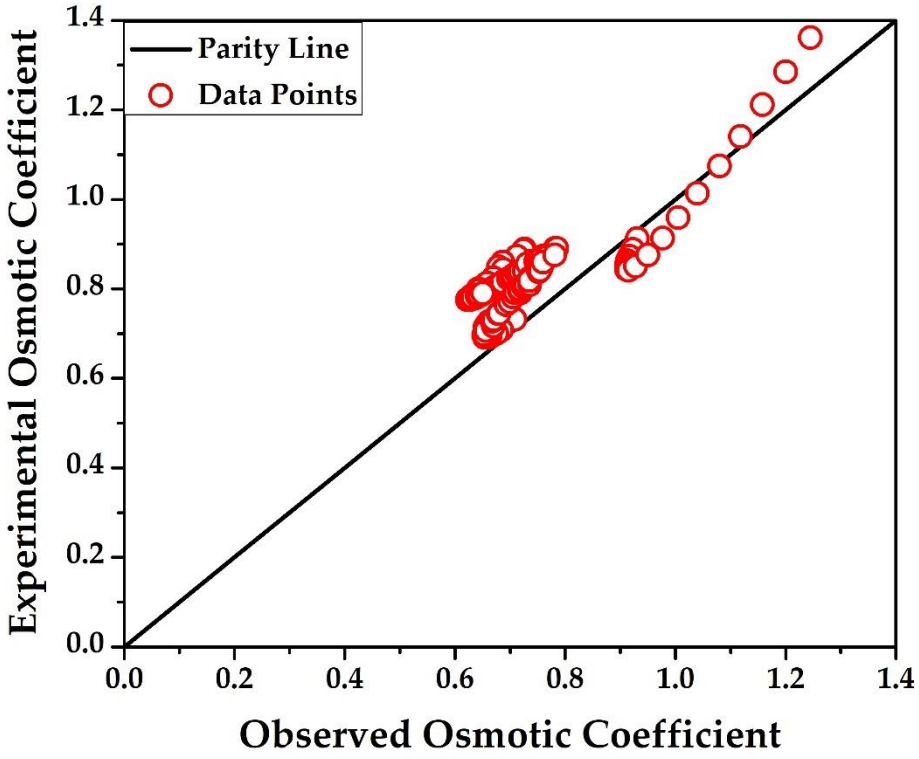
CHAPTER 4

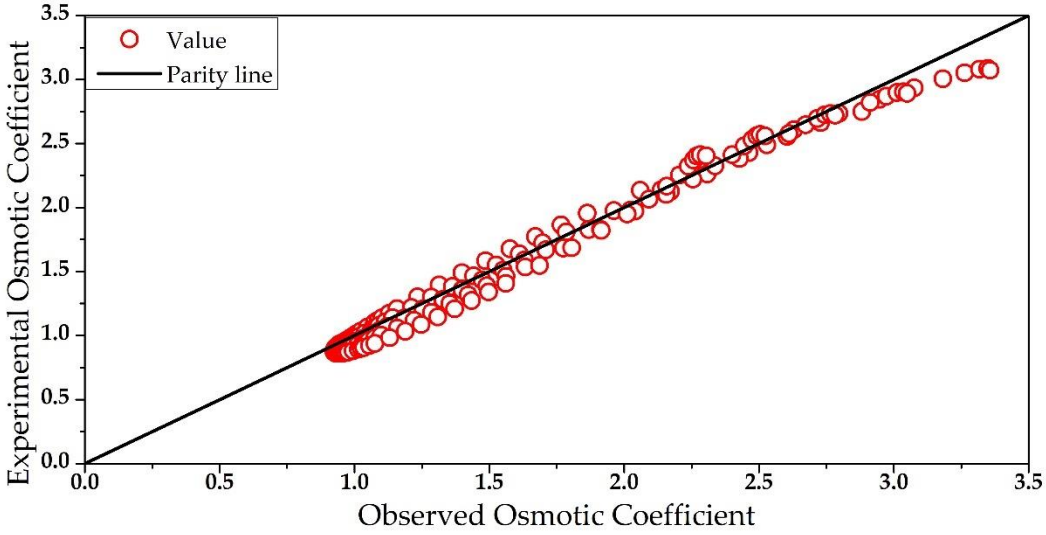
RESULTS AND DISCUSSION

4.1 Parity Plot

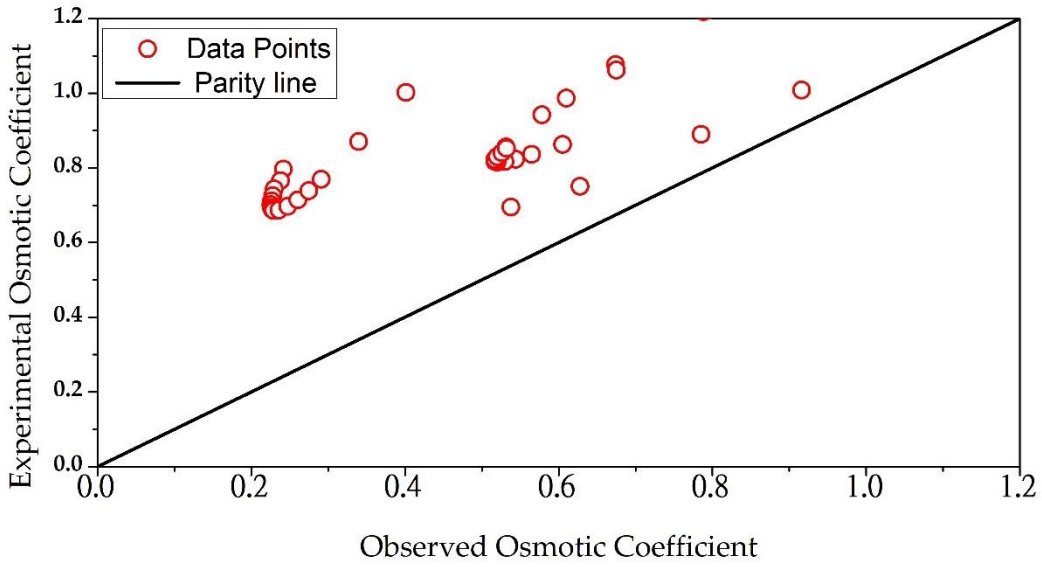
1 -NaCl



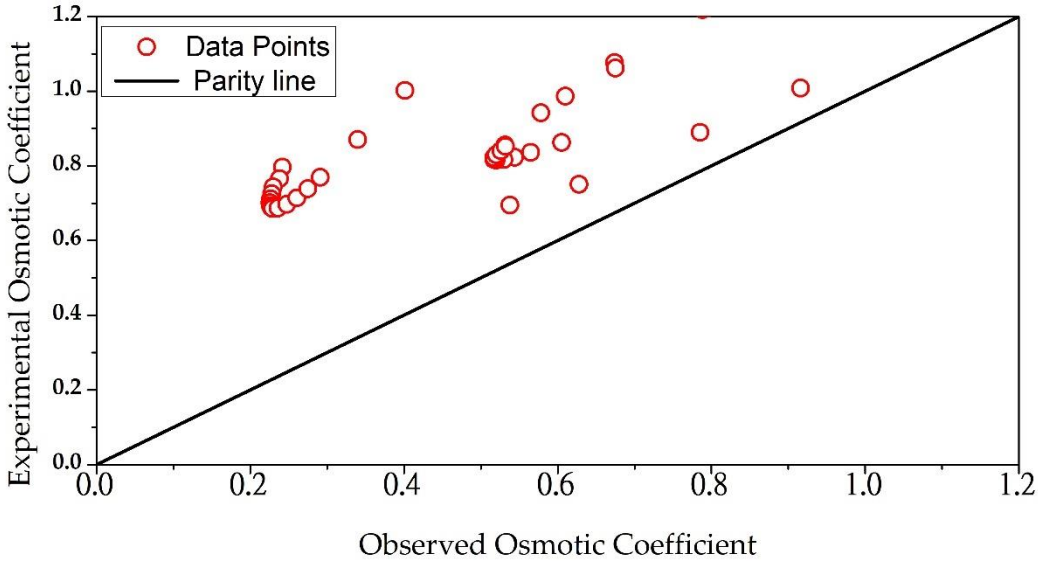
2-LiCl



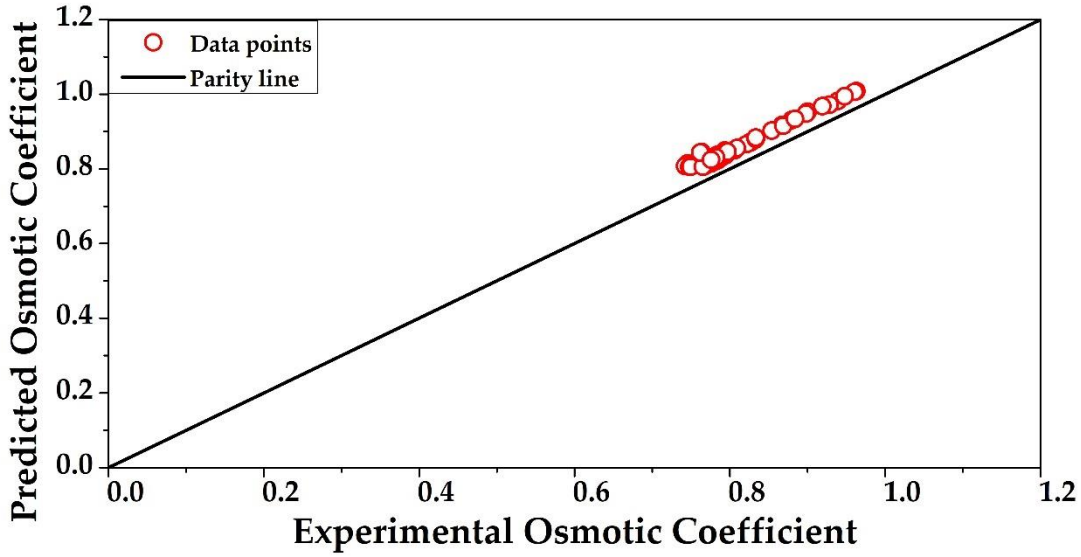
3-$CaCl_2$



4-$MgSO_4$



5-Li_2SO_4


Data points
Parity line
Predicted Osmotic Coefficient
Experimental Osmotic Coefficient
0.0
0.2
0.4
0.6
0.8
1.0
1.2

4.2 Critical Point

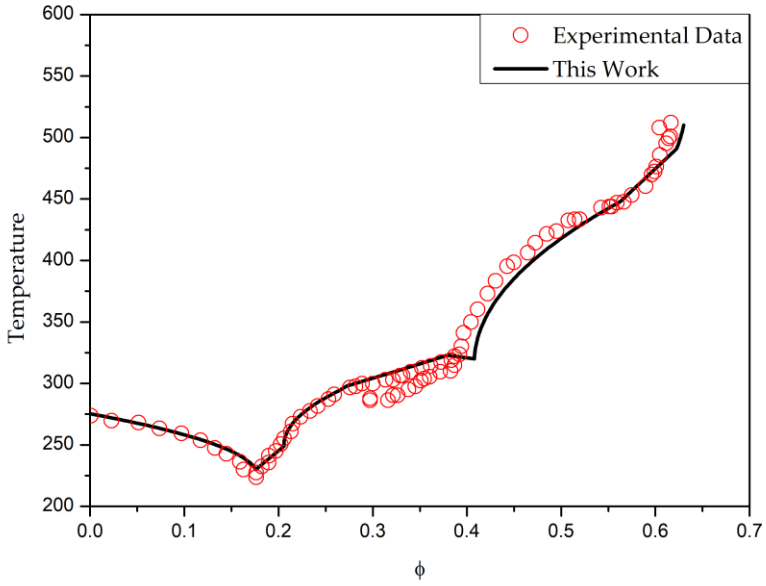
Salt	ϕ_s	Temperature	Literature Critical Temperature	Deviation	Reference
NaCl	0.1506340	214.799	253.153	17.85%	[11]
LiCl	0.15237	200.0489	193.31	3.35%	[12]
$CaCl_2$	0.29971	243.15	223.388	8.127%	[13]
$MgSO_4$	0.104073	287.972	291.19	1.117%	[14]
Li_2SO_4	0.152345	260.824	251.515	3.569%	[15]

4.3 Regarding Parameters

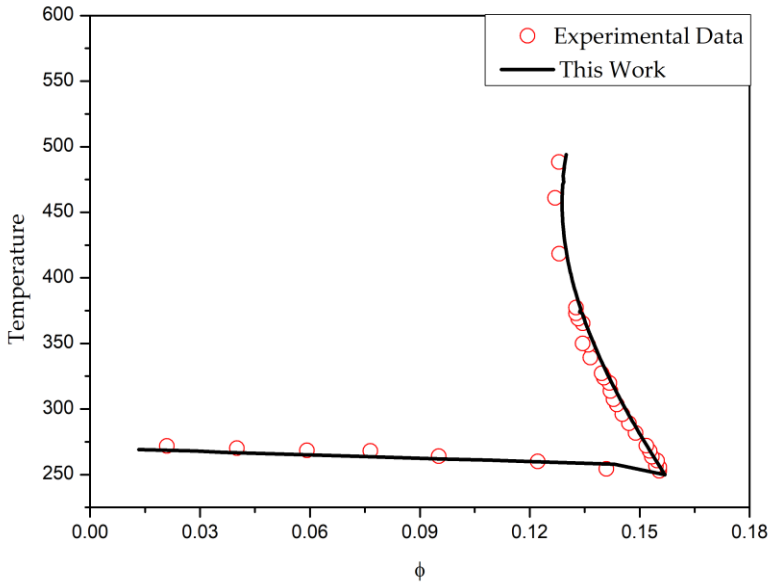
a	*0*	*0*	*51.9789*	*$4.5x10^{-7}$*	*$3.8x10^{-8}$*
b	*1.274642*	*1.27485*	*0*	*1.27012*	*1.27515*
c	*15.92609*	*11.6397*	*0*	*53.8784*	*5.98346*
d	*93.45038*	*75.575*	*139.892*	*305.534*	*39.8211*
e	*0.534174*	*0.53407*	*7.41714*	*0.53537*	*0.53411*
f	*0*	*0*	*0*	*0*	*0*
g	*60.15876*	*44.7589*	*0*	*194.162*	*36.7534*
h	*0.987123*	*0.99022*	*3.14758*	*0.98586*	*0.9871*
i	*0*	*0*	*0*	*0.42987*	*0*
j	*1.035697*	*1.03633*	*0*	*1.00217*	*1.03091*
k	*1.982129*	*1.82918*	*0*	*2.78937*	*1.98314*
l	*9.659121*	*7.31275*	*0*	*34.3719*	*0.00967*
m	*3.037581*	*3.05209*	*0*	*2.51154*	*3.12718*
n	*4.901202*	*4.55327*	*0*	*5.41687*	*4.90889*
o	*18.08217*	*15.0771*	*25.2565*	*45.305*	*9.13539*

4.2 Salt Phase Diagram -Model 1 n=3

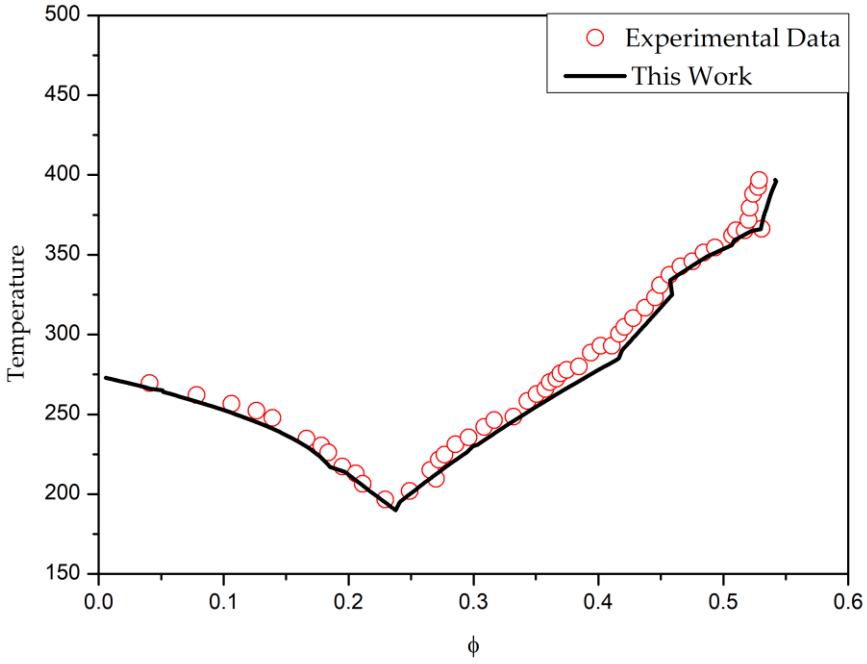
1-$CaCl_2$



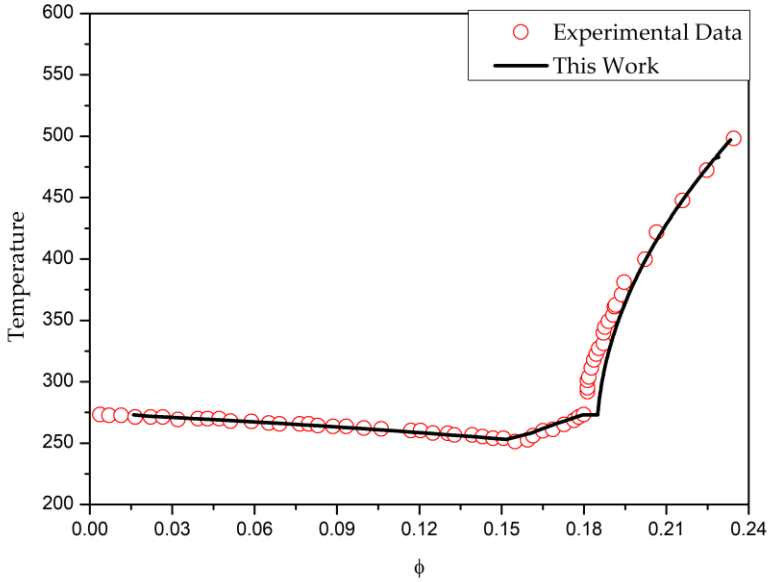
2-Li_2SO_4



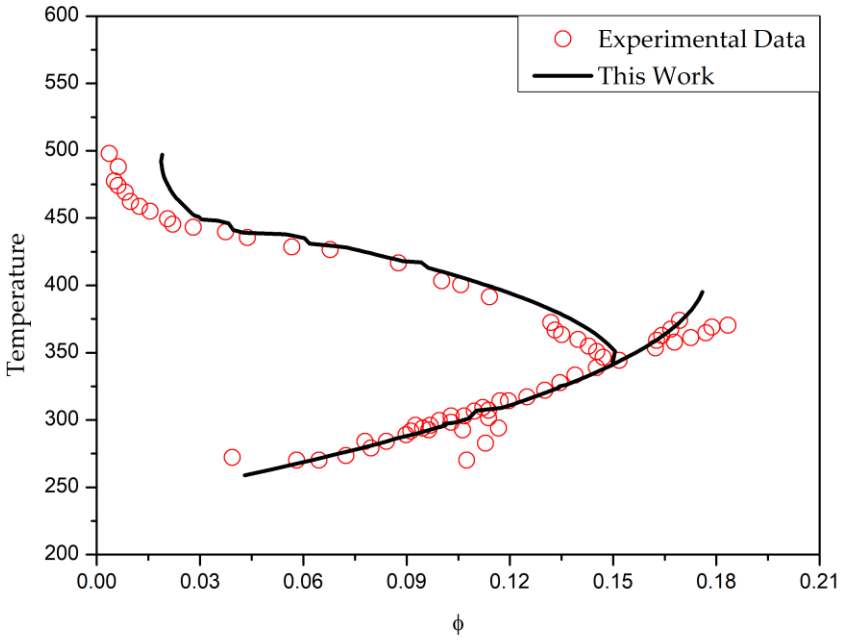
3-LiCl


Experimental Data
This Work
Temperature
ϕ
500
450
400
350
300
250
200
150
0.0
0.1
0.2
0.3
0.4
0.5
0.6

4-NaCl

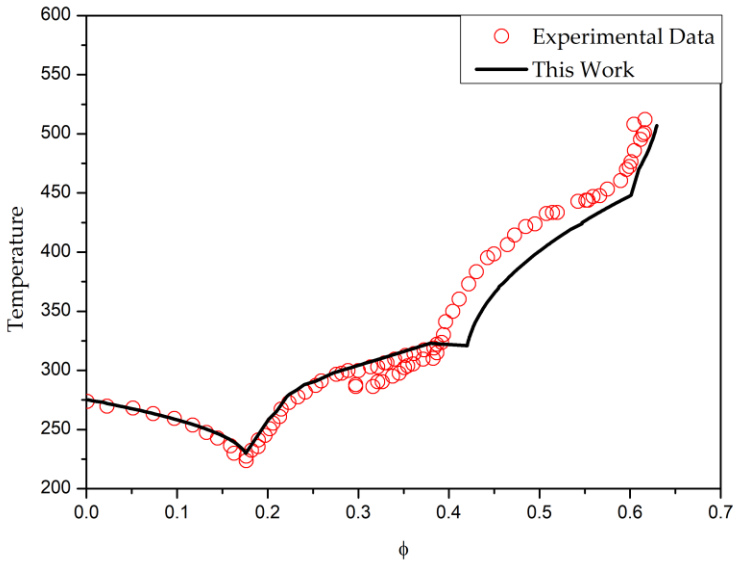

Experimental Data
This Work
Temperature
ϕ
600
550
500
450
400
350
300
250
200
0.00
0.03
0.06
0.09
0.12
0.15
0.18
0.21
0.24

5-Mg_2SO_4

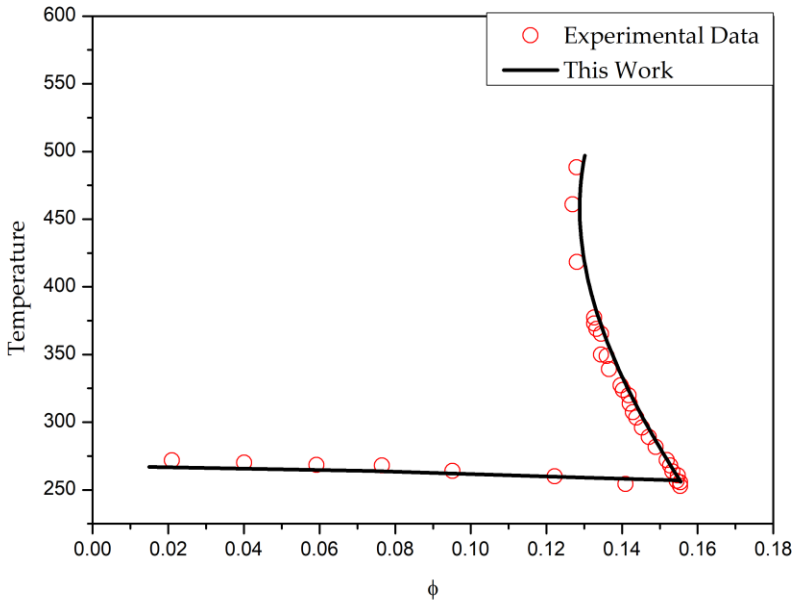


4.2 Salt Phase Diagram -Model 1 n=4

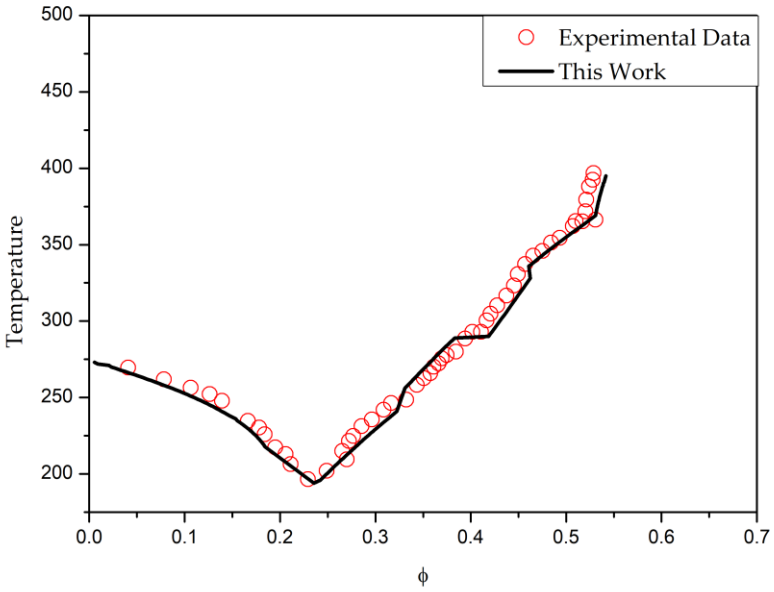
1-$CaCl_2$



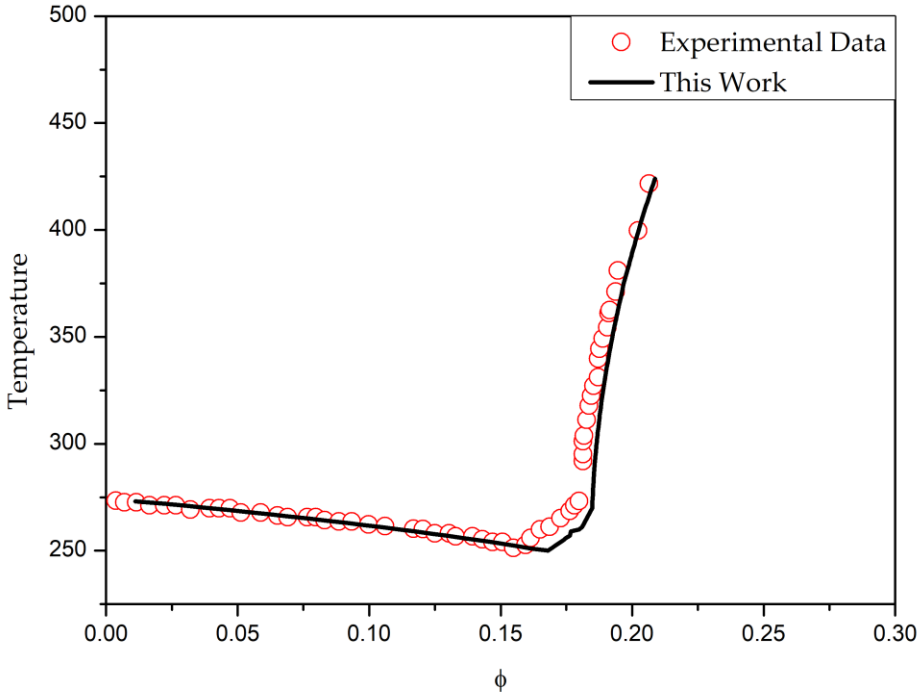
2-Li_2SO_4



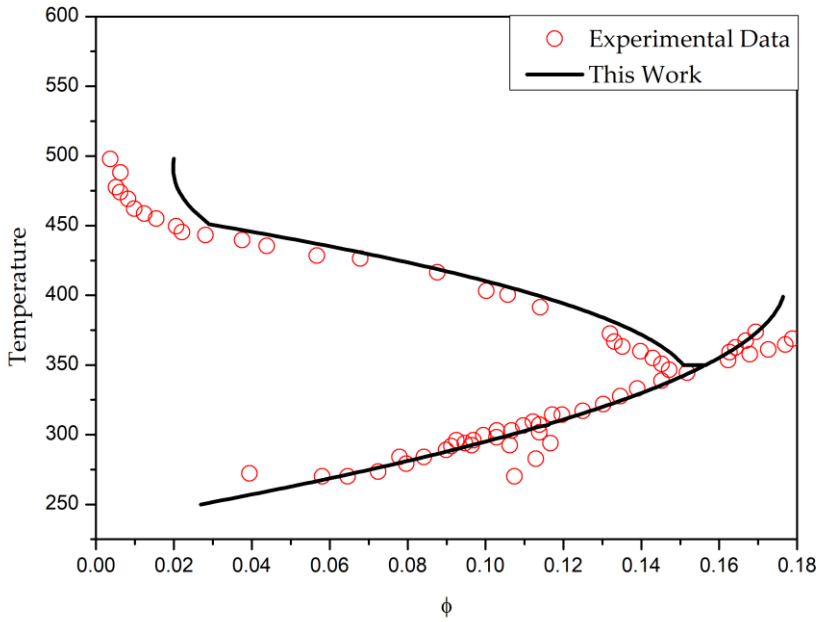
3-LiCl



4-NaCl

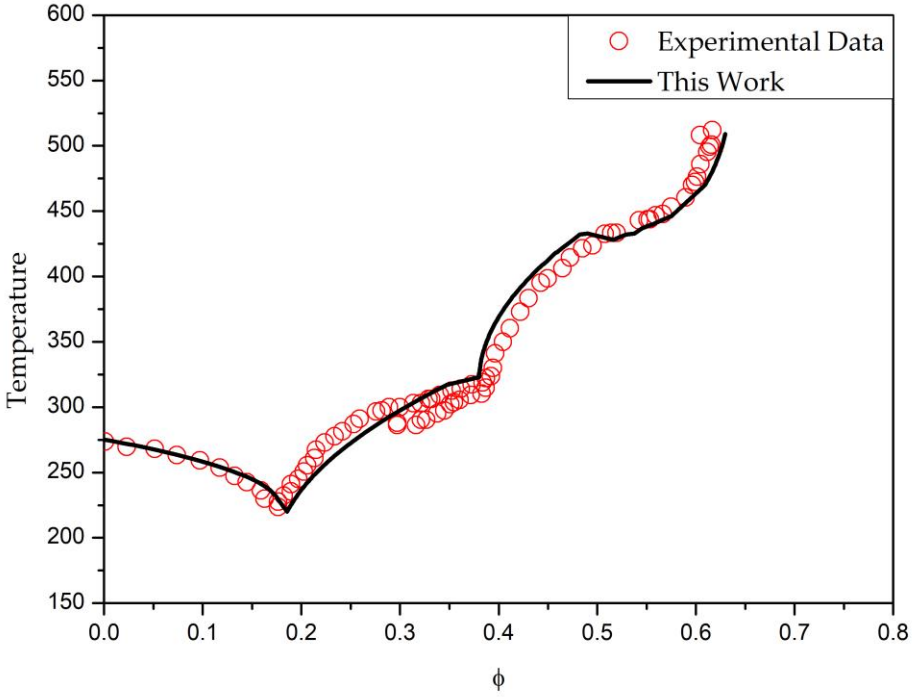


5-Mg_2SO_4

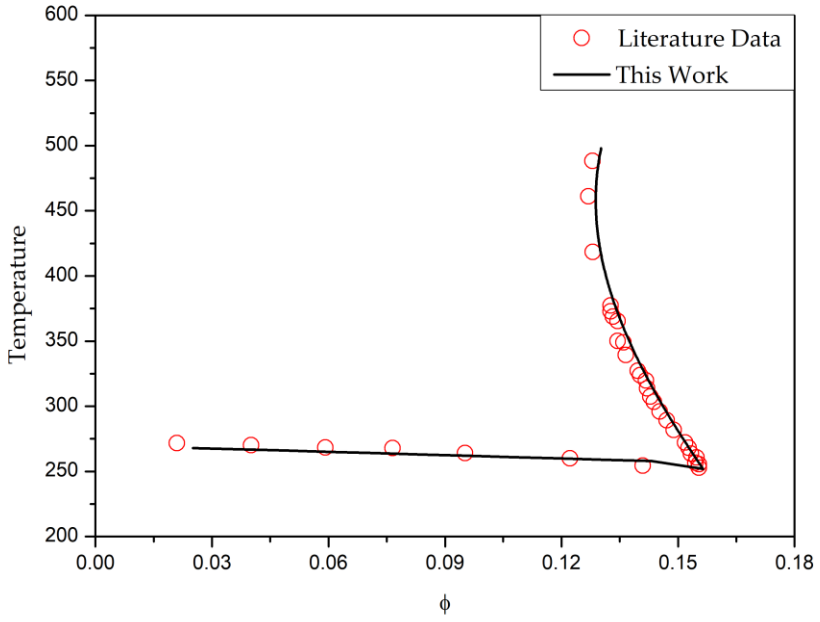


4.2 Salt Phase Diagram Model 2

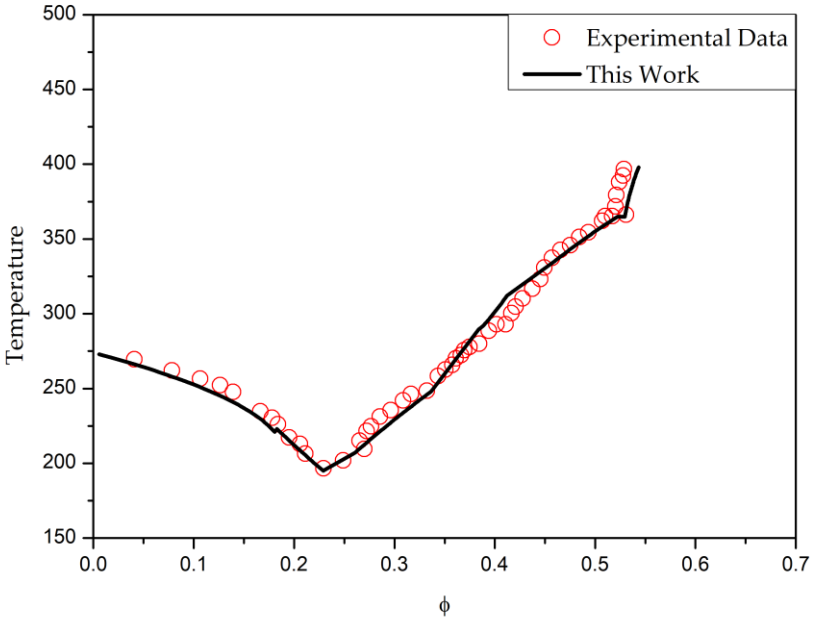
1-$CaCl_2$



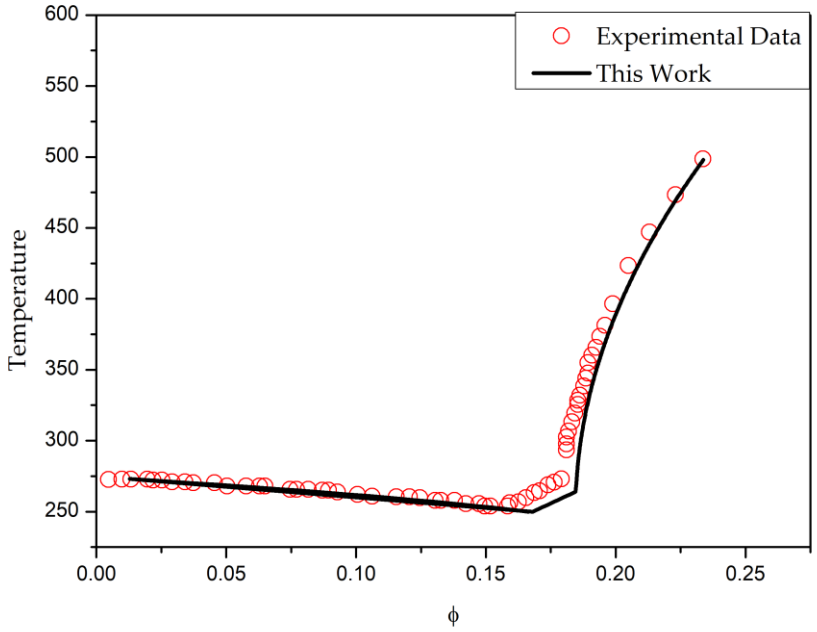
2-Li_2SO_4



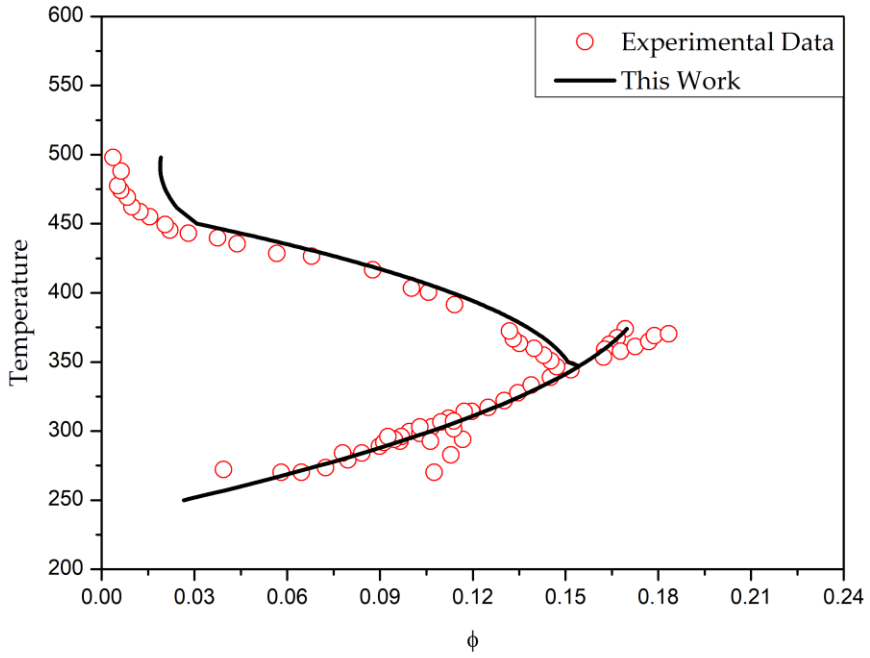
3-LiCl


Experimental Data
This Work
Temperature
ϕ
500
450
400
350
300
250
200
150
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7

4-NaCl


Experimental Data
This Work
Temperature
ϕ
600
550
500
450
400
350
300
250
0.00
0.05
0.10
0.15
0.20
0.25

5-Mg_2SO_4


Experimental Data
This Work
Temperature
600
550
500
450
400
350
300
250
200
0.00
0.03
0.06
0.09
0.12
0.15
0.18
0.21
0.24
ϕ

CHAPTER 5

SUMMARY AND CONCLUSION

In this work, a new models is introduced to analyze the phase behavior of Salt hydrates. The present model has its limitations. Pitzer model are having a large number of parameters and the Bet model is applicable only up to a certain range, Also Deybe huckel and davies Equation deviate from the experimental result at large concentrations. The Phase Analysis Equation has been derived from the proposed model. The equations have been derived and Further steps require stimulation in Mathematica or Matlab and also validating the obtained result from literature data as well as DSC experiment.

CHAPTER 6

SCOPE FOR FUTURE WORK

Parameters and critical point are derived from the model. Phase diagram of Salts are are also modelled in this thesis. Further work can be experimented for the validation of the models.