	**III**	66	62	7+3		
4	**IV**	69	65	6+4		
5	**V**	73	68	5+5		
6	**VI**	71	70	4+6		
7	**VII**	69	67	3+7		
8	**VIII**	65	63	2+8		
9	**IX**	63	61	1+9		

Table 3: Effect of 0.4 gm NaCl on Critical Solution Temperature in Phenol water system

Sr.No	Test Tube No	Miscibility Temperature	Turbidity Temperature	Composition of Water + Phenol	Average Miscibility Temperature in degree Celsius (CST)	Average Turbidity Temperature in degree Celsius
1	**I**	61	60	9 +1	67.11	65.22
2	**II**	63	62	8+2		
3	**III**	65	63	7+3		
4	**IV**	69	66	6+4		
5	**V**	71	70	5+5		
6	**VI**	72	71	4+6		
7	**VII**	70	67	3+7		
8	**VIII**	68	65	2+8		
9	**IX**	65	63	1+9		

Table 4: Effect of 0.6 gm NaCl on Critical Solution Temperature in Phenol water system

Sr.No	Test Tube No	Miscibility Temperature	Turbidity Temperature	Composition of Water + Phenol	Average Miscibility Temperature in degree Celsius (CST)	Average Turbidity Temperature in degree Celsius
1	I	63	61	9 +1	68.22	66.33
2	II	65	63	8+2		
3	III	68	65	7+3		
4	IV	69	68	6+4		
5	V	73	72	5+5		
6	VI	72	69	4+6		
7	VII	69	68	3+7		
8	VIII	68	67	2+8		
9	IX	67	64	1+9		

Table 5: Effect of 0.2 gm Succinic acid on Critical Solution Temperature in Phenol water system

Sr.No	Test Tube No	Miscibility Temperature	Turbidity Temperature	Composition of Water + Phenol	Average Miscibility Temperature in degree Celsius (CST)	Average Turbidity Temperature in degree Celsius
1	I	68	69	9 +1	62.44	60.11
2	II	66	67	8+2		
3	III	64	63	7+3		
4	IV	59	60	6+4		
5	V	58	58	5+5		
6	VI	59	59	4+6		
7	VII	61	60	3+7		
8	VIII	63	62	2+8		
9	IX	64	63	1+9		

Table 2: Effect of 0.4 gm Succinic acid on Critical Solution Temperature in Phenol water system

Sr.No	Test Tube No	Miscibility Temperature	Turbidity Temperature	Composition of Water + Phenol	Average Miscibility Temperature in degree Celsius (CST)	Average Turbidity Temperature in degree Celsius
1	I	67	66	9 +1	60.66	59.66
2	II	64	63	8+2		
3	III	60	59	7+3		
4	IV	58	57	6+4		
5	V	57	56	5+5		
6	VI	58	57	4+6		
7	VII	59	58	3+7		
8	VIII	61	60	2+8		
9	IX	62	61	1+9		

Table 2: Effect of 0.6 gm NaCl on Critical Solution Temperature in Phenol water system

Sr.No	Test Tube No	Miscibility Temperature	Turbidity Temperature	Composition of Water + Phenol	Average Miscibility Temperature in degree Celsius (CST)	Average Turbidity Temperature in degree Celsius
1	I	65	64	9 +1	60.33	59.55
2	II	62	63	8+2		
3	III	59	58	7+3		
4	IV	58	57	6+4		
5	V	57	56	5+5		
6	VI	59	58	4+6		
7	VII	60	60	3+7		
8	VIII	61	61	2+8		
9	IX	62	59	1+9		

CONCLUSION

The critical solution temperature is increased with the increasing concentration of sodium chloride and in case of succinic acid critical solution temperature is decreased with increasing concentration this is because sodium chloride is soluble only in aqueous layer but succinic acid soluble in organic and aqueous layer and hence it is conclude that the change in critical solution temperature with respect to nature of added impurity.

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