Supporting information

Liquid Densities and Excess Quantities for the Green Esterification Process

[1]Achsah Rajendran Startha Christabel, [1]Anantharaj Ramalingam*,
[1]Danish John Paul Mark Reji, [1]Shruthi Nagaraj, [2]Siddharth Ravichandran

[1]Department of Chemical Engineering, SSN College of Engineering, Rajiv Gandhi Salai (OMR), Kalavakkam, Tamilnadu-603110.
[2]Davidson School of Chemical Engineering, Purude University, 480 W Stadium Ave, West Lafayette, IN 47907

*Author to whom all correspondence should be addressed

E-mail : anantharajr@ssn.edu.in
Tel: 044-32909138-263
Fax: 044-32909138

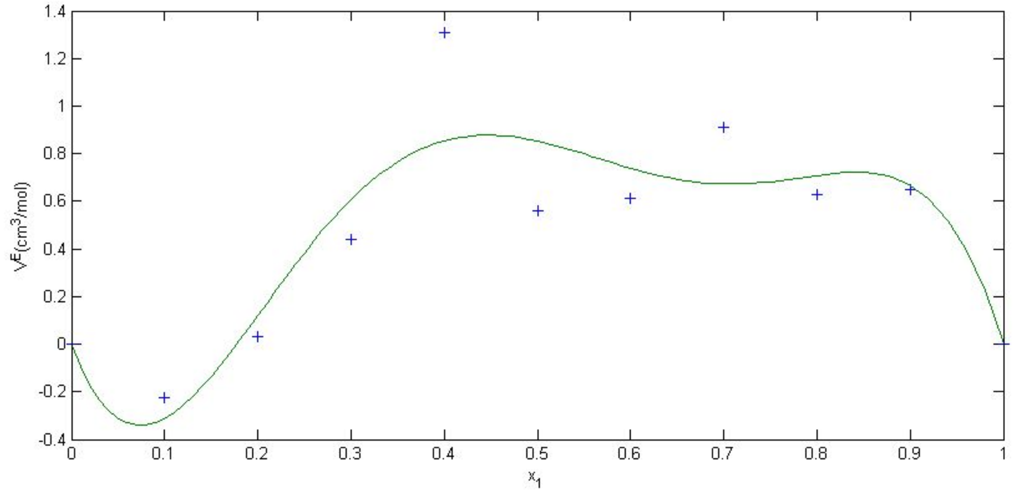


Figure S1: Excess molar volume for n-butyl acetate + n-butanol with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 293.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

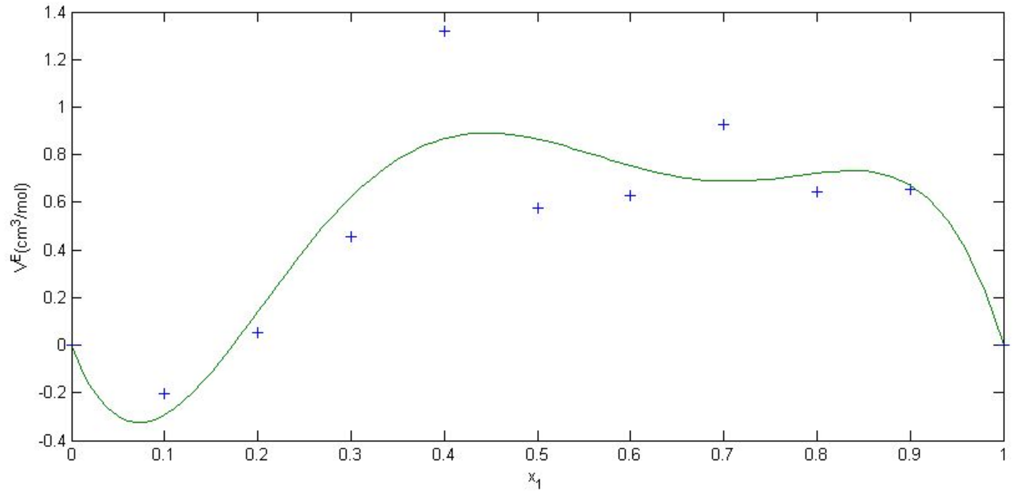


Figure S2: Excess molar volume for n-butyl acetate + n-butanol with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 298.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

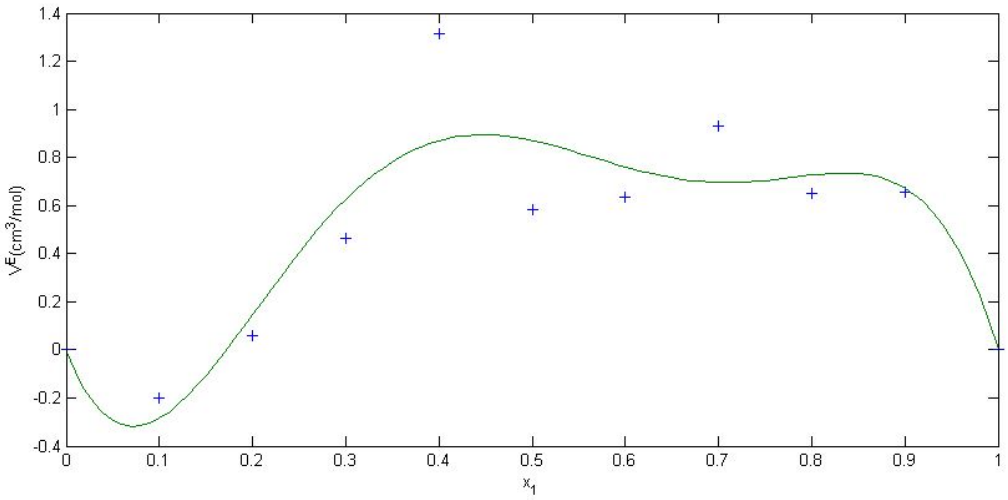


Figure S3: Excess molar volume for n-butyl acetate + n-butanol with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 303.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

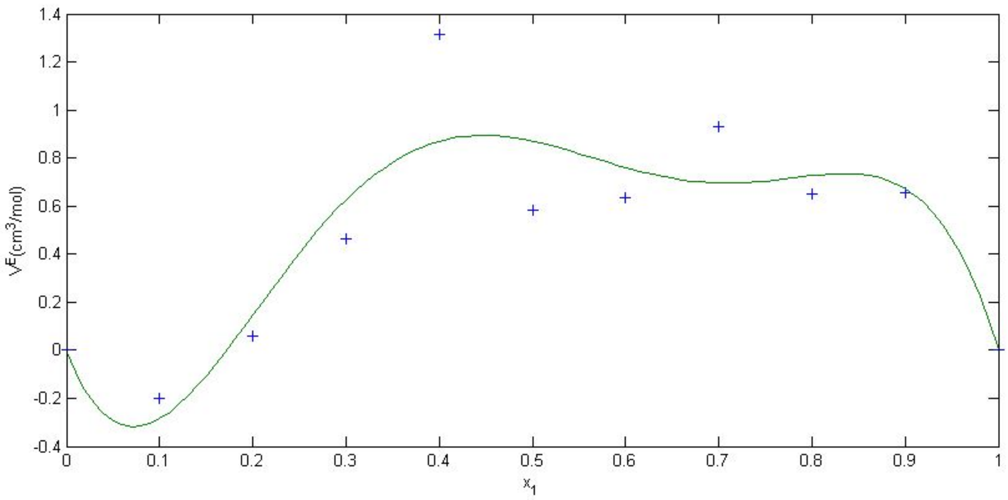


Figure S4: Excess molar volume for n-butyl acetate + n-butanol with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 308.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

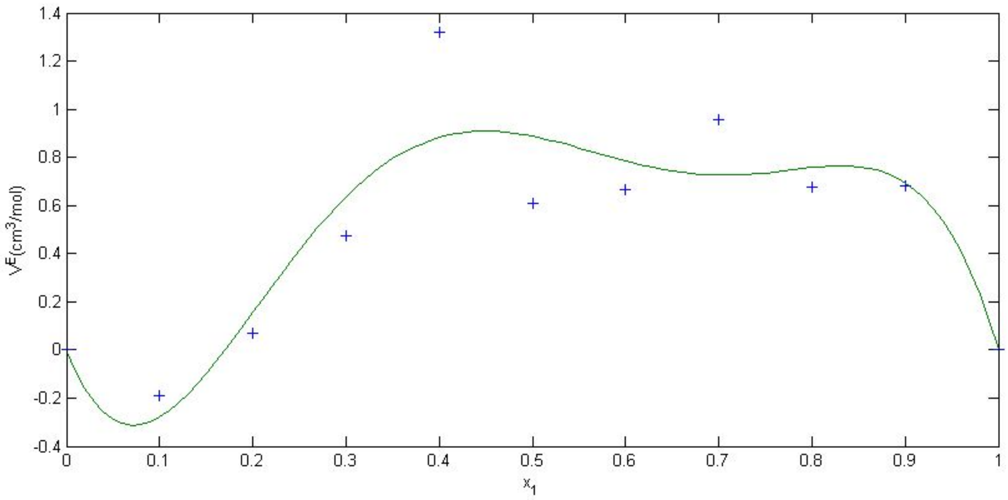


Figure S5: Excess molar volume for n-butyl acetate + n-butanol with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 313.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

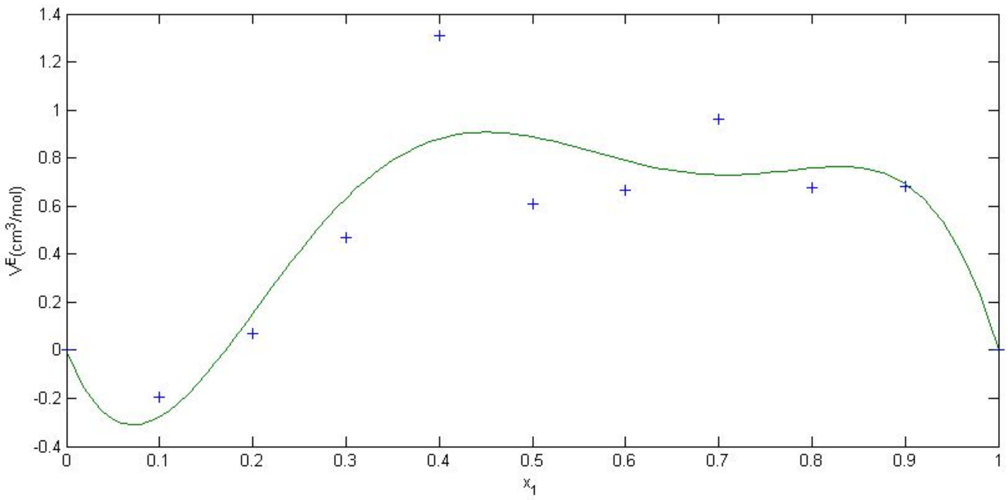


Figure S6: Excess molar volume for n-butyl acetate + n-butanol with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 318.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

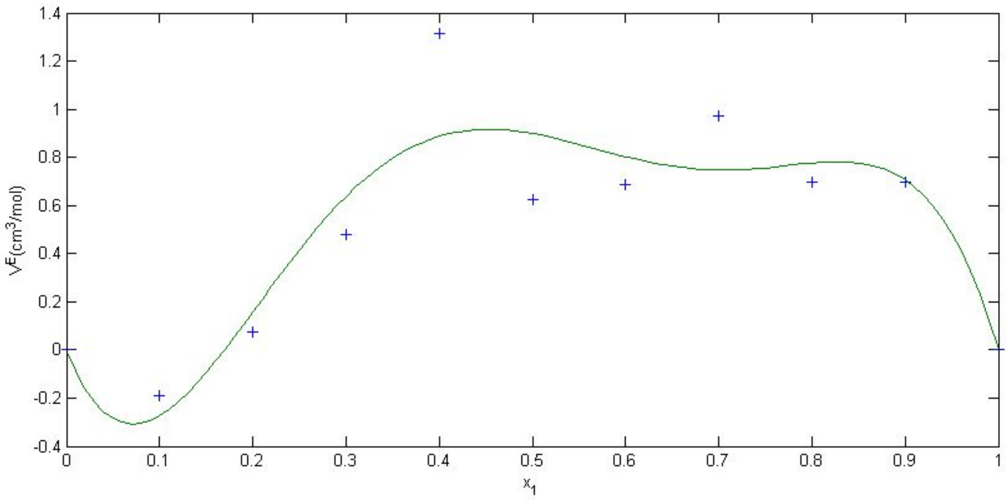


Figure S7: Excess molar volume for n-butyl acetate + n-butanol with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 323.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

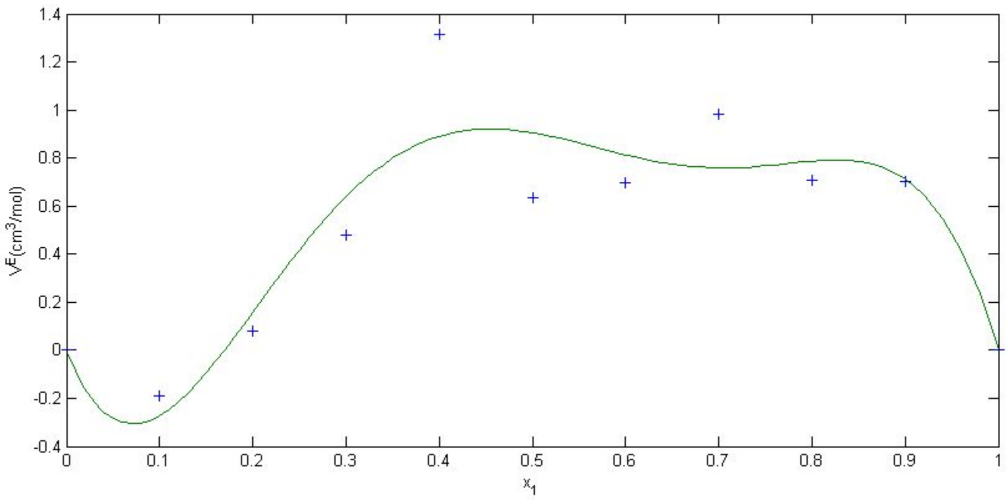


Figure S8: Excess molar volume for n-butyl acetate + n-butanol with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 328.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

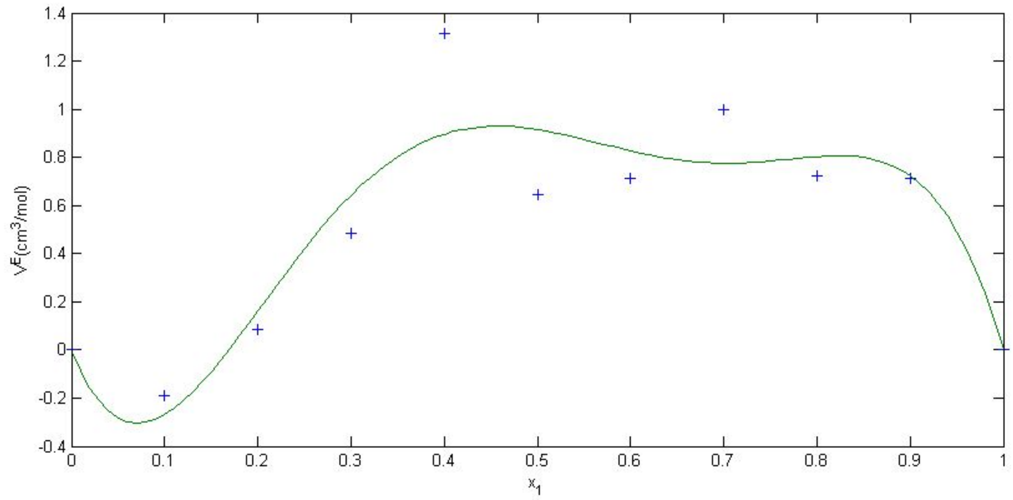


Figure S9: Excess molar volume for n-butyl acetate + n-butanol with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 333.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

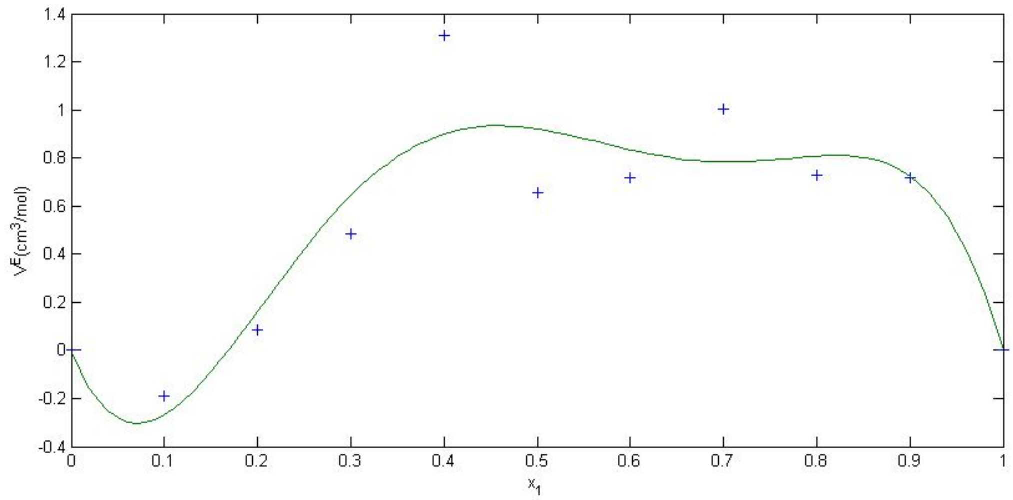


Figure S10: Excess molar volume for n-butyl acetate + n-butanol with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 338.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

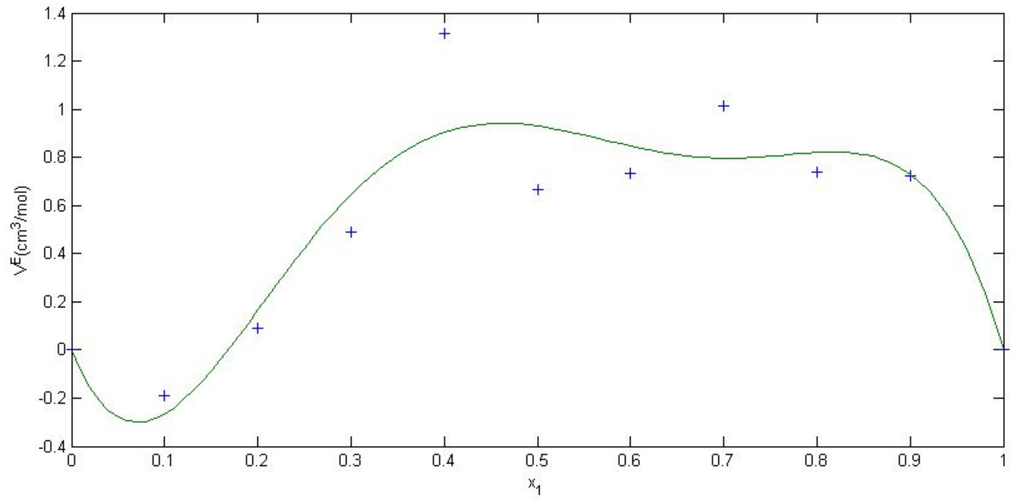


Figure S11: Excess molar volume for n-butyl acetate + n-butanol with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 343.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

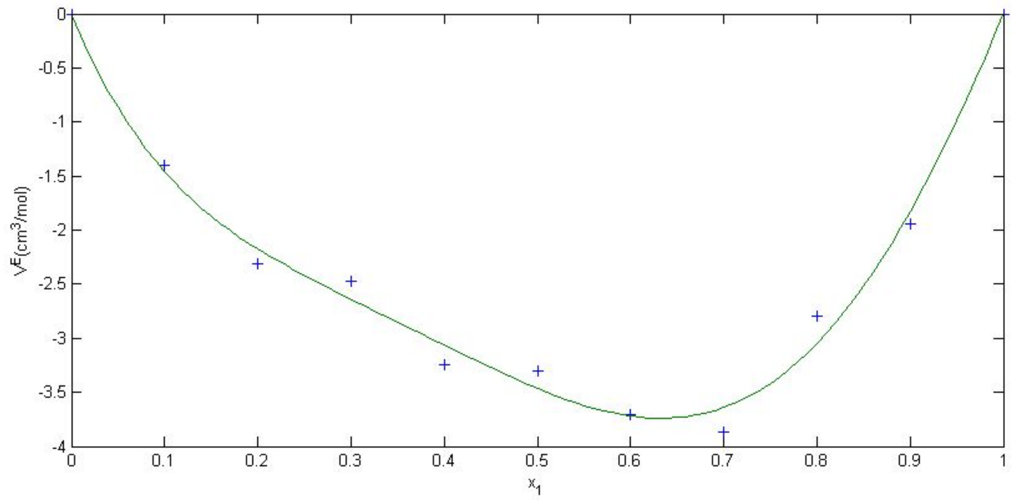


Figure S12: Excess molar volume for n-butyl acetate + Acetic acid with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 293.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

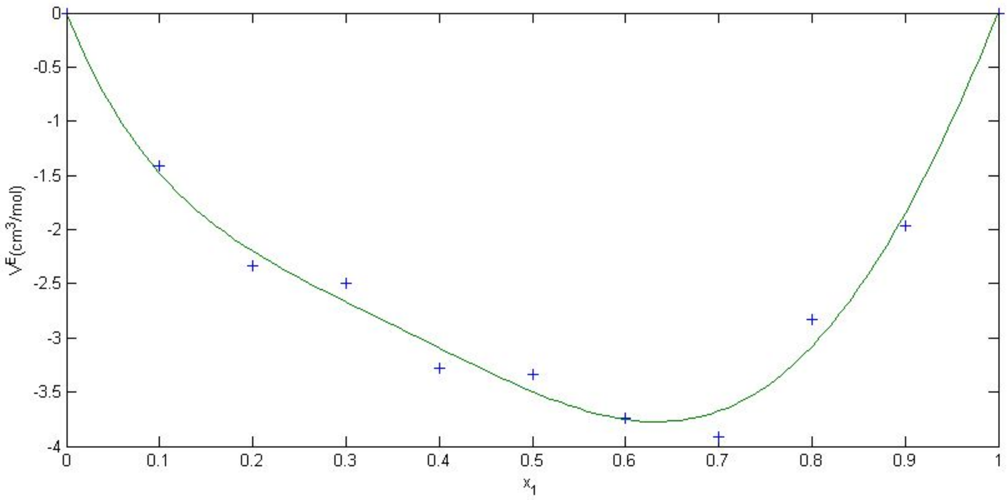


Figure S13: Excess molar volume for n-butyl acetate + Acetic acid with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 298.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

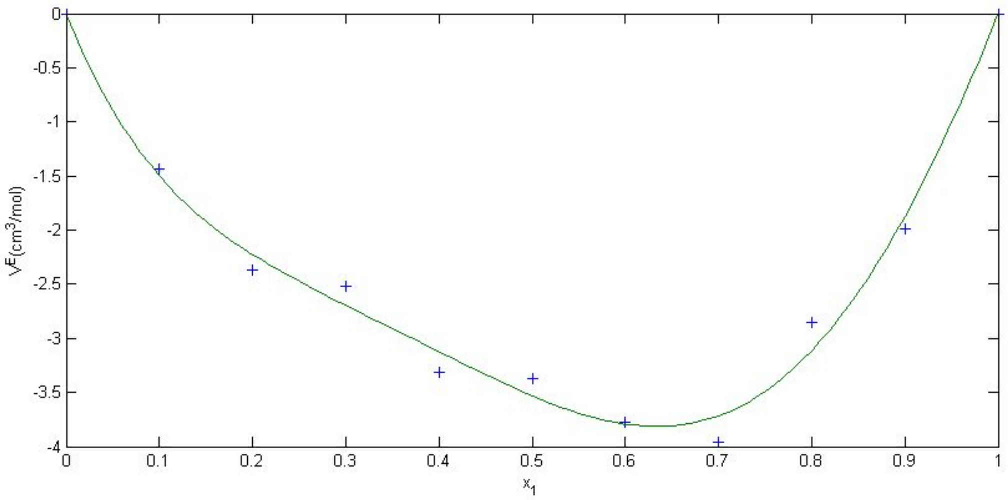


Figure S14: Excess molar volume for n-butyl acetate + Acetic acid with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 303.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

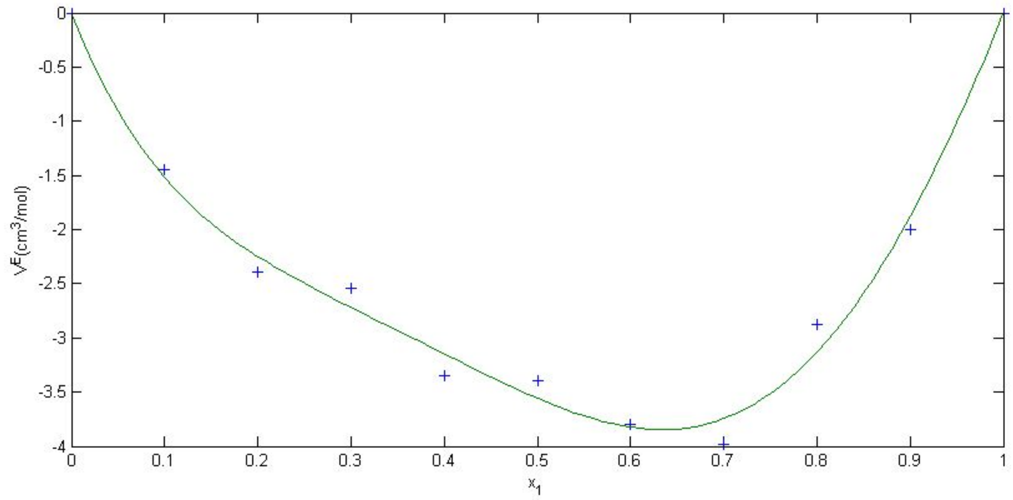


Figure S15: Excess molar volume for n-butyl acetate + Acetic acid with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 308.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

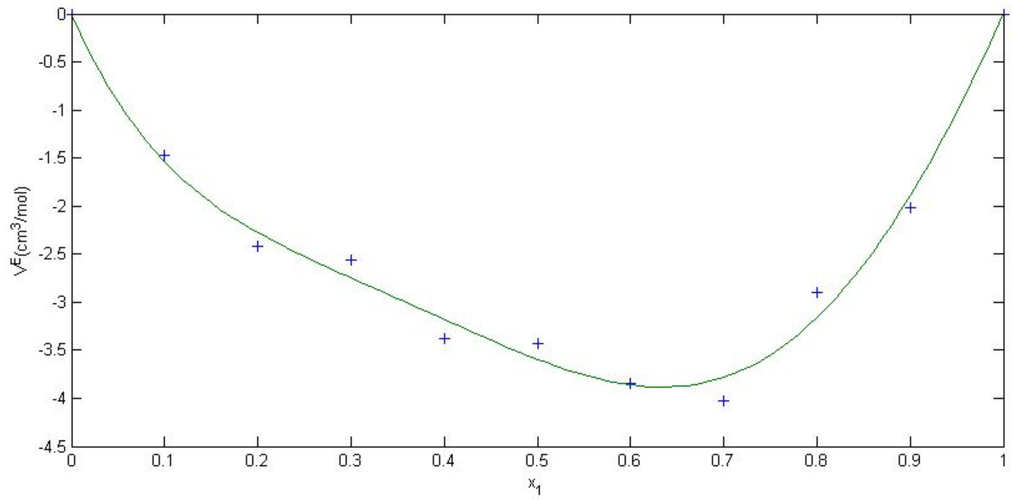


Figure S16: Excess molar volume for n-butyl acetate + Acetic acid with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 313.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

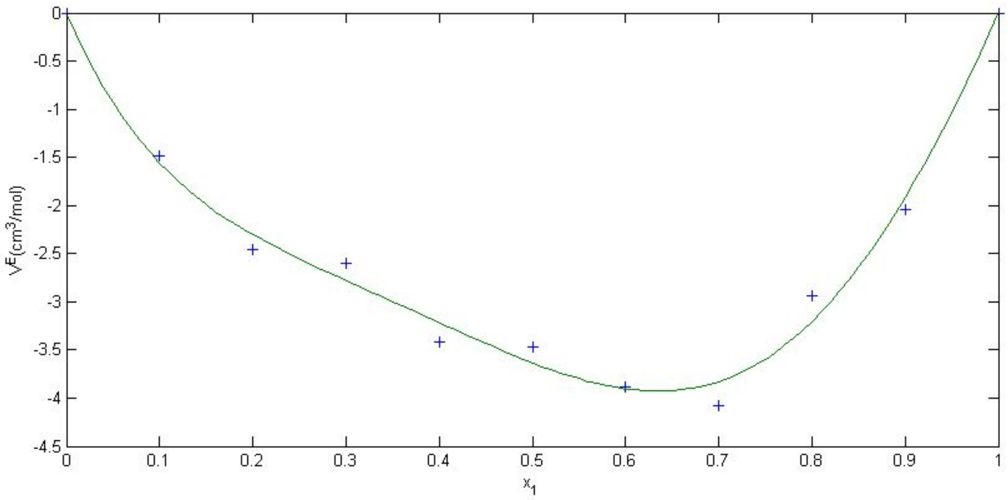


Figure S17: Excess molar volume for n-butyl acetate + Acetic acid with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 318.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

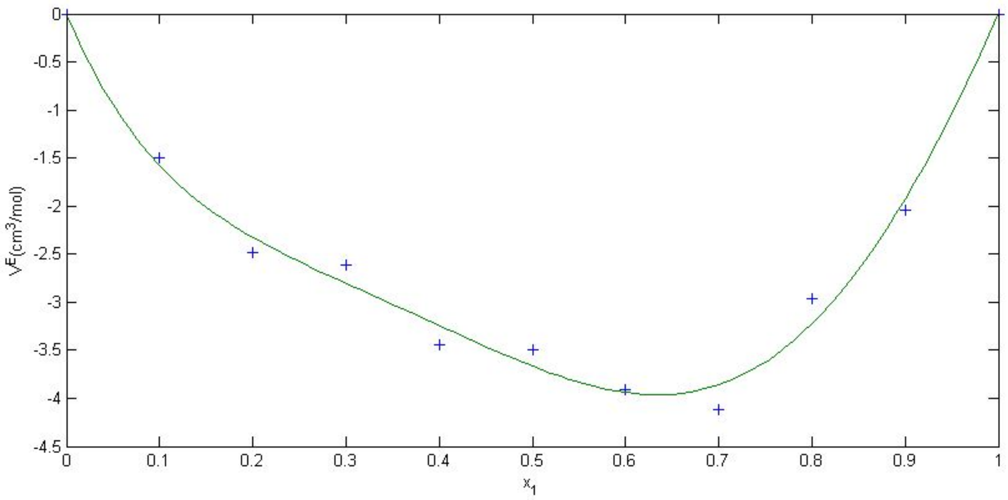


Figure S18: Excess molar volume for n-butyl acetate + Acetic acid with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 323.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

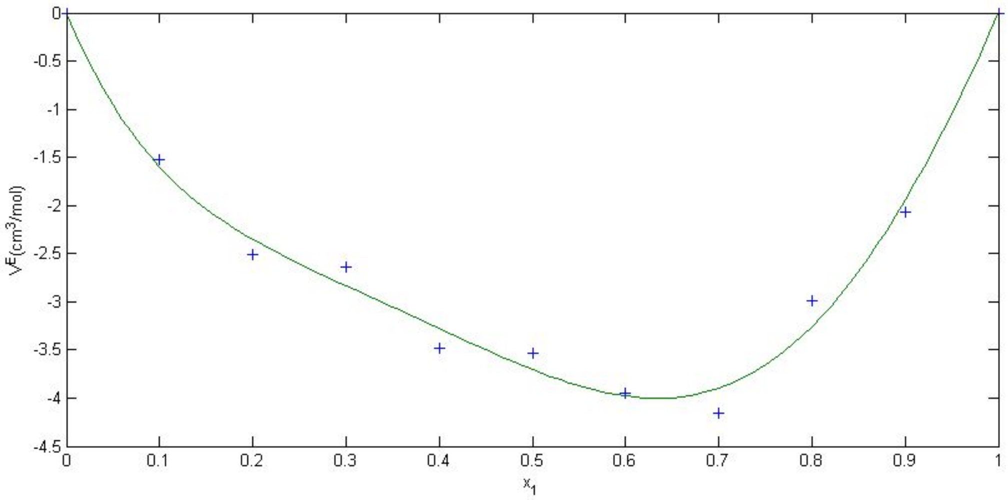


Figure S19: Excess molar volume for n-butyl acetate + Acetic acid with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 328.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

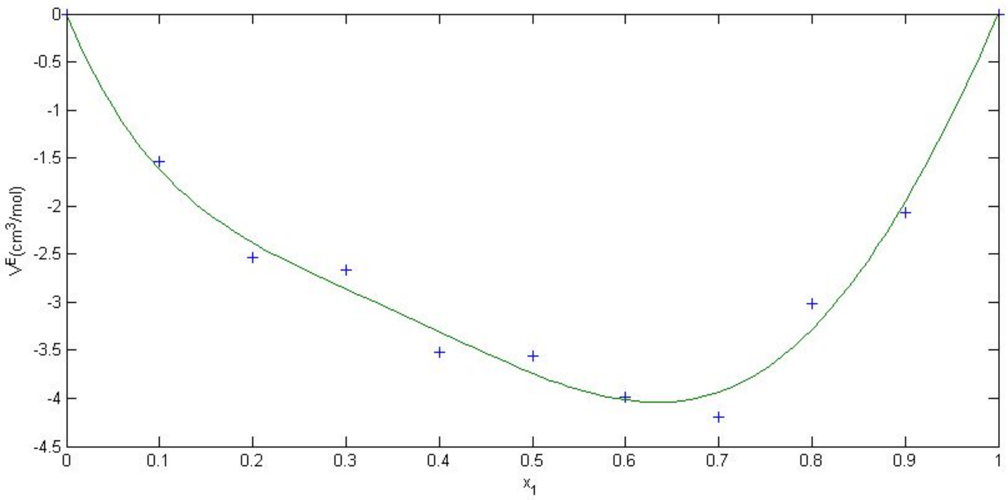


Figure S20: Excess molar volume for n-butyl acetate + Acetic acid with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 333.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

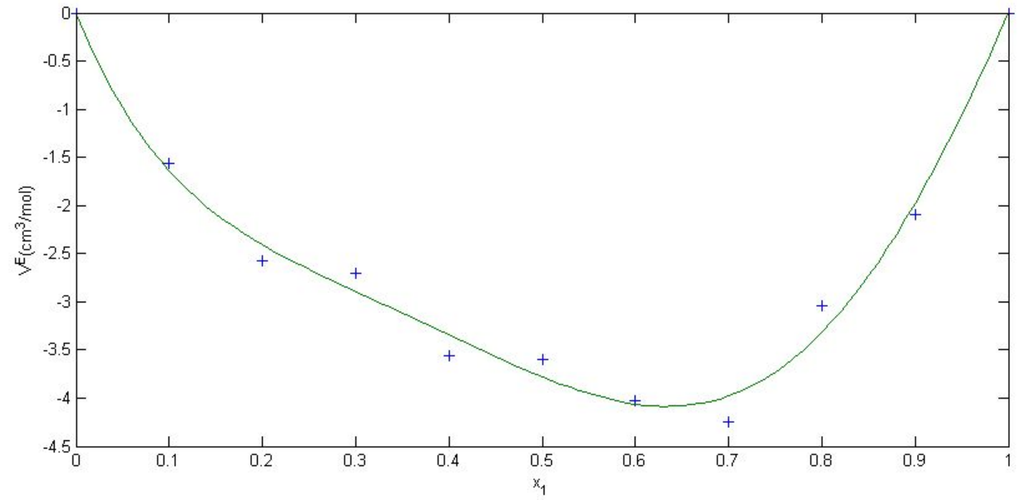


Figure S21: Excess molar volume for n-butyl acetate + Acetic acid with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 338.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

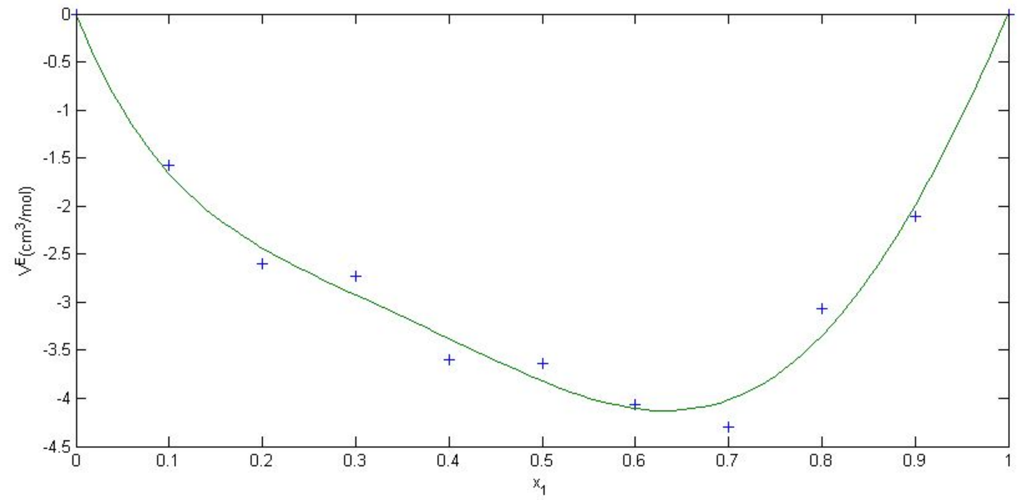


Figure S22: Excess molar volume for n-butyl acetate + Acetic acid with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 343.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

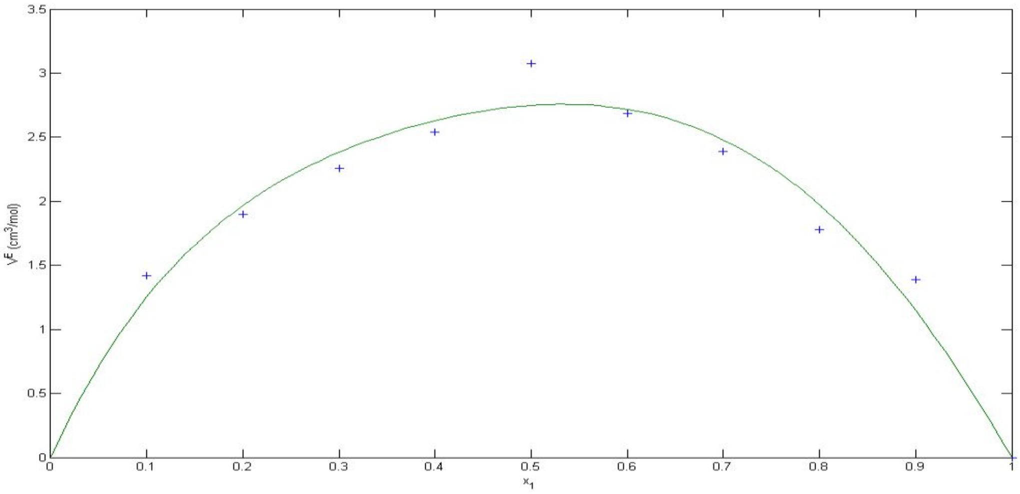


Figure S23: Excess molar volume for DES_1 (ChCl-Gly) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 293.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

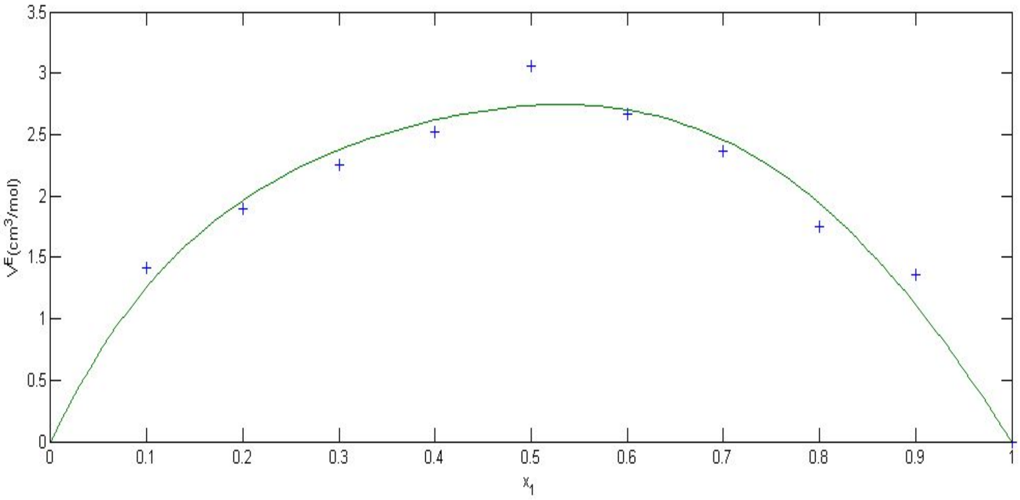


Figure S24: Excess molar volume for DES_1 (ChCl-Gly) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 298.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

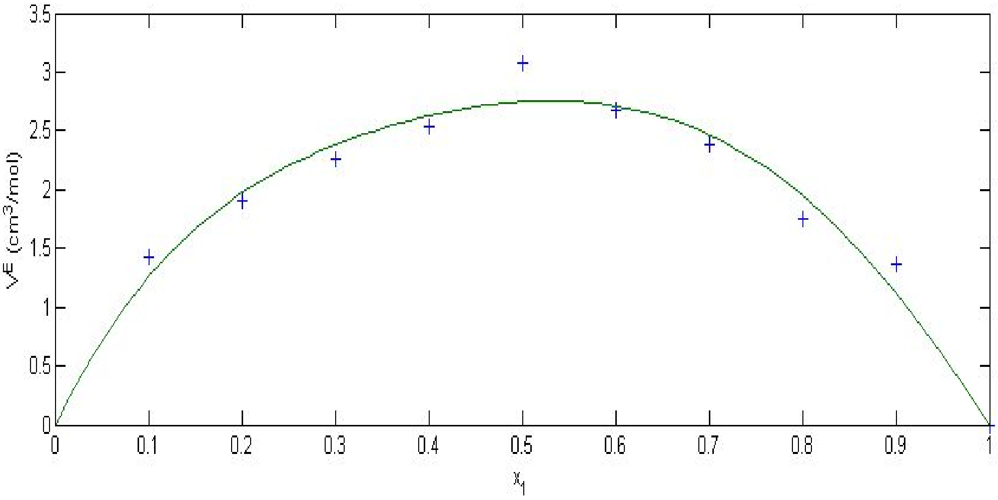


Figure S25: Excess molar volume for DES_1 (ChCl-Gly) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 303.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

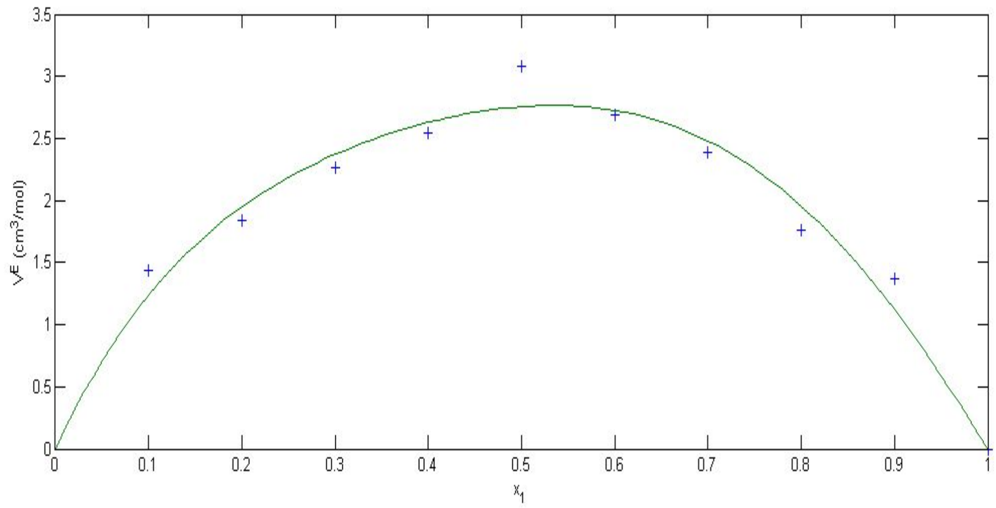


Figure S26: Excess molar volume for DES_1 (ChCl-Gly) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 308.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

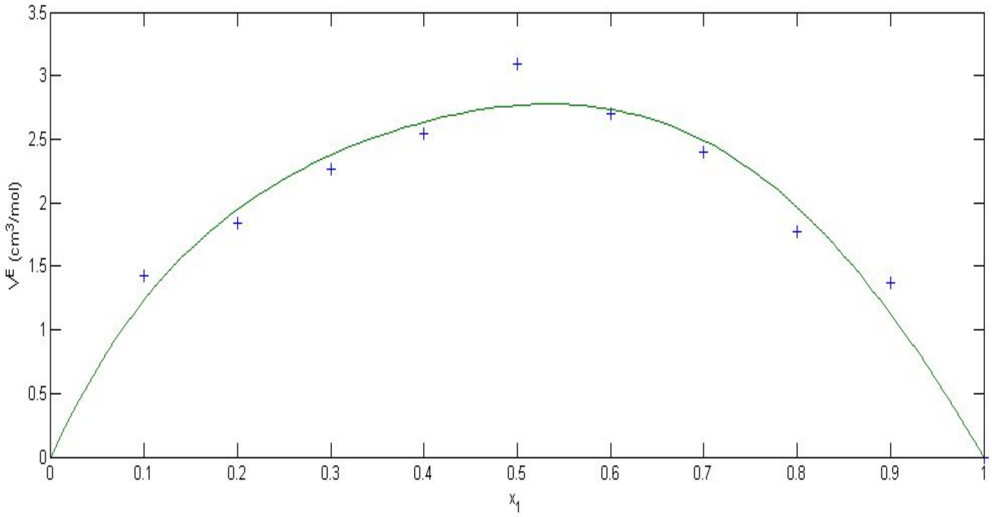


Figure S27: Excess molar volume for DES_1 (ChCl-Gly) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 313.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

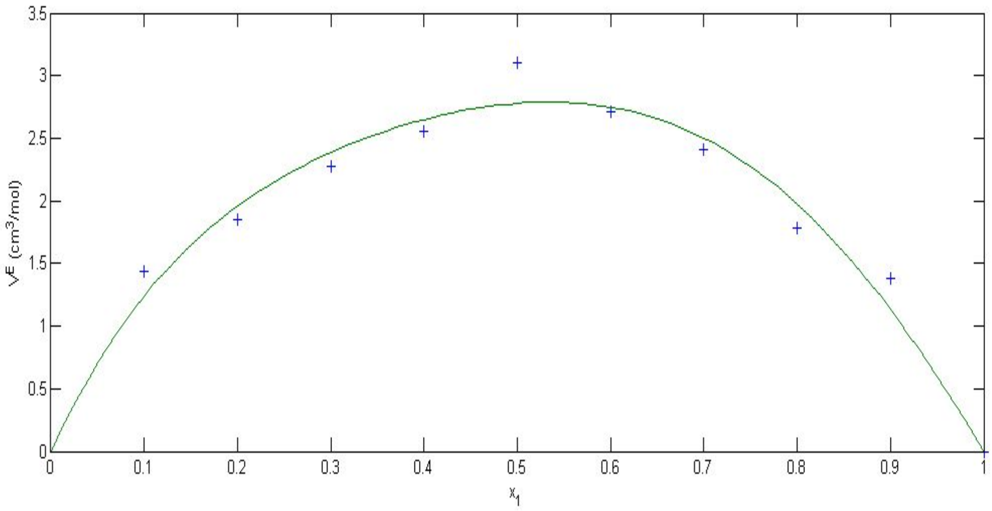


Figure S28: Excess molar volume for DES_1 (ChCl-Gly) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 318.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

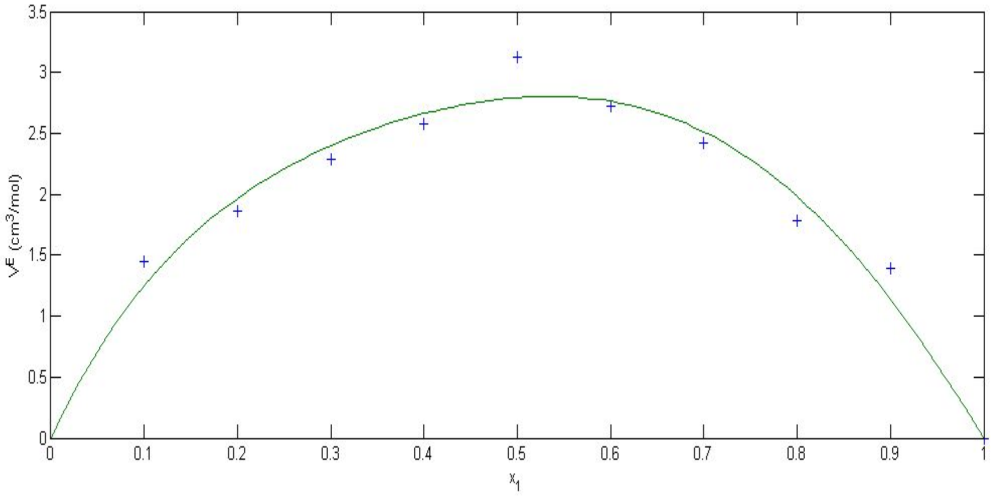


Figure S29: Excess molar volume for DES_1 (ChCl-Gly) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 323.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

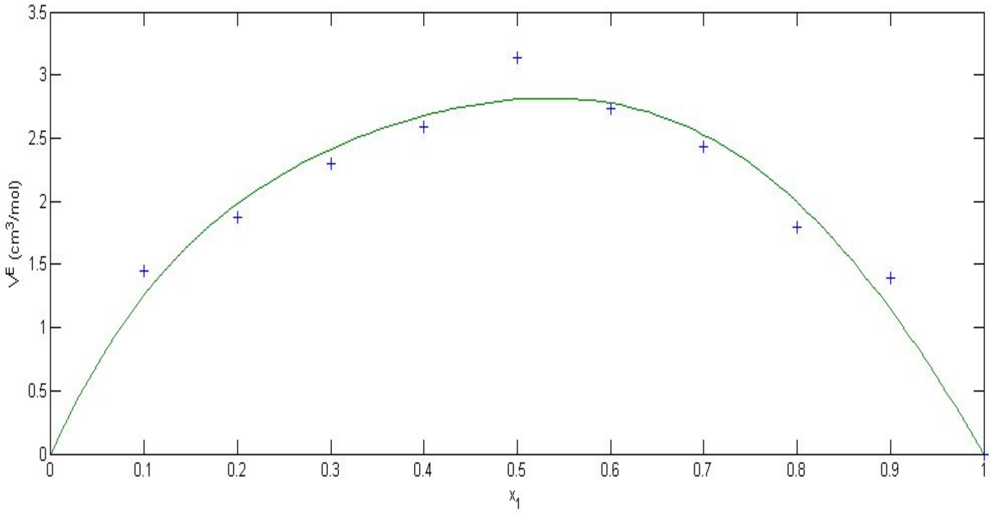


Figure S30: Excess molar volume for DES_1 (ChCl-Gly) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 328.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

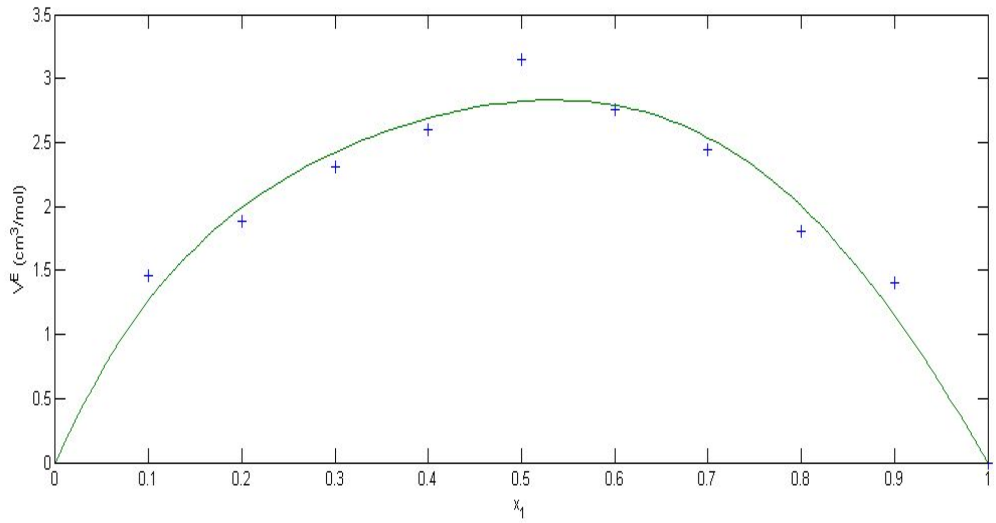


Figure S31: Excess molar volume for DES_1 (ChCl-Gly) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 333.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

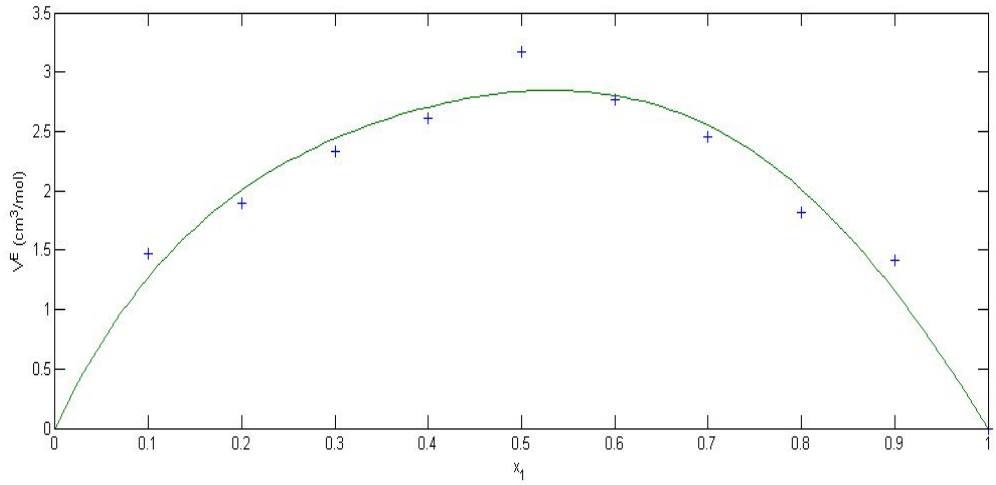


Figure S32: Excess molar volume for DES_1 (ChCl-Gly) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 338.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

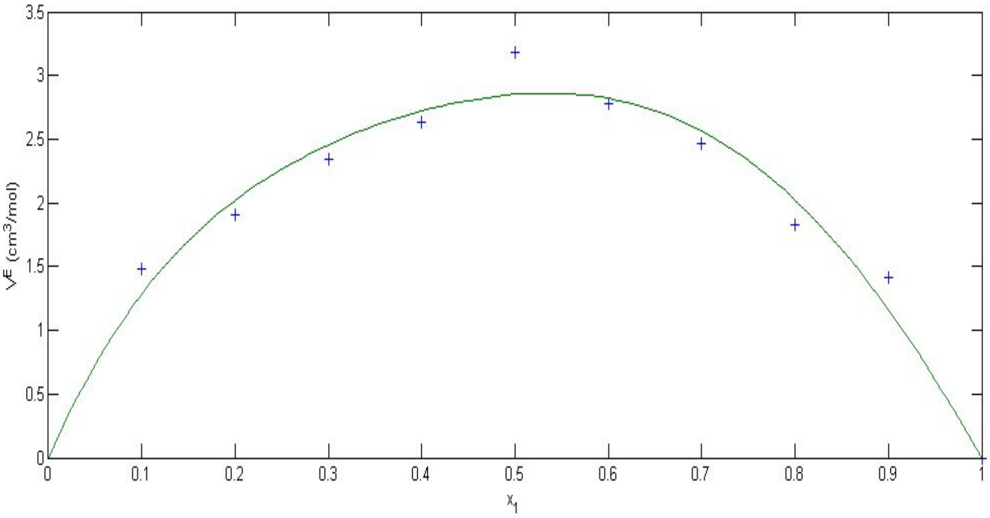


Figure S33: Excess molar volume for DES_1 (ChCl-Gly) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 343.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

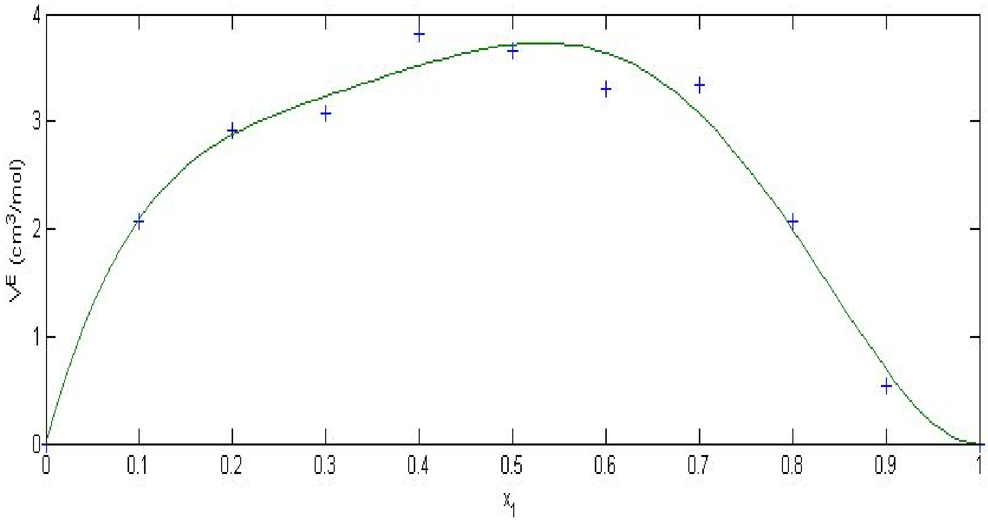


Figure S34: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 293.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

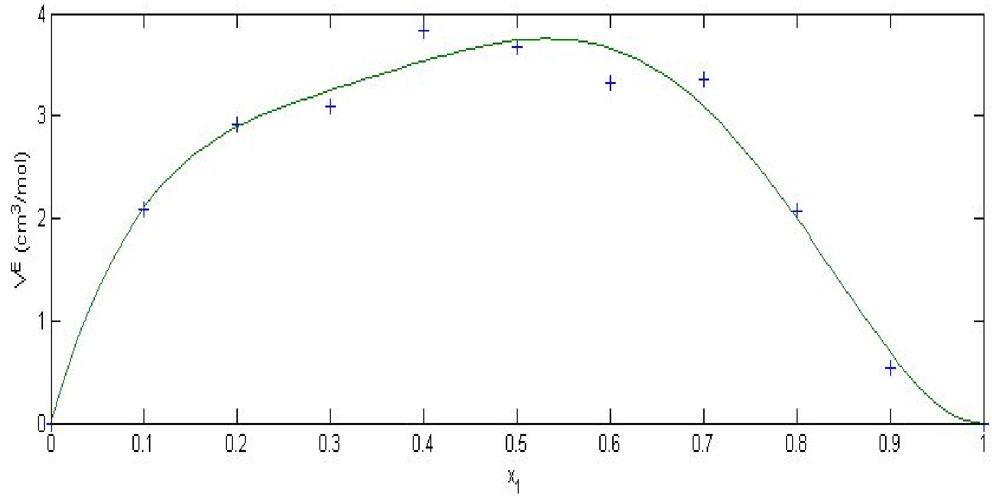


Figure S35: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 298.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

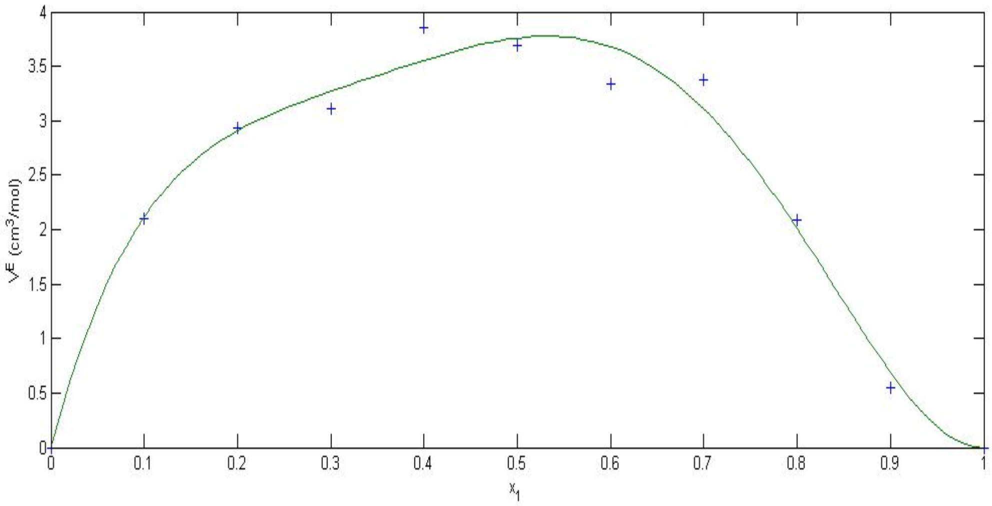


Figure S36: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 303.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

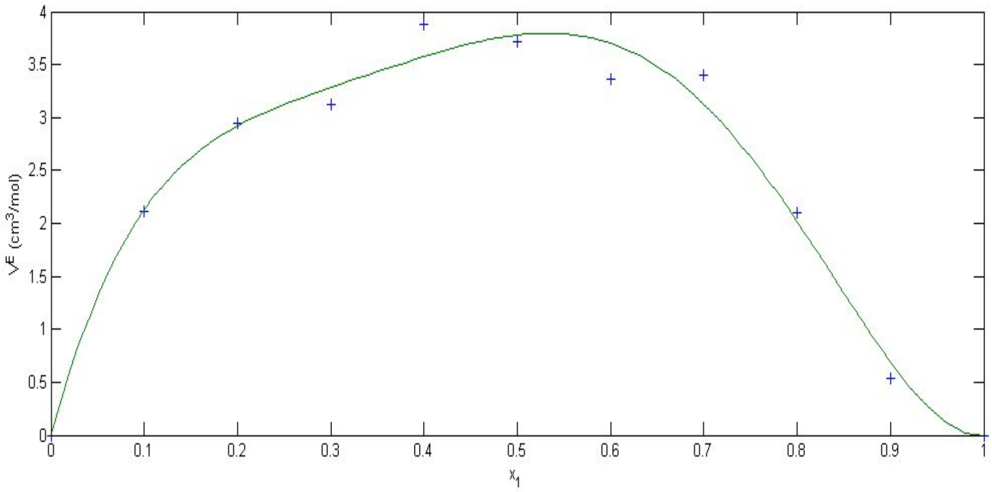


Figure S37: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 308.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

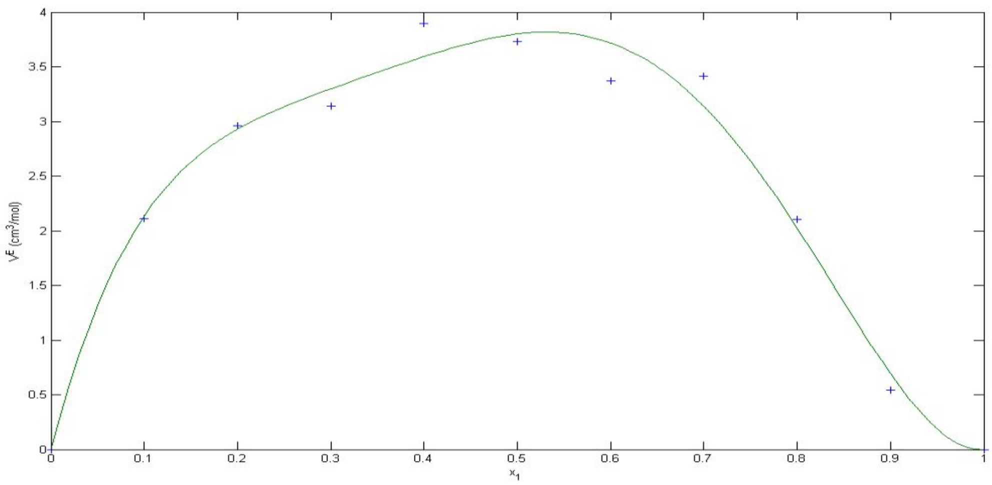


Figure S38: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 313.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

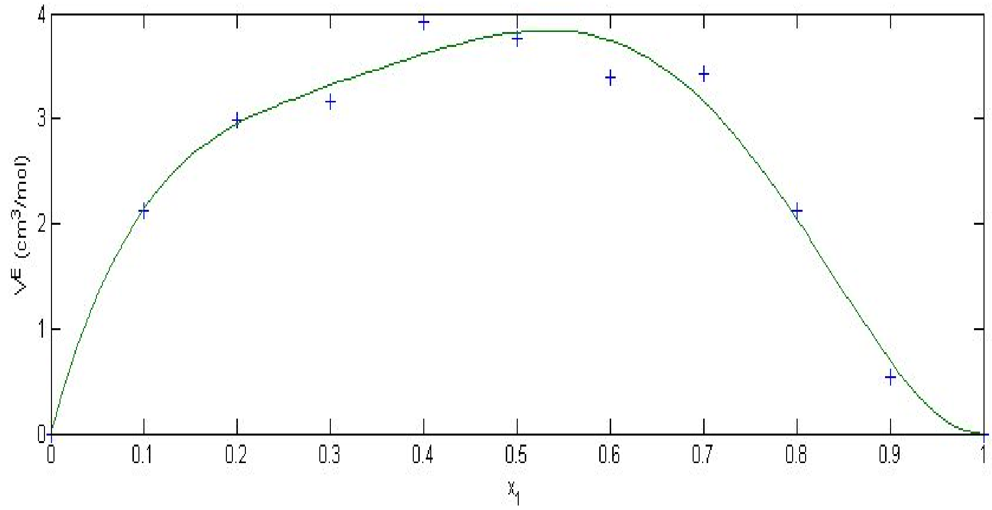


Figure S39: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 318.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

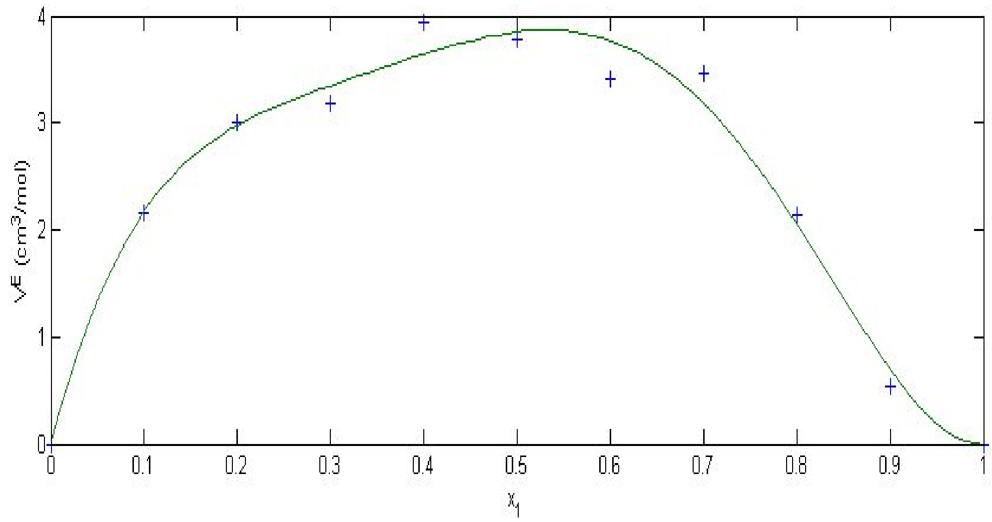


Figure S40: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 323.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

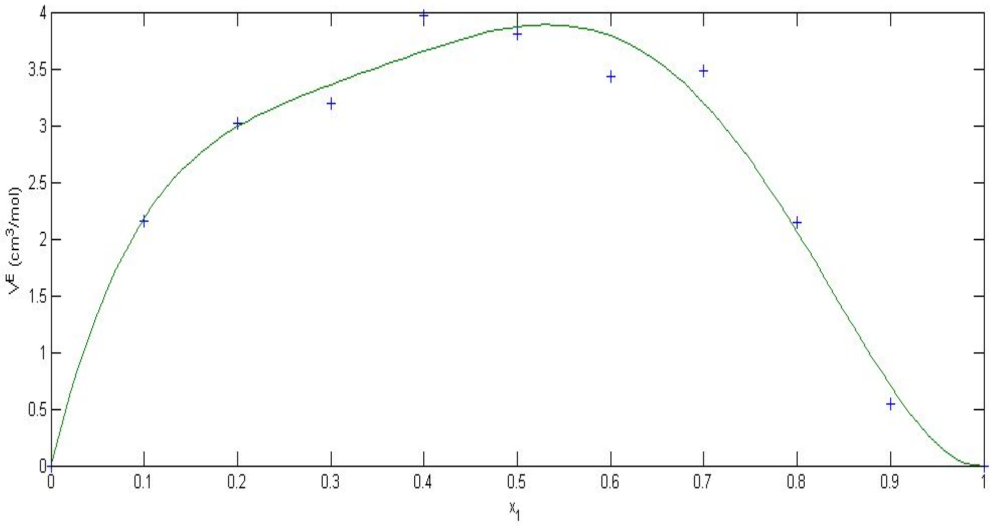


Figure S41: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 328.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

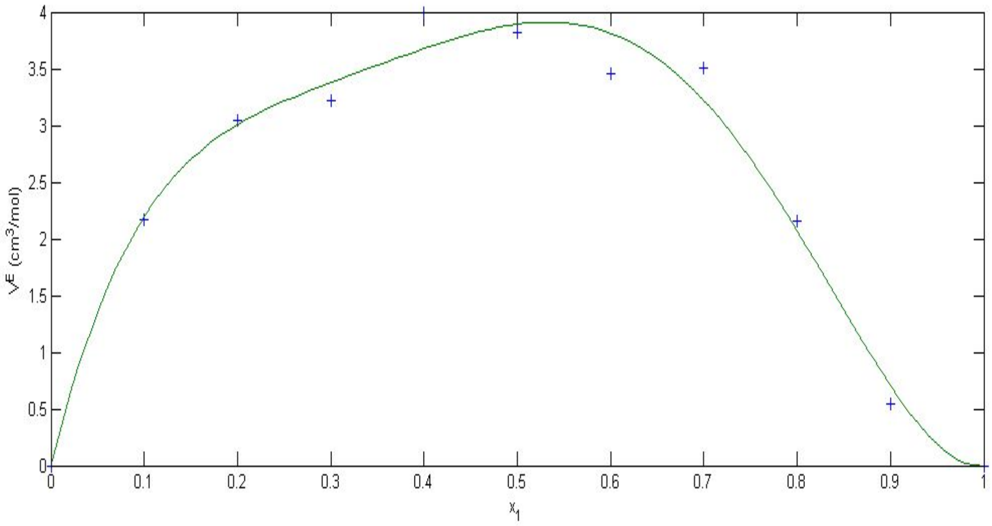


Figure S42: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 333.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

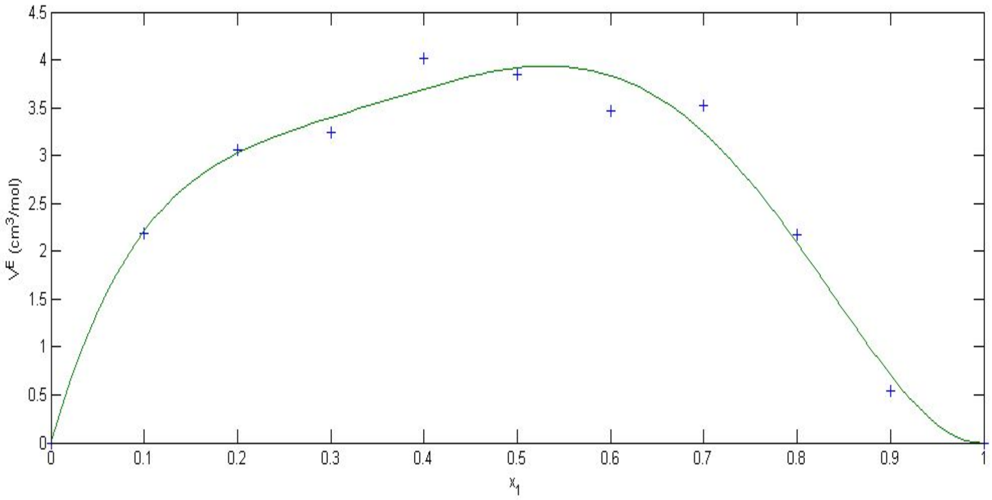


Figure S43: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 338.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

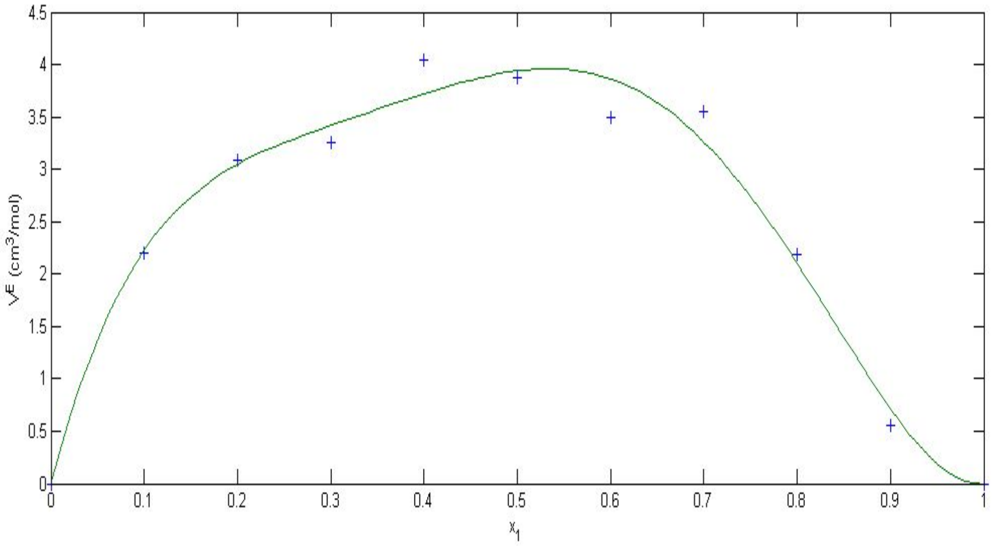
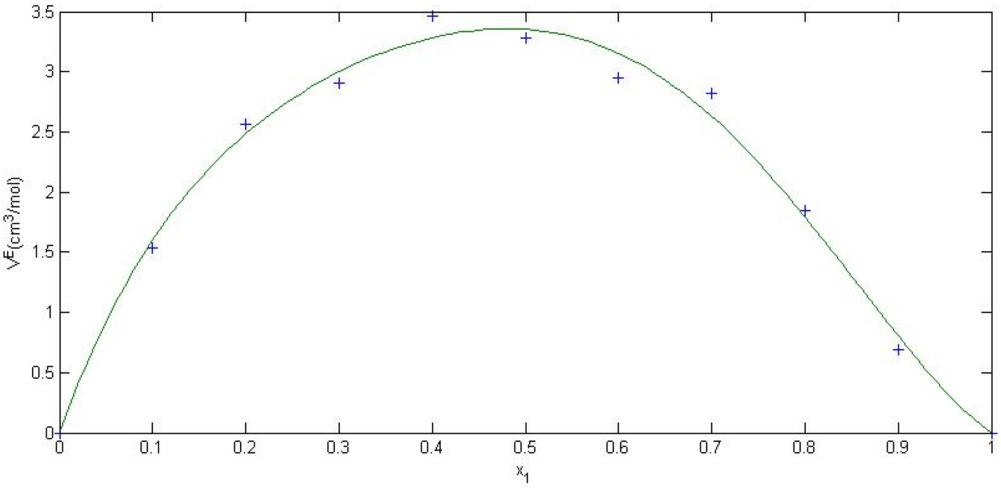


Figure S44: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][HSO_4] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 343.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.



FigureS45: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][$EtSO_4$] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 293.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

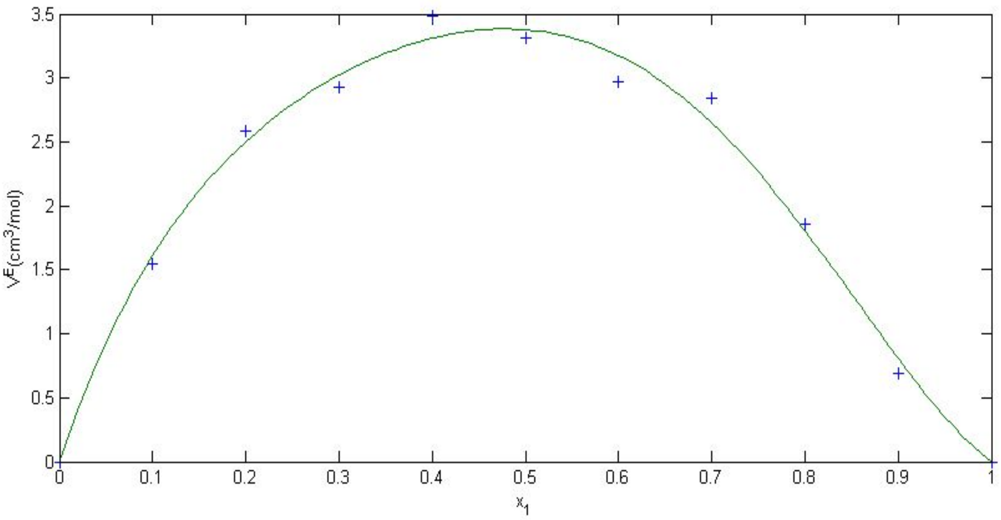


Figure S46: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][$EtSO_4$] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 298.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

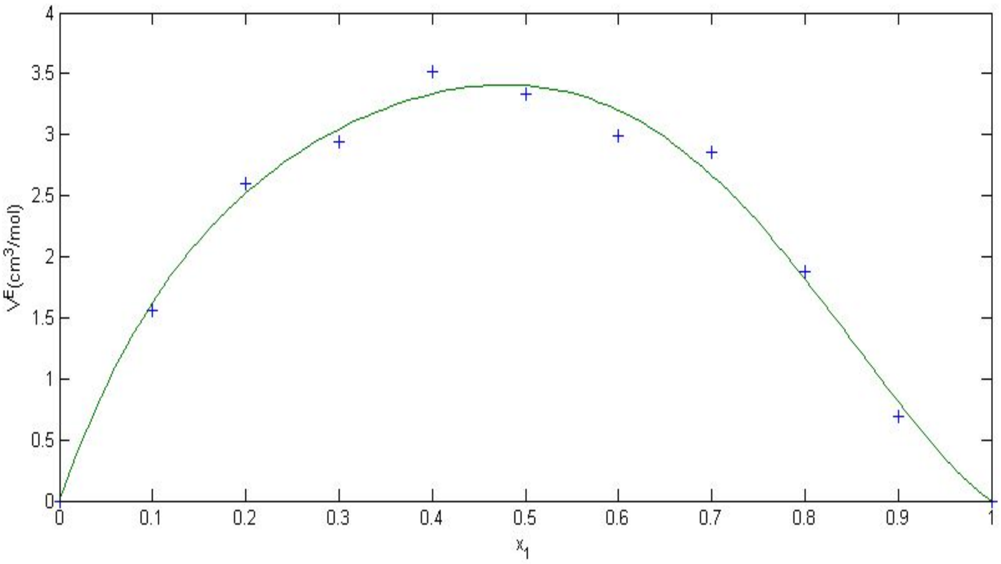


Figure S47: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][$EtSO_4$] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 303.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

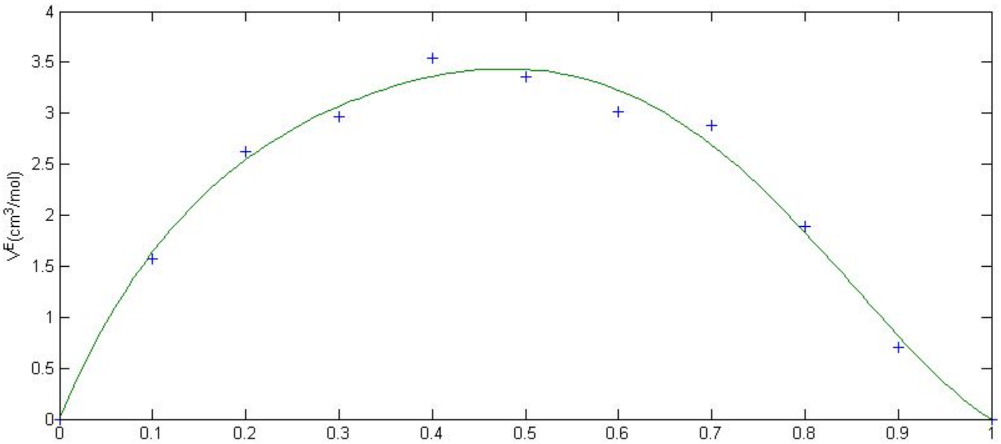


Figure S48: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][$EtSO_4$] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 308.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

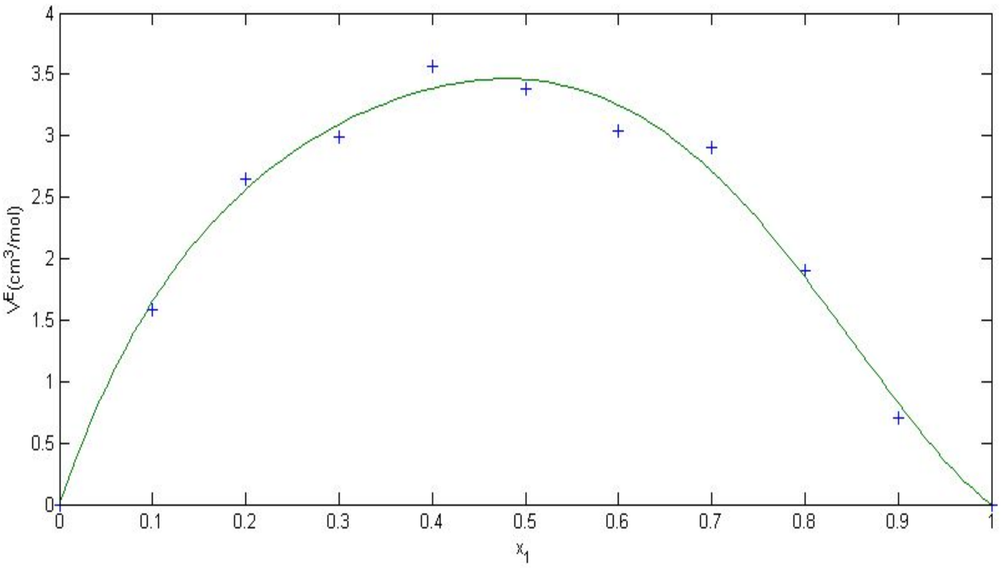


Figure S49: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][$EtSO_4$] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 313.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

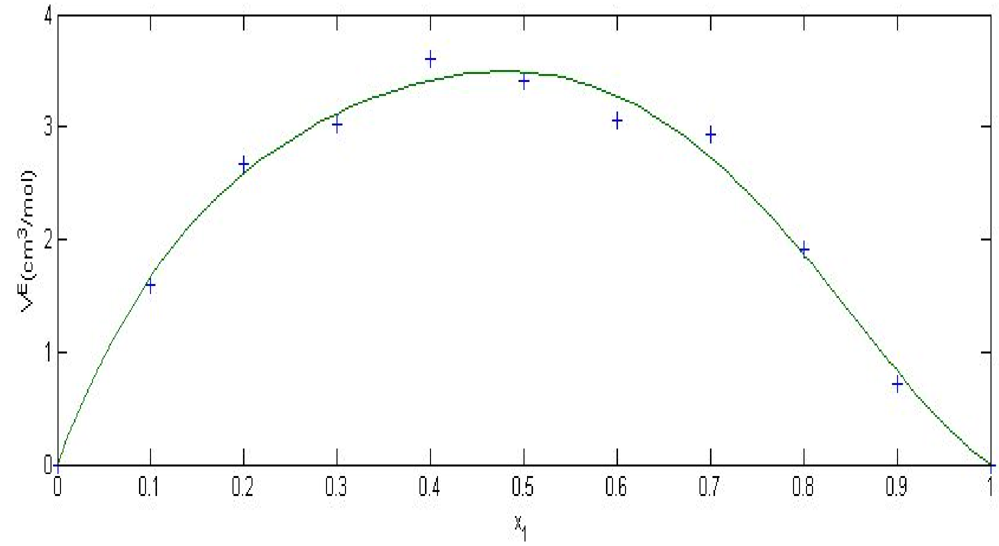


Figure S50: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][$EtSO_4$] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 318.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

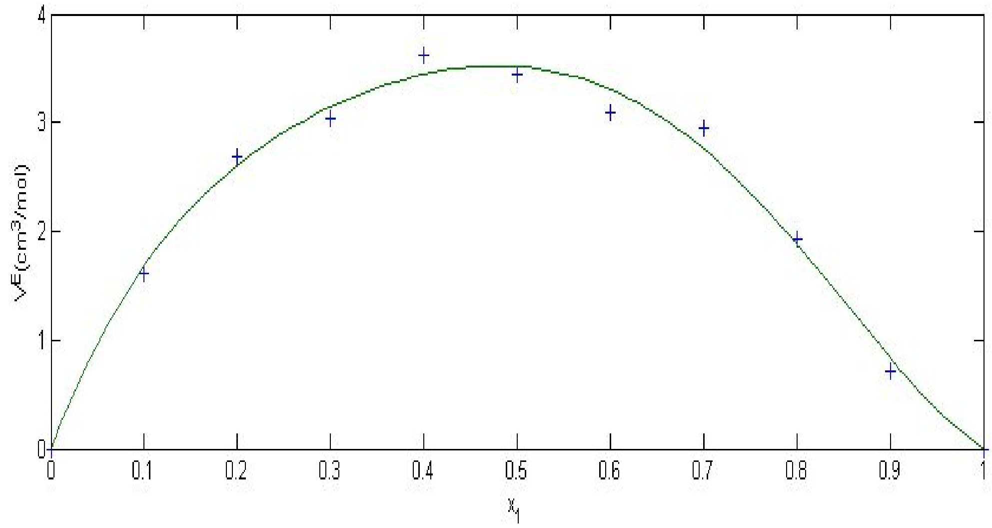


Figure S51: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][$EtSO_4$] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 323.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

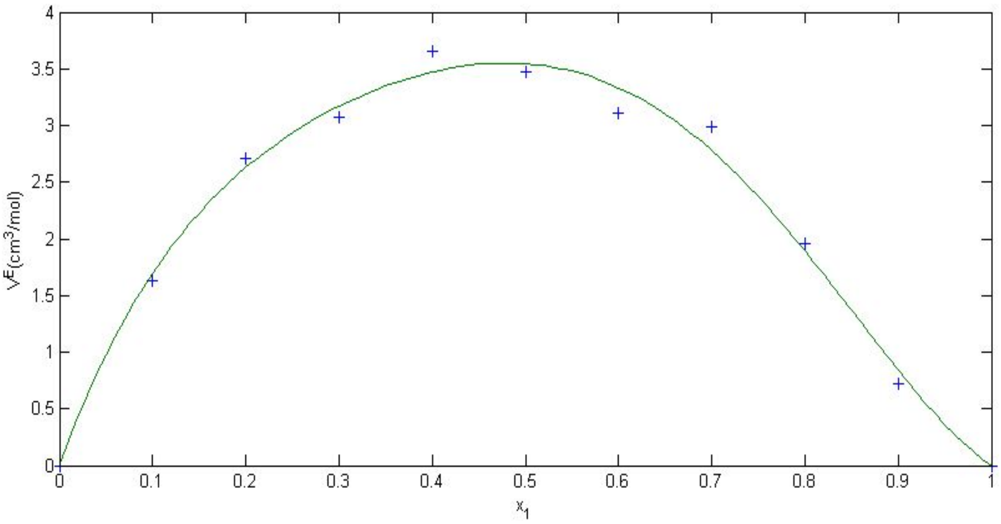


Figure S52: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][$EtSO_4$] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 328.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

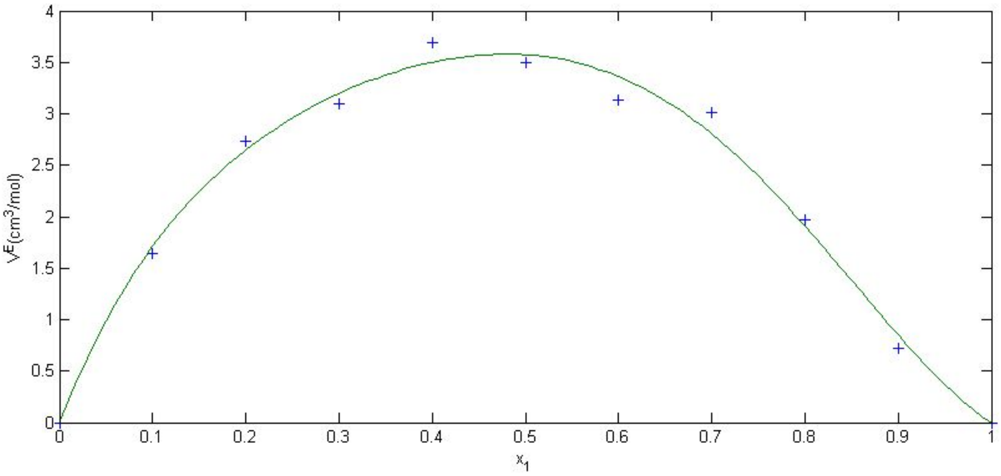


Figure S53: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][$EtSO_4$] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 333.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

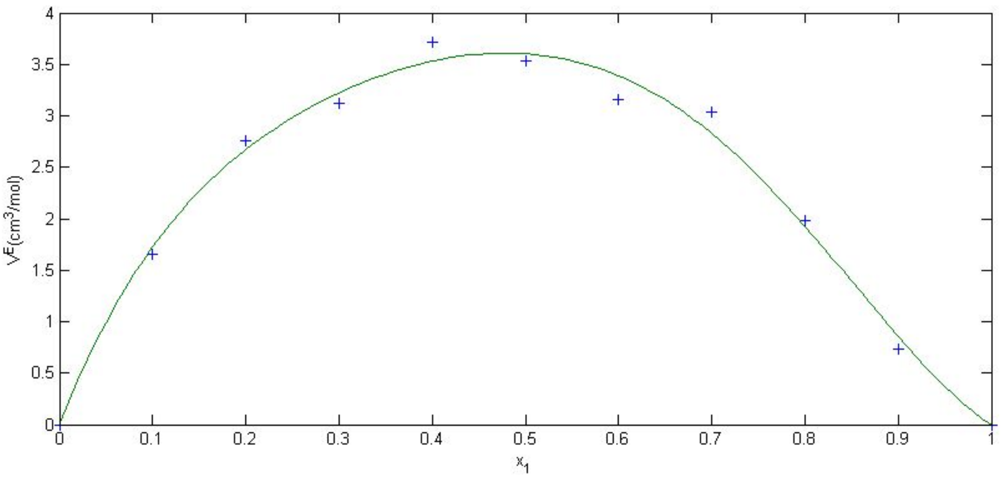


Figure S54: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][$EtSO_4$] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 338.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

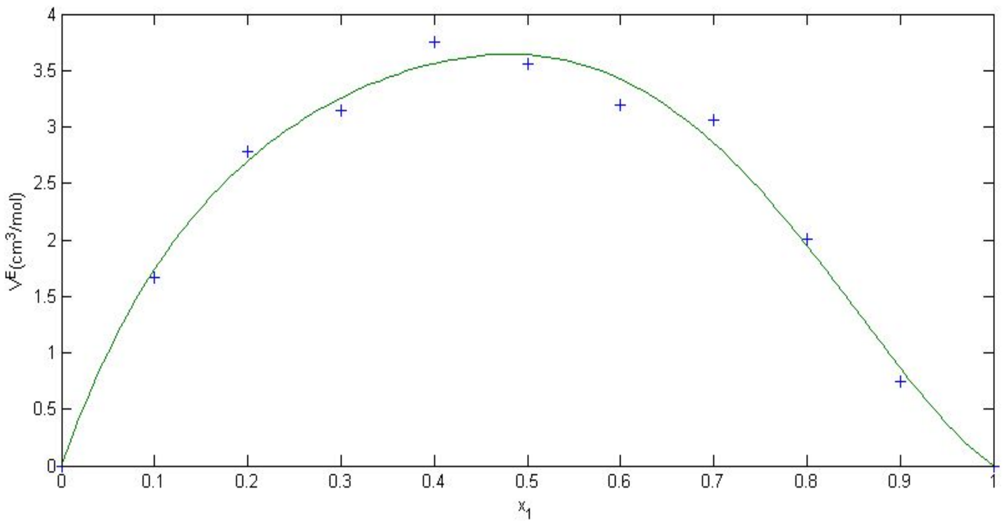


Figure S55: Excess molar volume for DES_2 (ChCl-Acetic acid) + [EMIM][$EtSO_4$] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 343.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

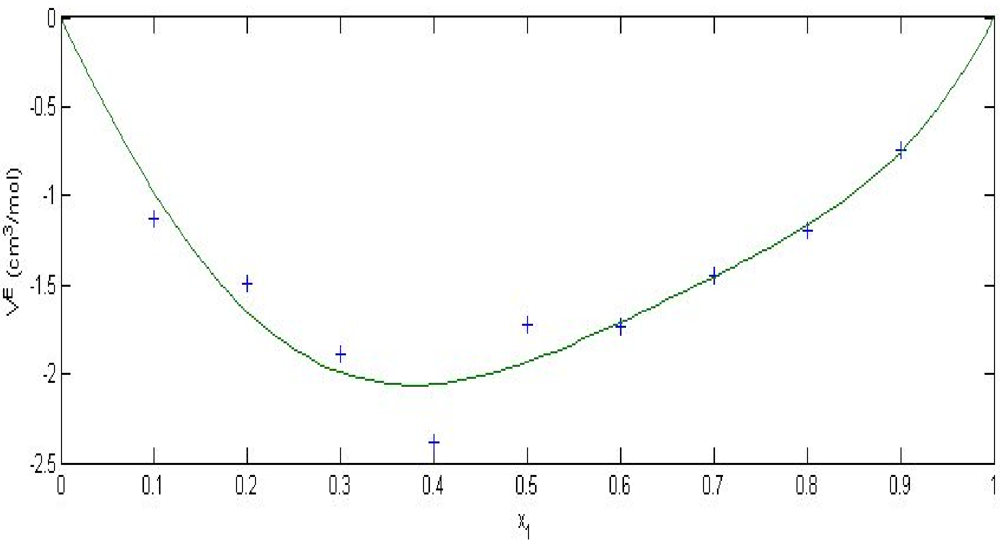


Figure S56: Excess molar volume for DES_2 (ChCl-Acetic acid) + [BMIM][OAc] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 293.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

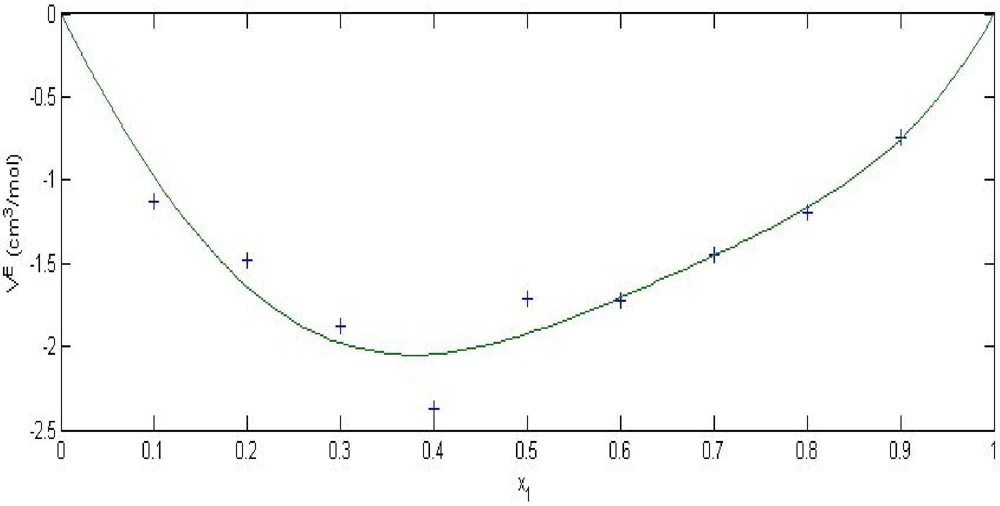


Figure S57: Excess molar volume for DES_2 (ChCl-Acetic acid) + [BMIM][OAc] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 298.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

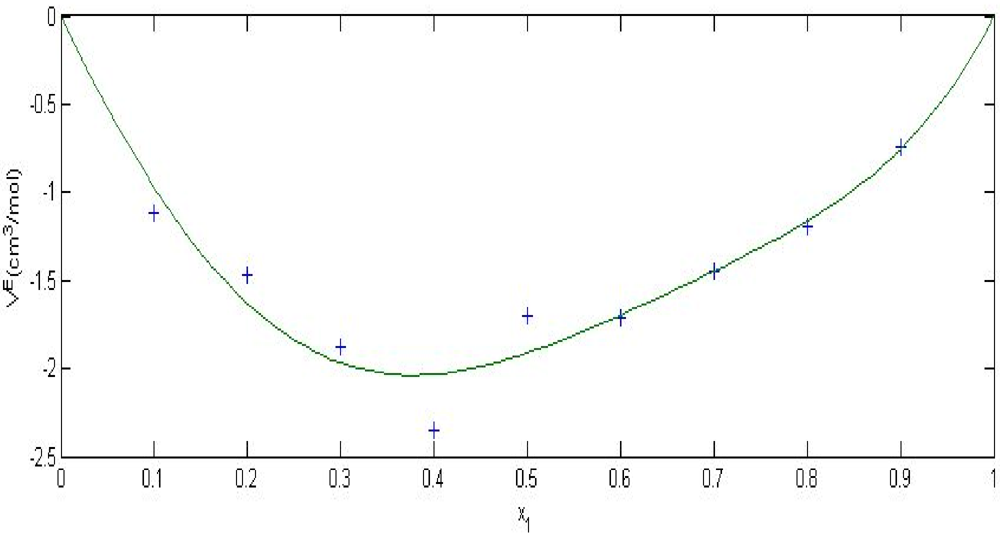


Figure S58: Excess molar volume for DES_2 (ChCl-Acetic acid) + [BMIM][OAc] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 303.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

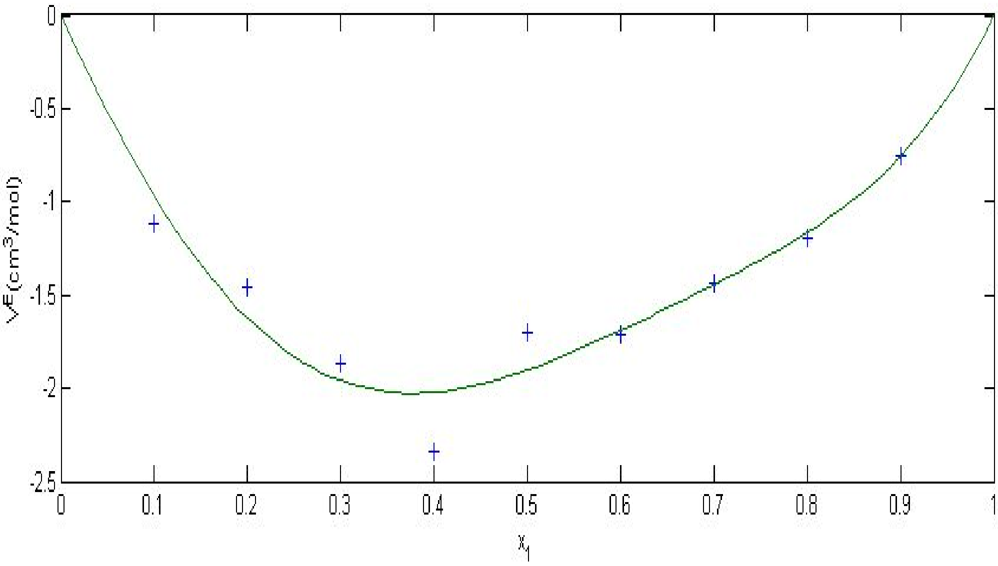


Figure S59: Excess molar volume for DES_2 (ChCl-Acetic acid) + [BMIM][OAc] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 308.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

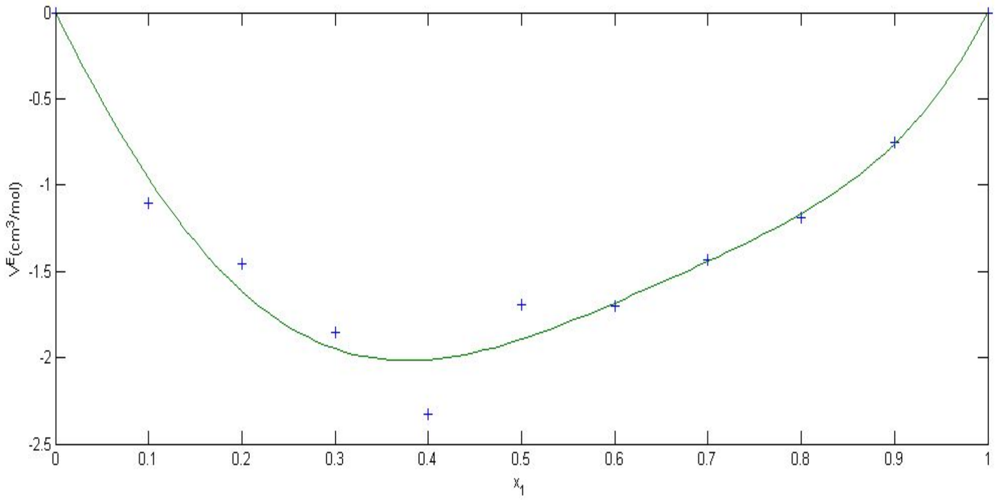


Figure S60: Excess molar volume for DES_2 (ChCl-Acetic acid) + [BMIM][OAc] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 313.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

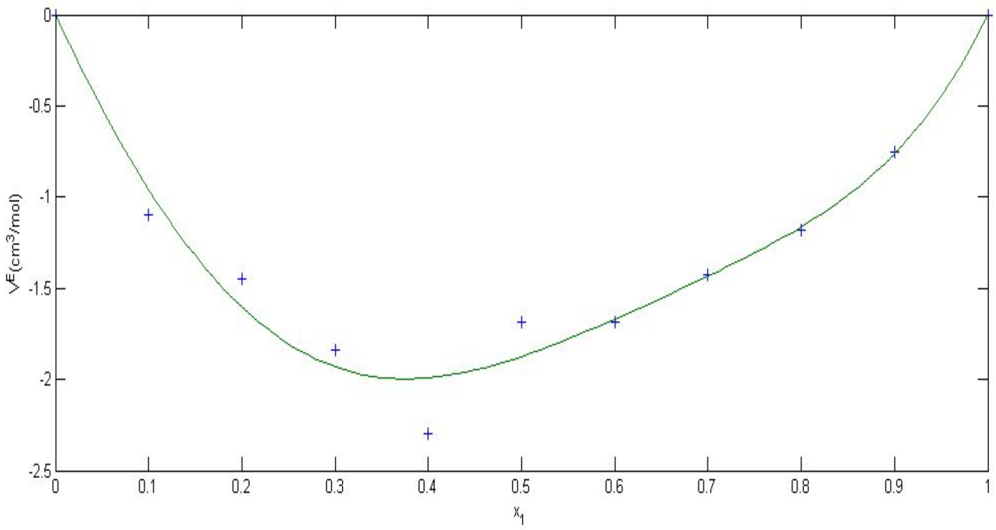


Figure S61: Excess molar volume for DES_2 (ChCl-Acetic acid) + [BMIM][OAc] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 318.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

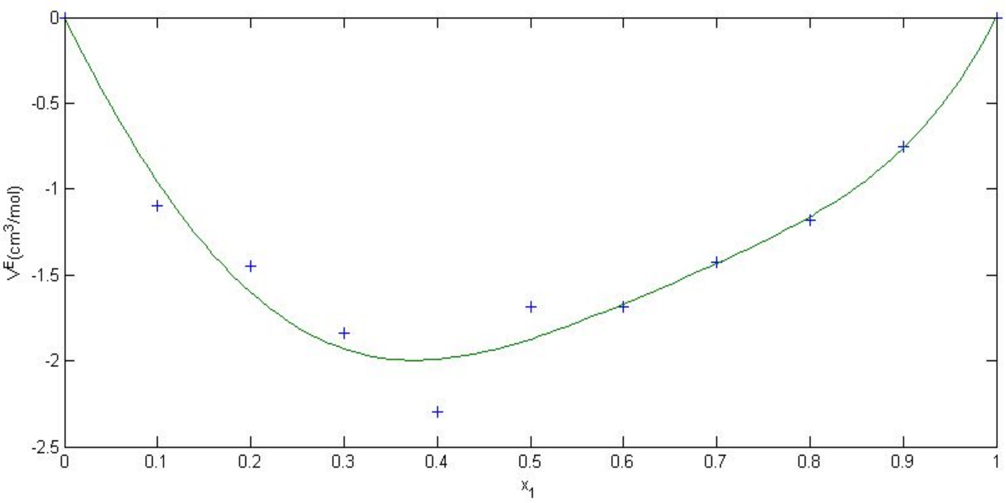


Figure S62: Excess molar volume for DES_2 (ChCl-Acetic acid) + [BMIM][OAc] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 323.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

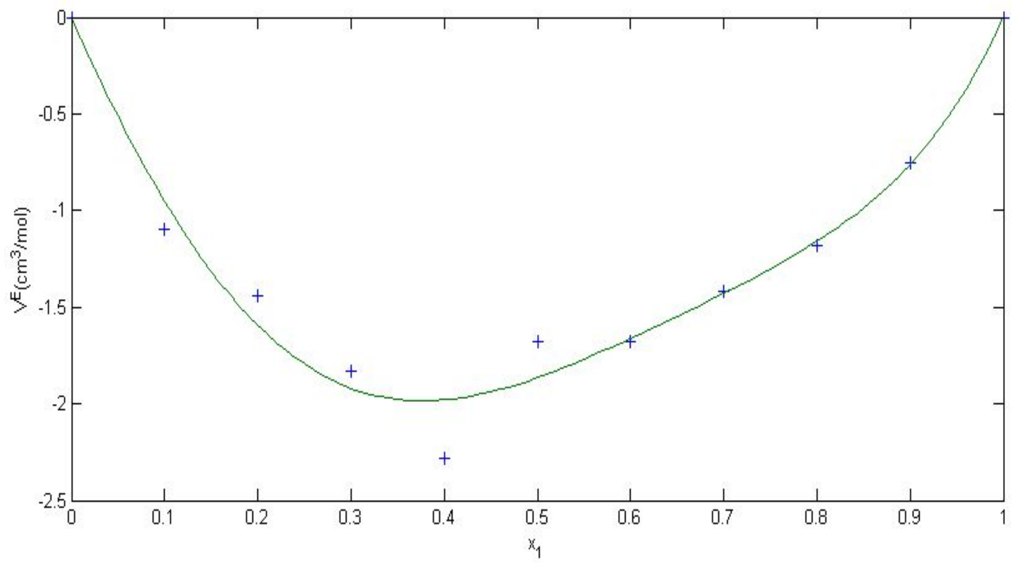


Figure S63: Excess molar volume for DES_2 (ChCl-Acetic acid) + [BMIM][OAc] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 328.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

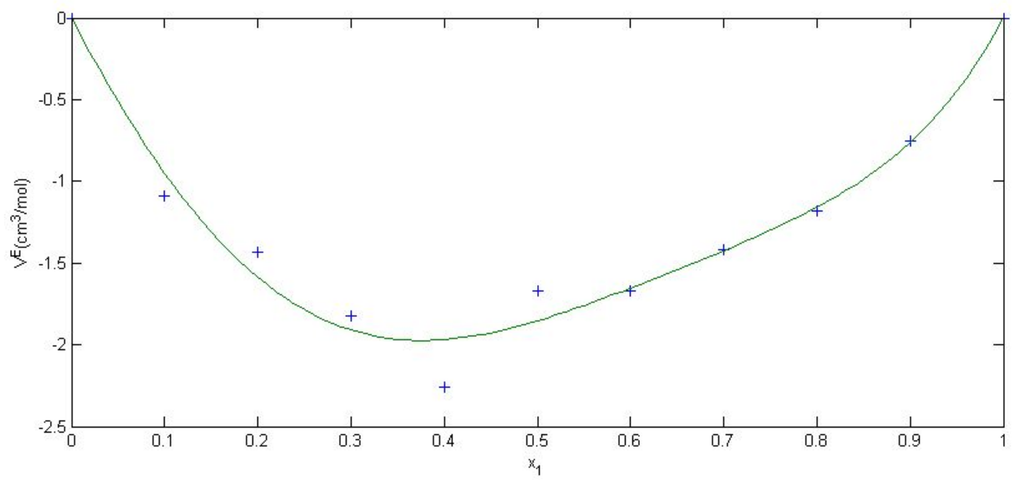


Figure S64: Excess molar volume for DES_2 (ChCl-Acetic acid) + [BMIM][OAc] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 333.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

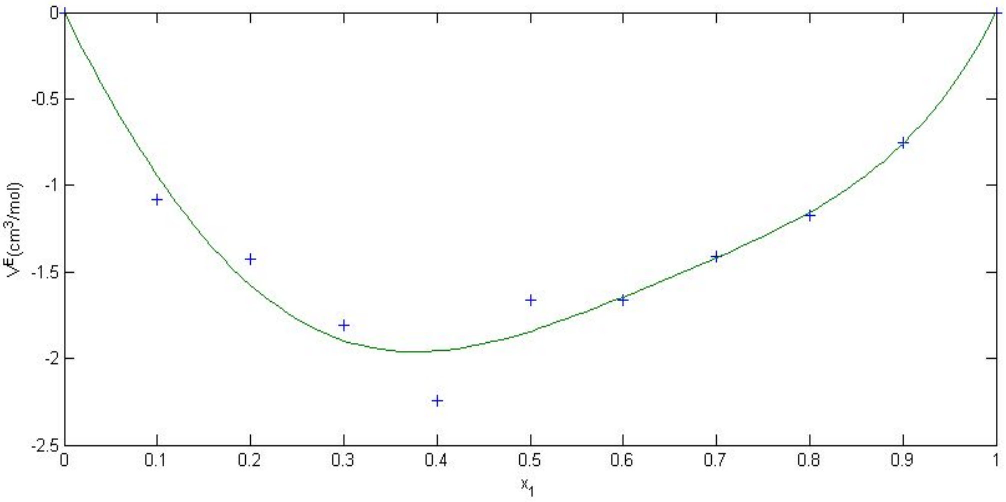


Figure S65: Excess molar volume for DES_2 (ChCl-Acetic acid) + [BMIM][OAc] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 338.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

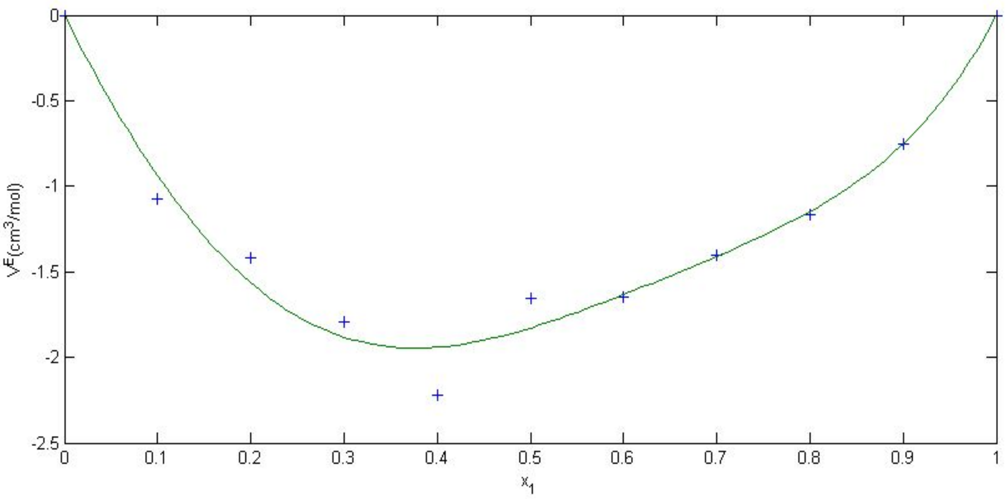


Figure S66: Excess molar volume for DES_2 (ChCl-Acetic acid) + [BMIM][OAc] with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 343.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

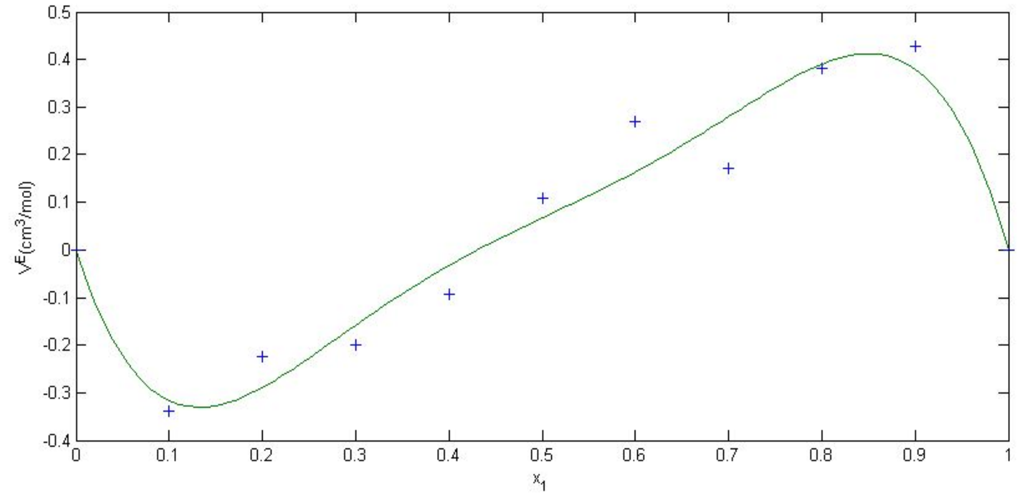


Figure S67: Excess molar volume for DES_1 (ChCl-Gly) + DES_2 (ChCl-Acetic acid) with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 293.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

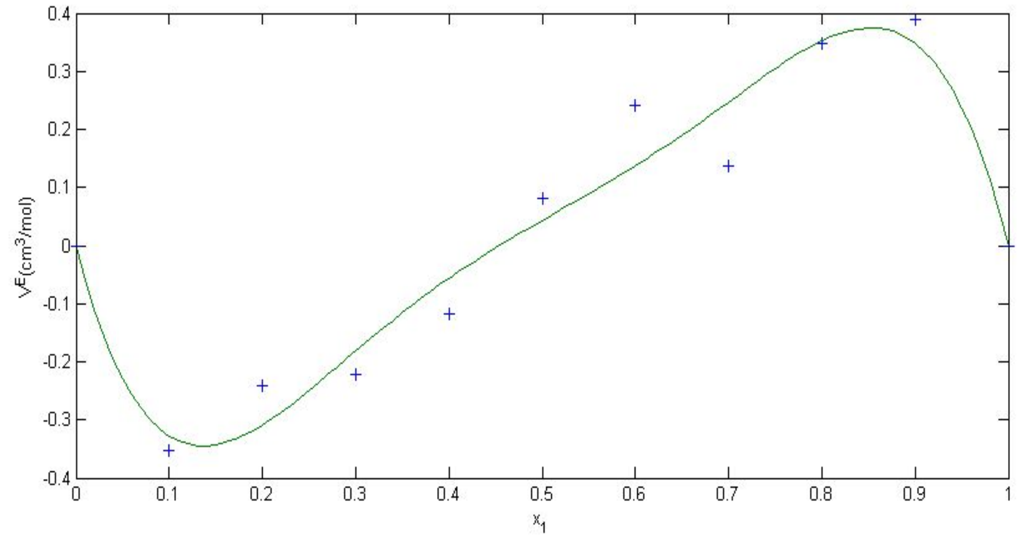


Figure S68: Excess molar volume for DES_1 (ChCl-Gly) + DES_2 (ChCl-Acetic acid) with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 298.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

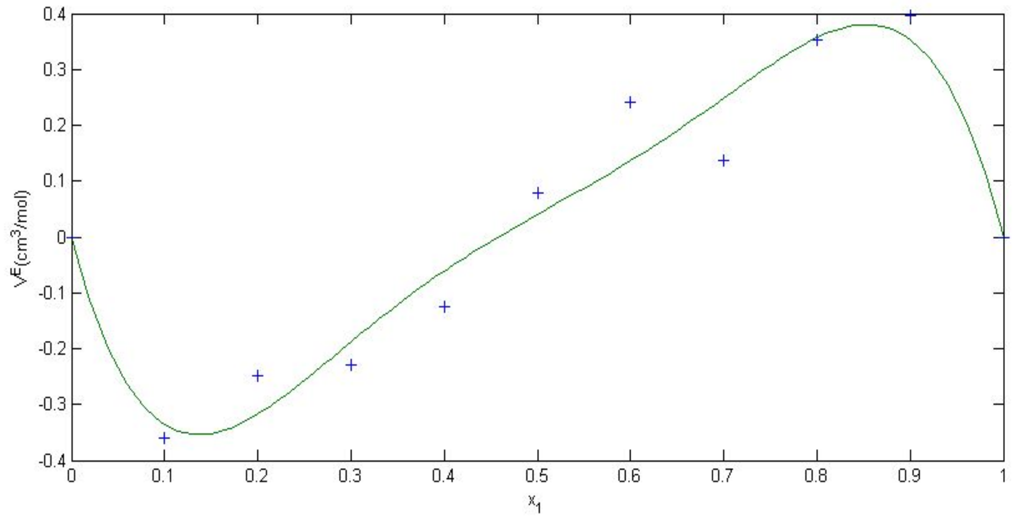


Figure S69: Excess molar volume for DES_1 (ChCl-Gly) + DES_2 (ChCl-Acetic acid) with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 303.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

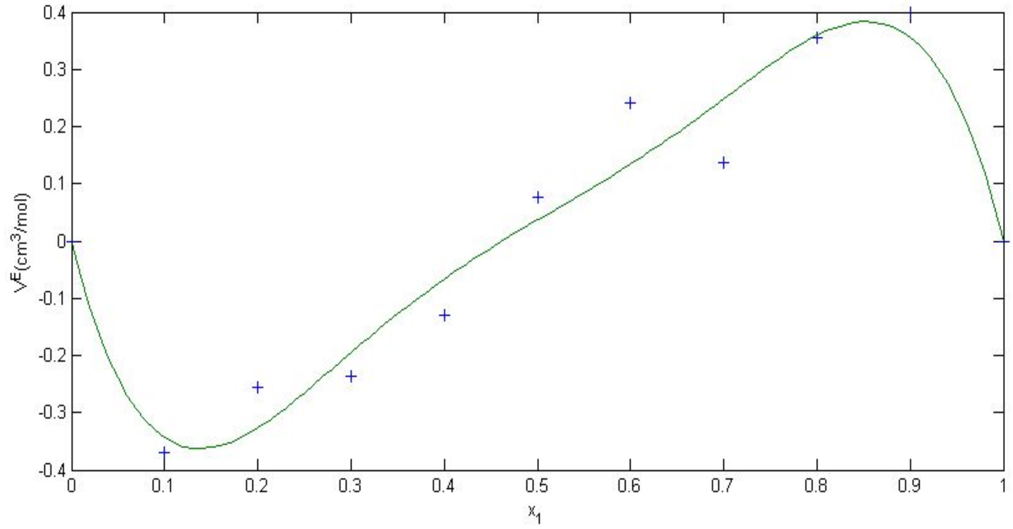


Figure S70: Excess molar volume for DES_1 (ChCl-Gly) + DES_2 (ChCl-Acetic acid) with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 308.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

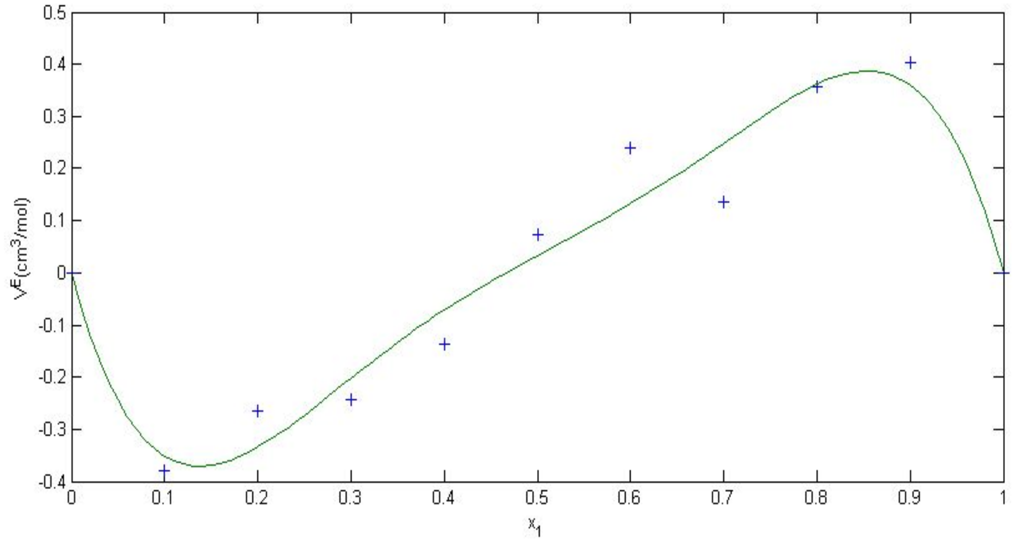


Figure S71: Excess molar volume for DES_1 (ChCl-Gly) + DES_2 (ChCl-Acetic acid) with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 313.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

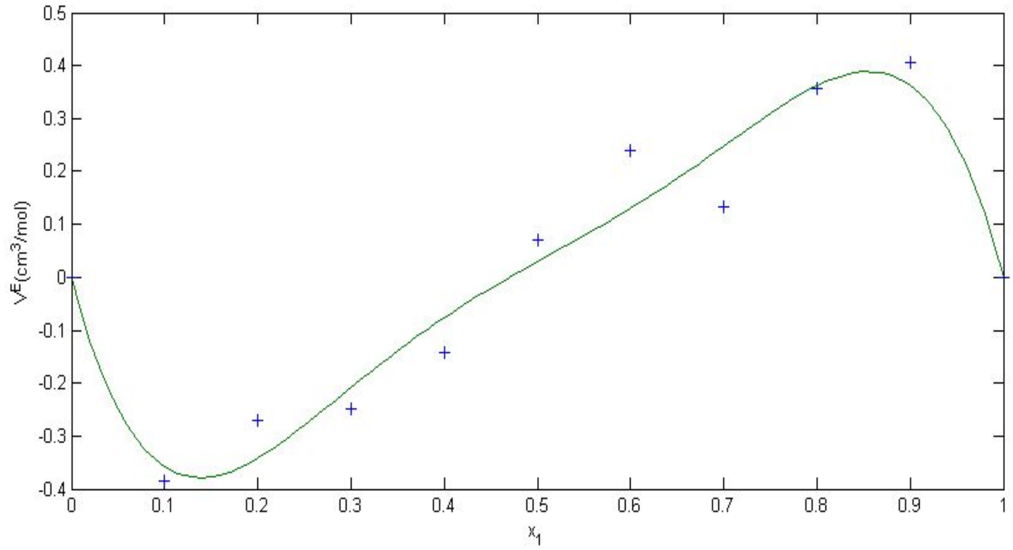


Figure S72: Excess molar volume for DES_1 (ChCl-Gly) + DES_2 (ChCl-Acetic acid) with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 318.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

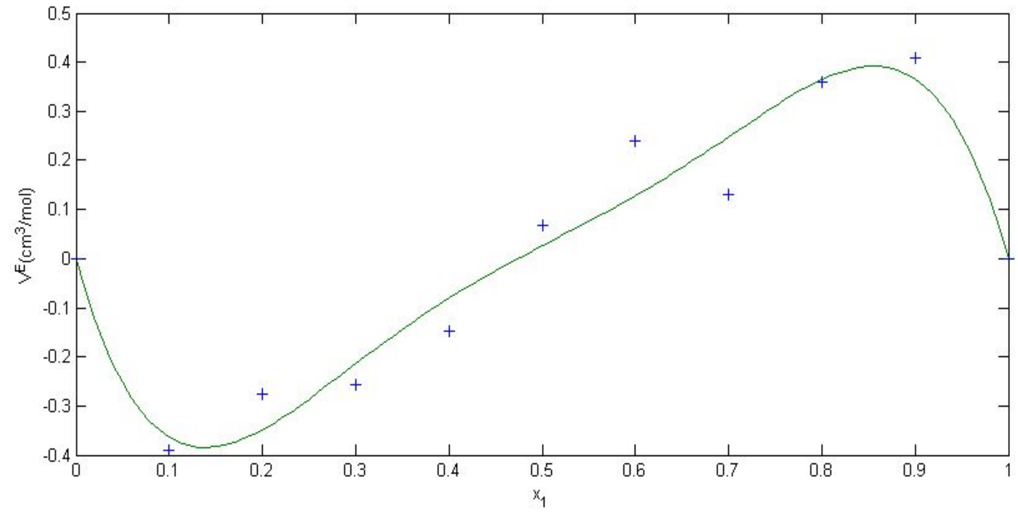


Figure S73: Excess molar volume for DES_1 (ChCl-Gly) + DES_2 (ChCl-Acetic acid) with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 323.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

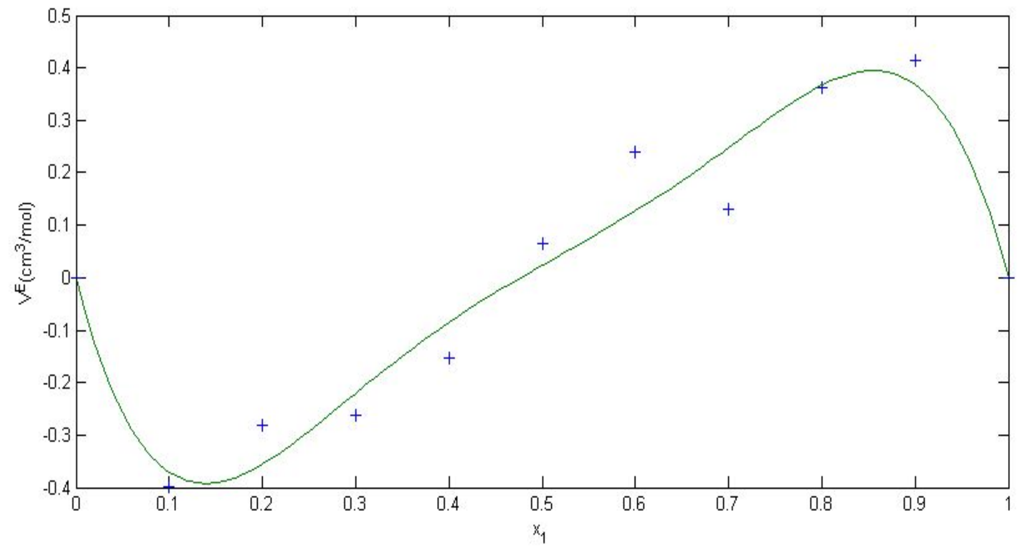


Figure S74: Excess molar volume for DES_1 (ChCl-Gly) + DES_2 (ChCl-Acetic acid) with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 328.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

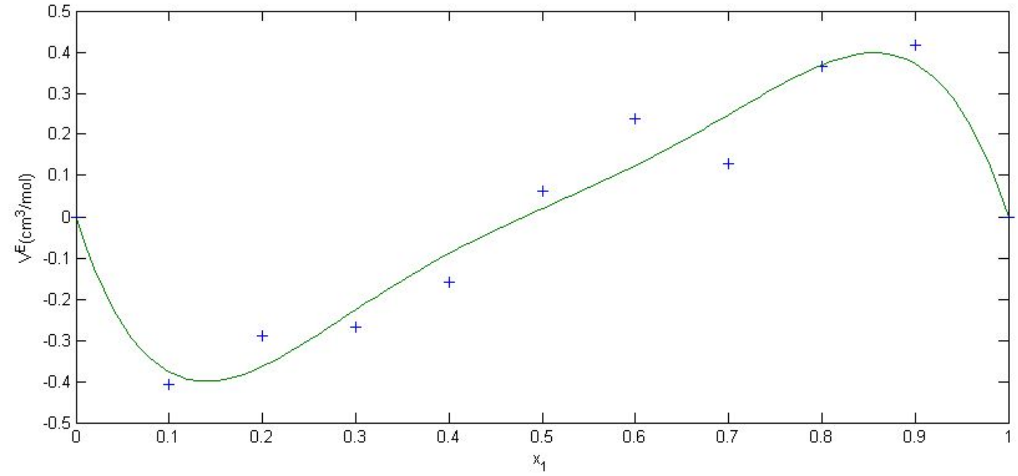


Figure S75: Excess molar volume for DES_1 (ChCl-Gly) + DES_2 (ChCl-Acetic acid) with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 333.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

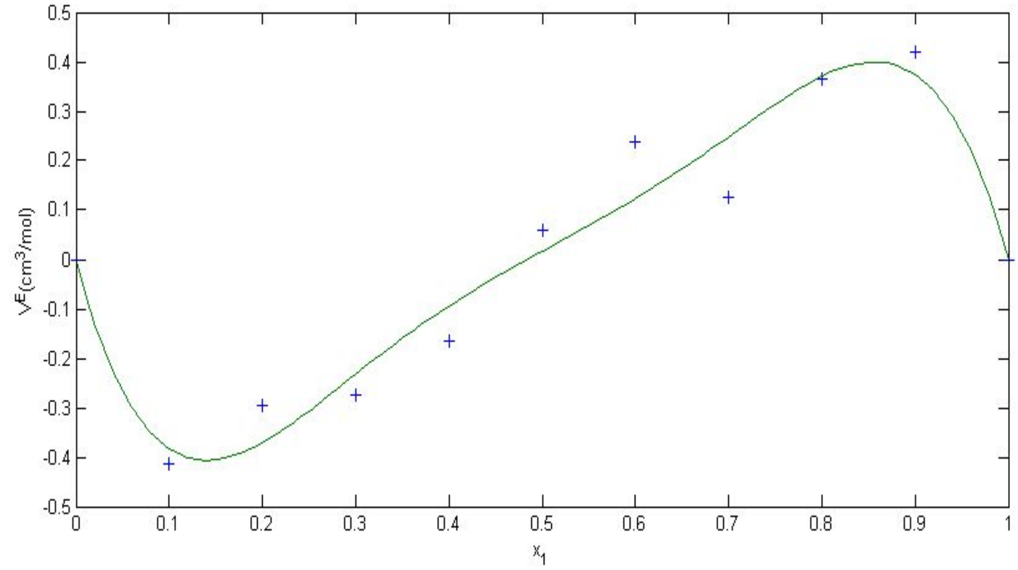


Figure S76: Excess molar volume for DES_1 (ChCl-Gly) + DES_2 (ChCl-Acetic acid) with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 338.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

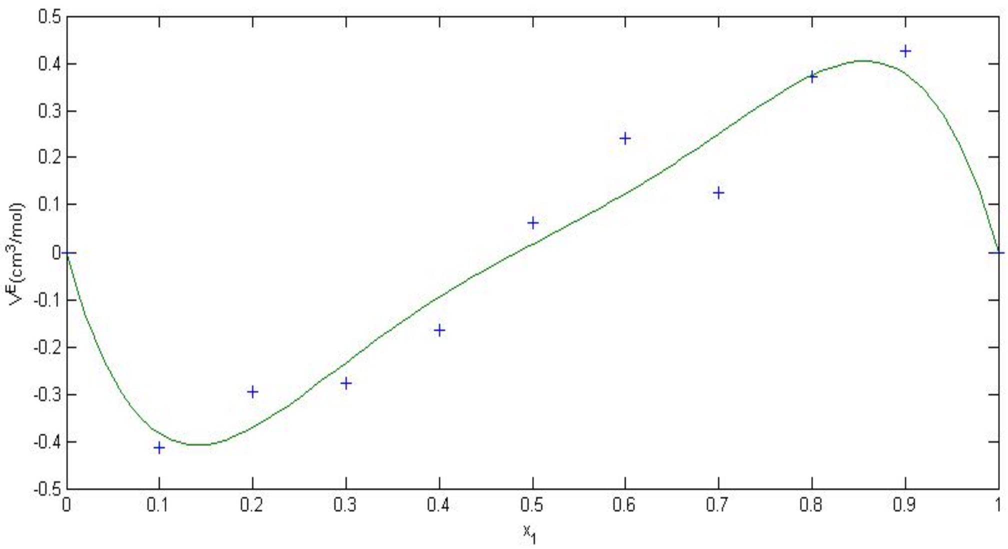


Figure S77: Excess molar volume for DES_1 (ChCl-Gly) + DES_2 (ChCl-Acetic acid) with respect to mole fraction x_1 (n-butyl acetate) from 0 to 1 at temperature 343.15 K. The lines are fitted with Redlich-Kister-type fittings representing four parameters.

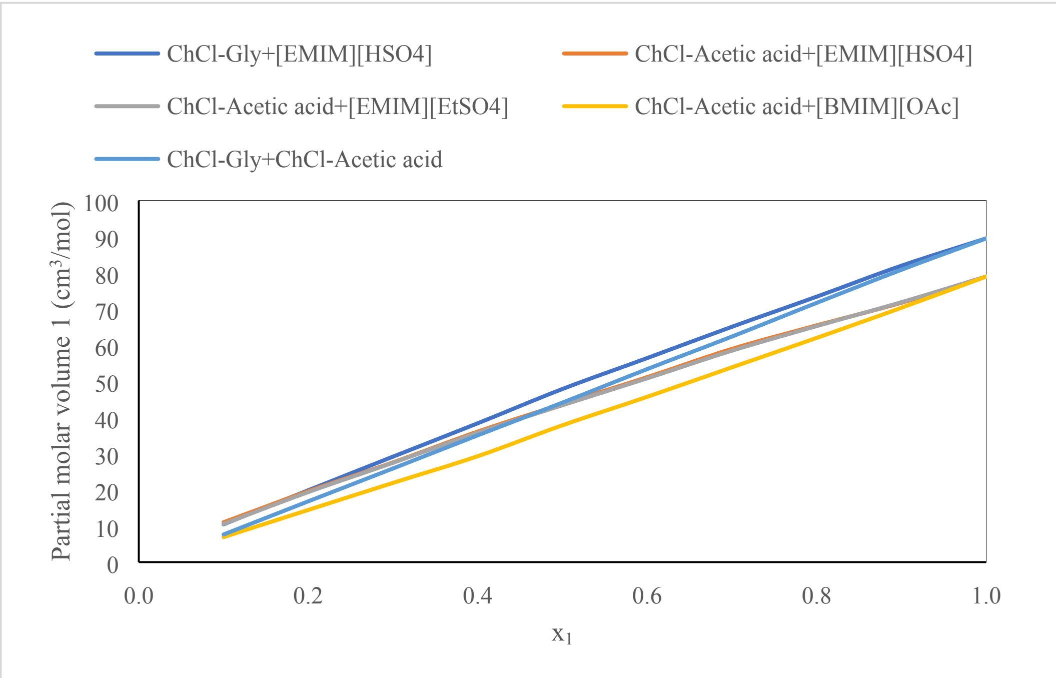


Figure S78: Partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 293.15 K.

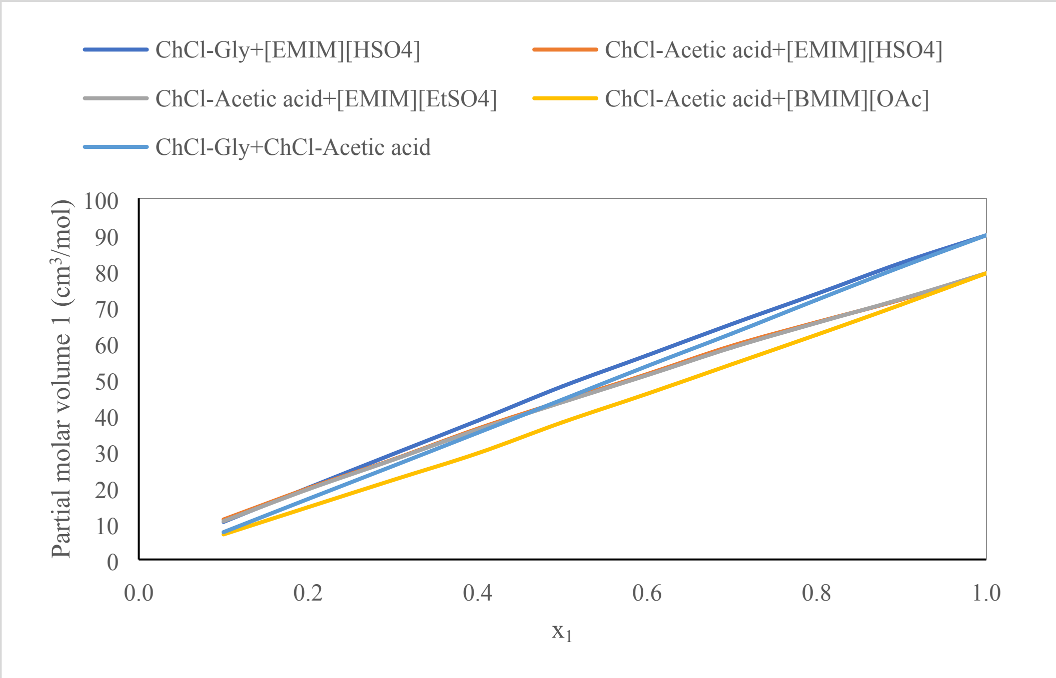


Figure S79: Partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 298.15 K.

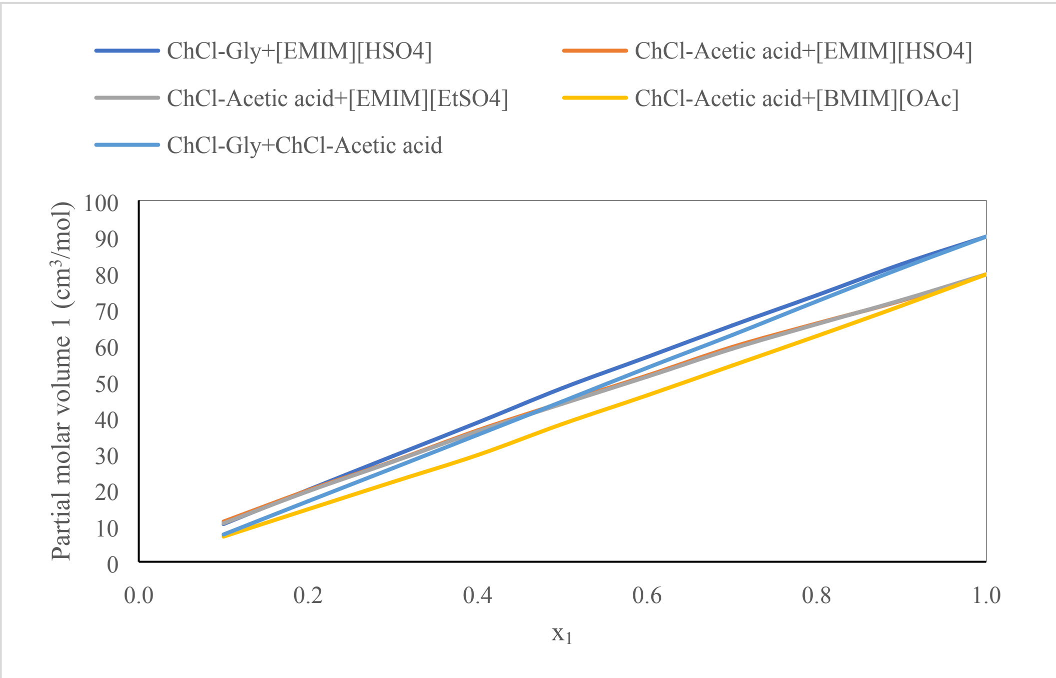


Figure S80: Partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 303.15 K.

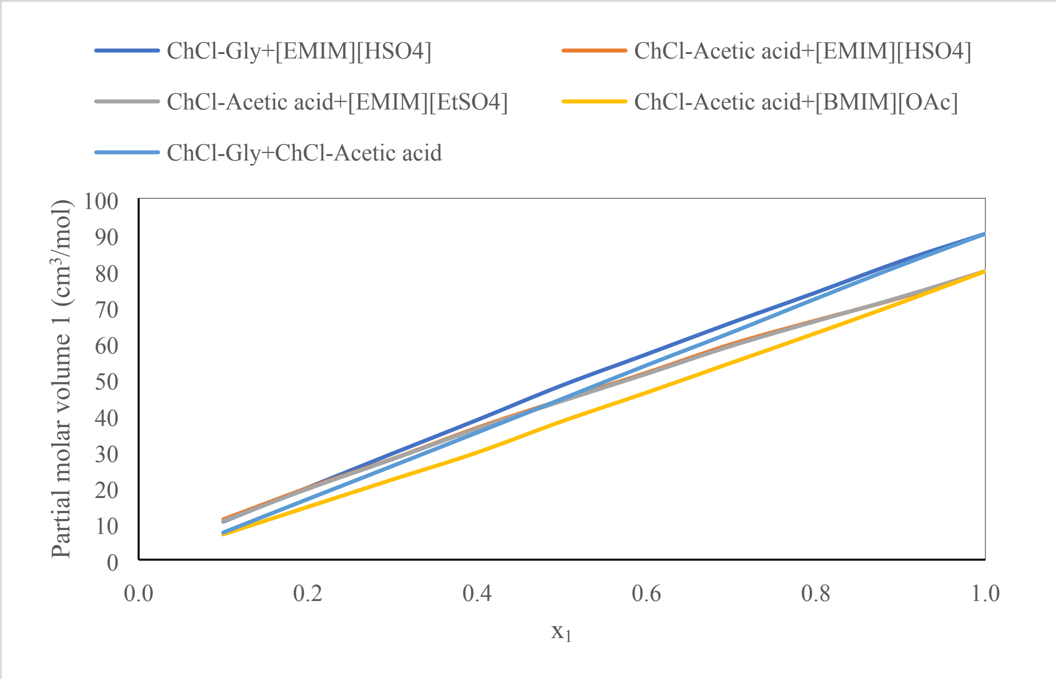


Figure S81: Partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 308.15 K.

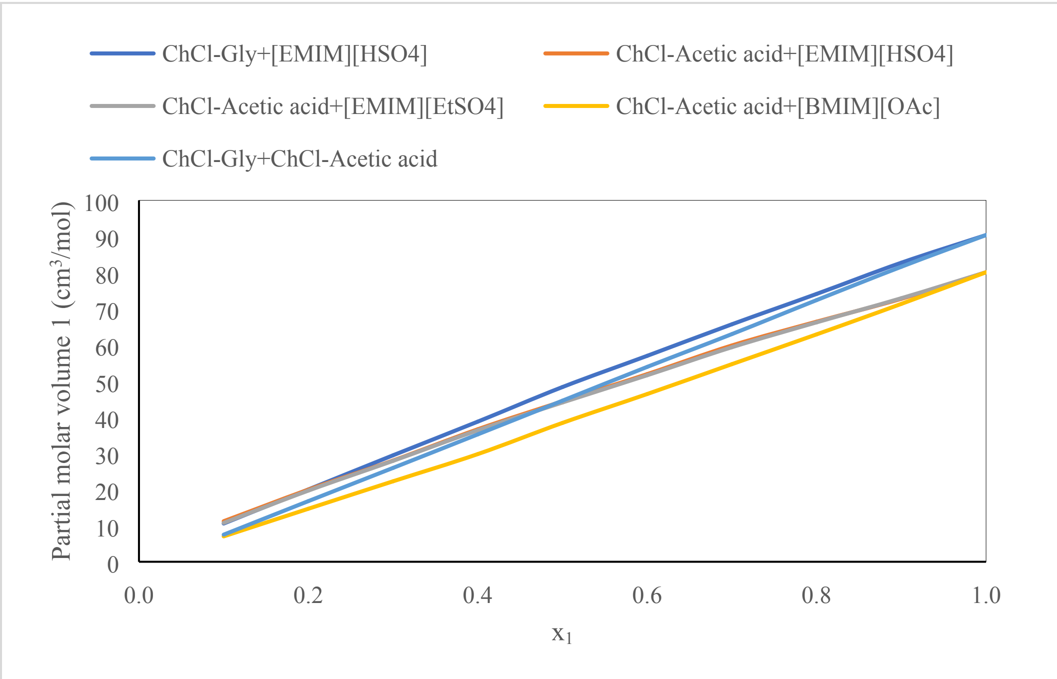


Figure S82: Partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 313.15 K.

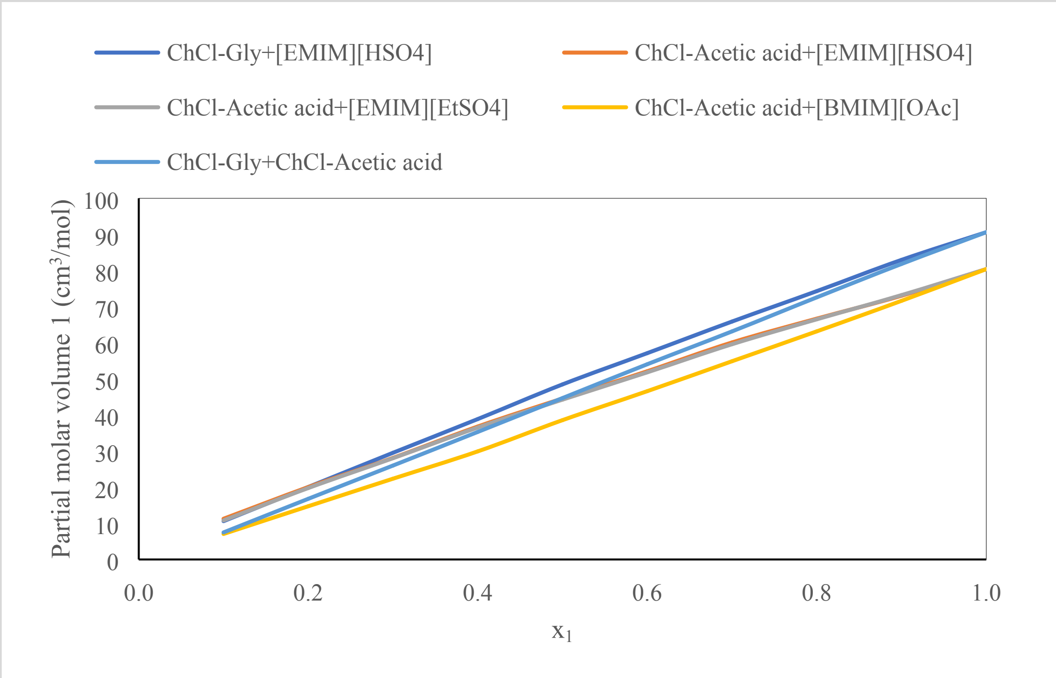


Figure S83: Partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 318.15 K.

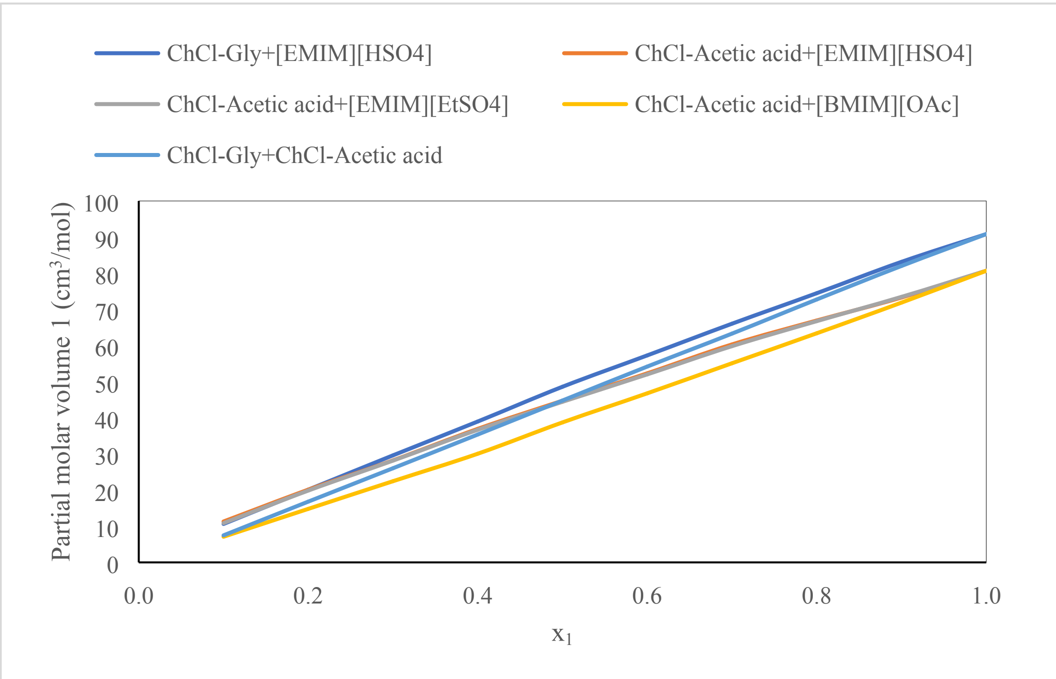


Figure S84: Partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 323.15 K.

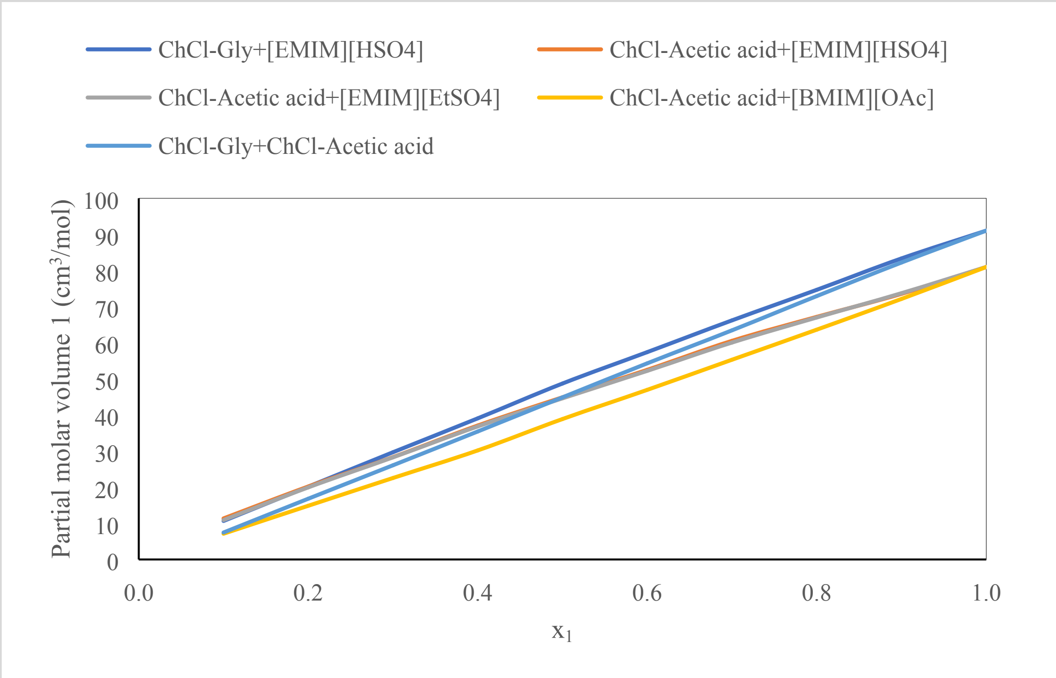


Figure S85: Partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 328.15 K.

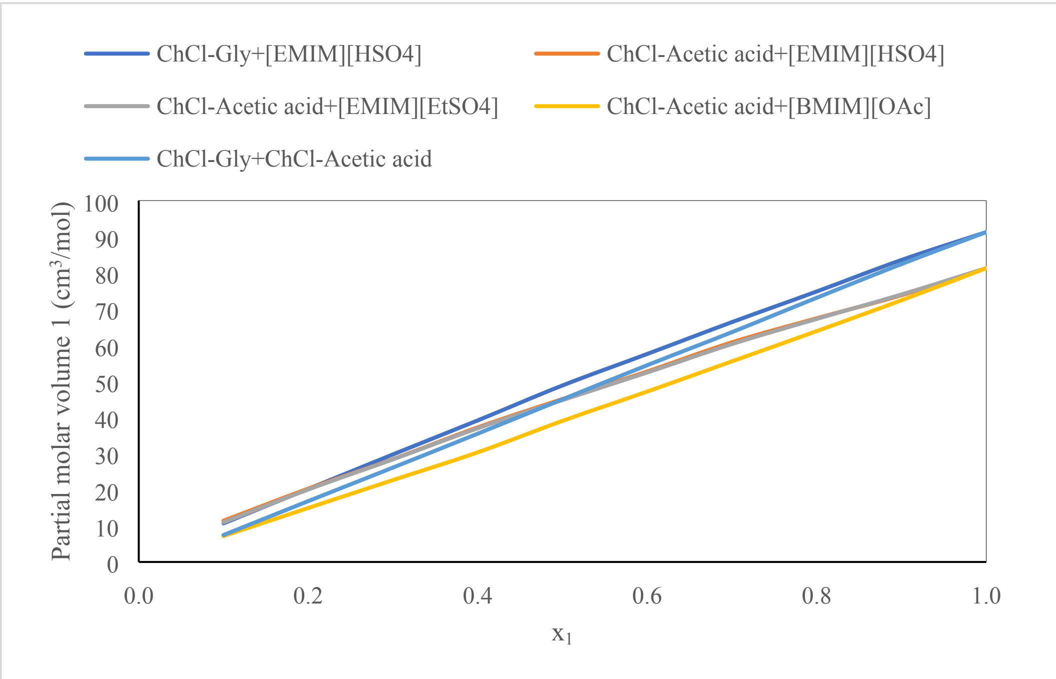


Figure S86: Partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 333.15 K.

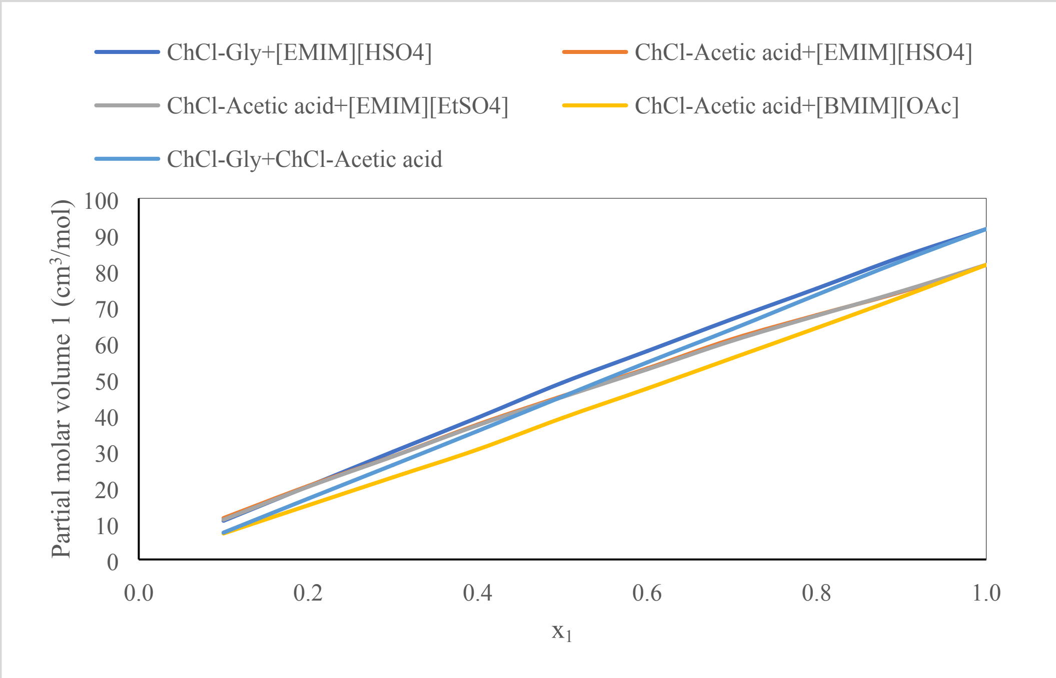


Figure S87: Partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 338.15 K.

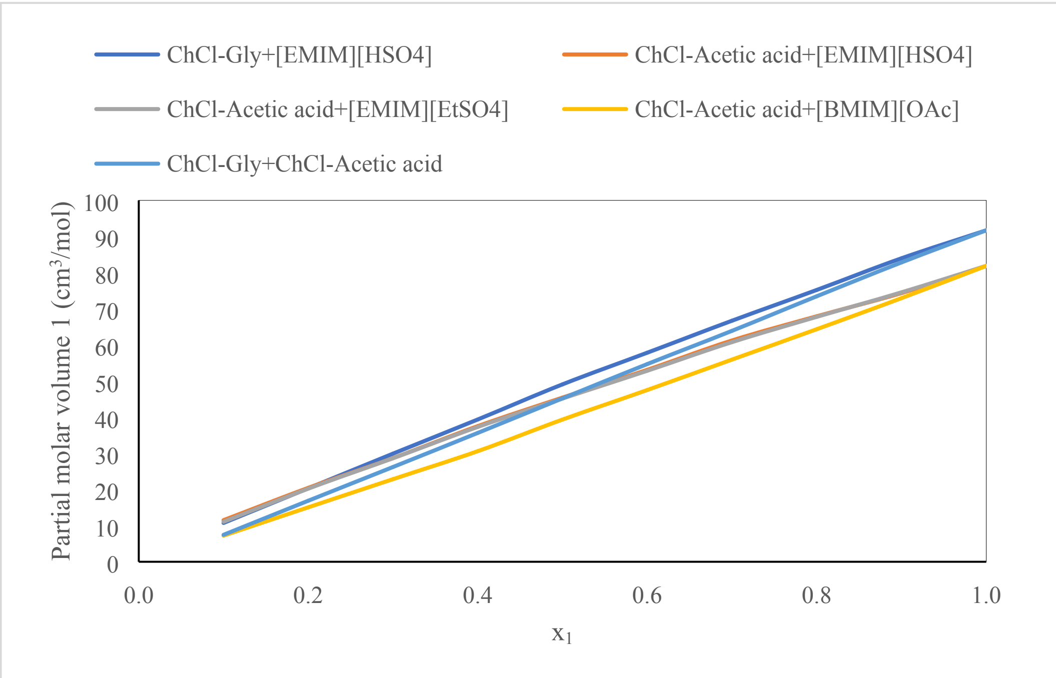


Figure S88: Partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 343.15 K.

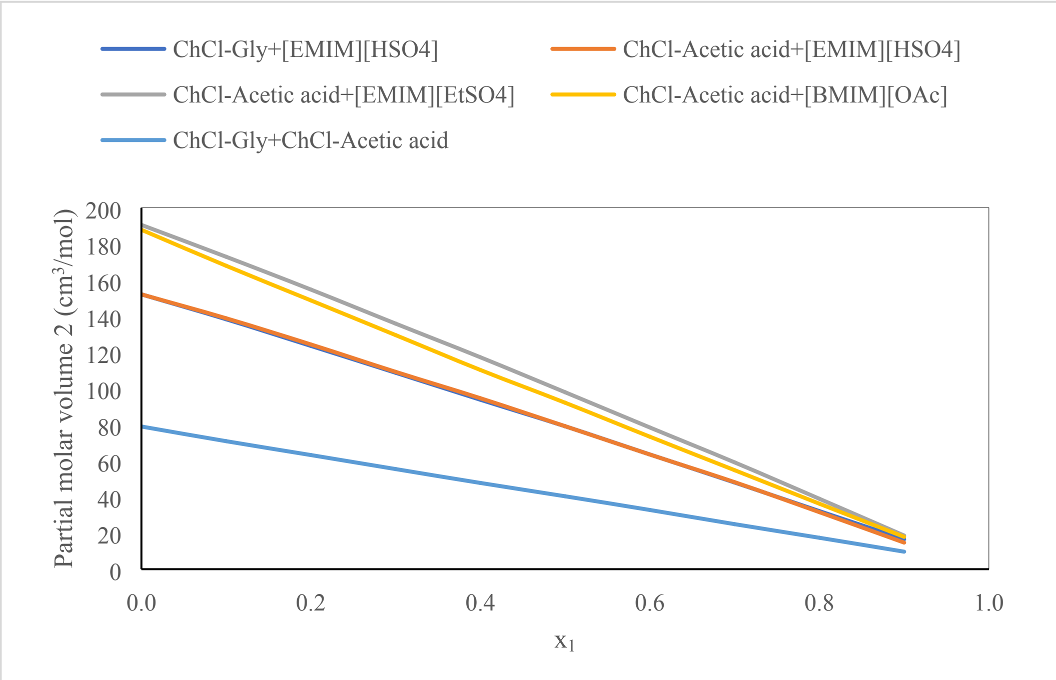


Figure S89: Partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 293.15 K.

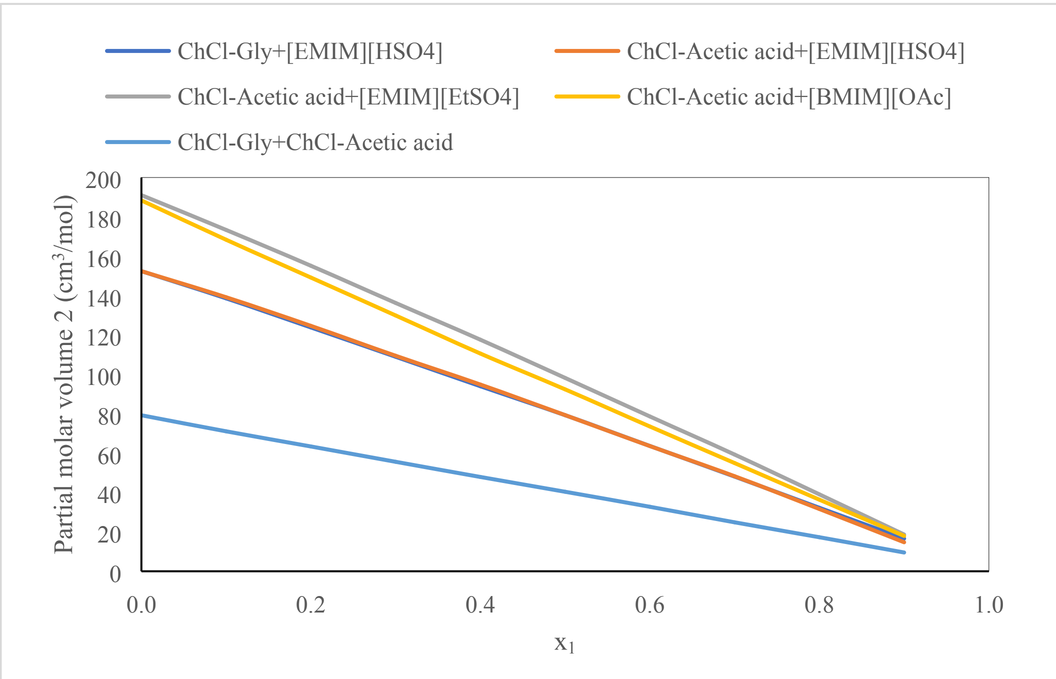


Figure S90: Partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 298.15 K.

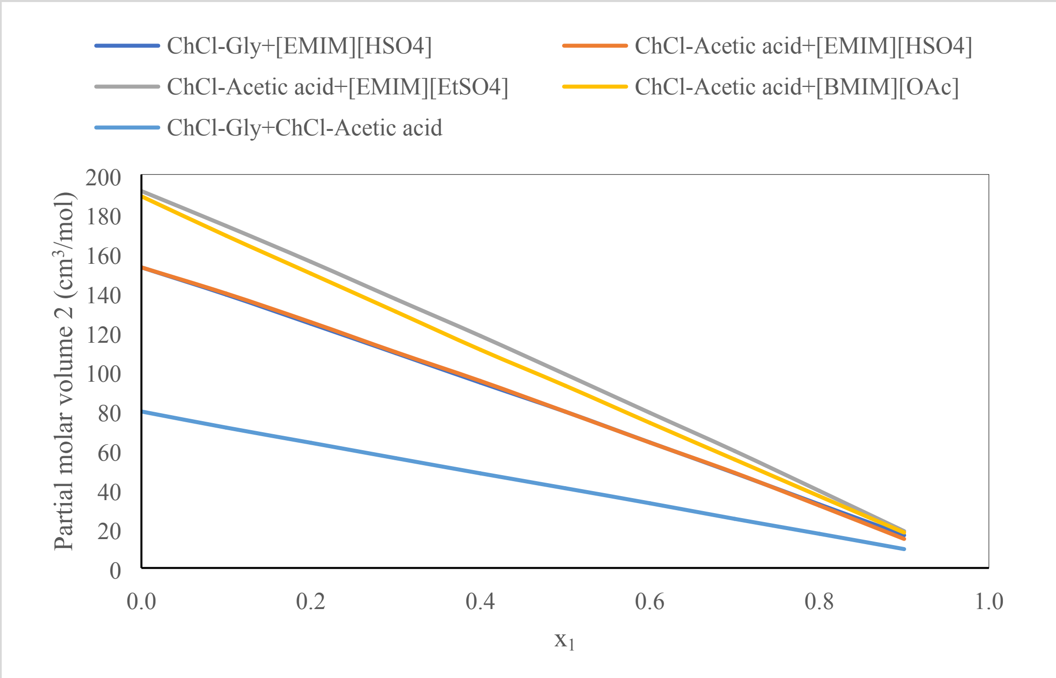


Figure S91: Partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 303.15 K.

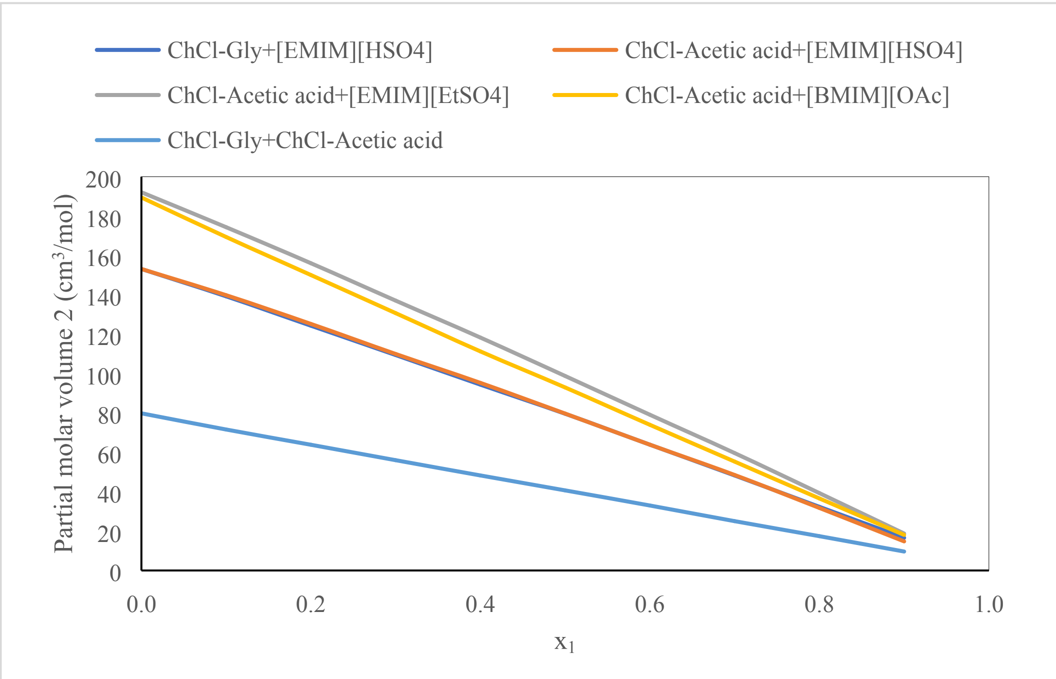


Figure S92: Partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 308.15 K.

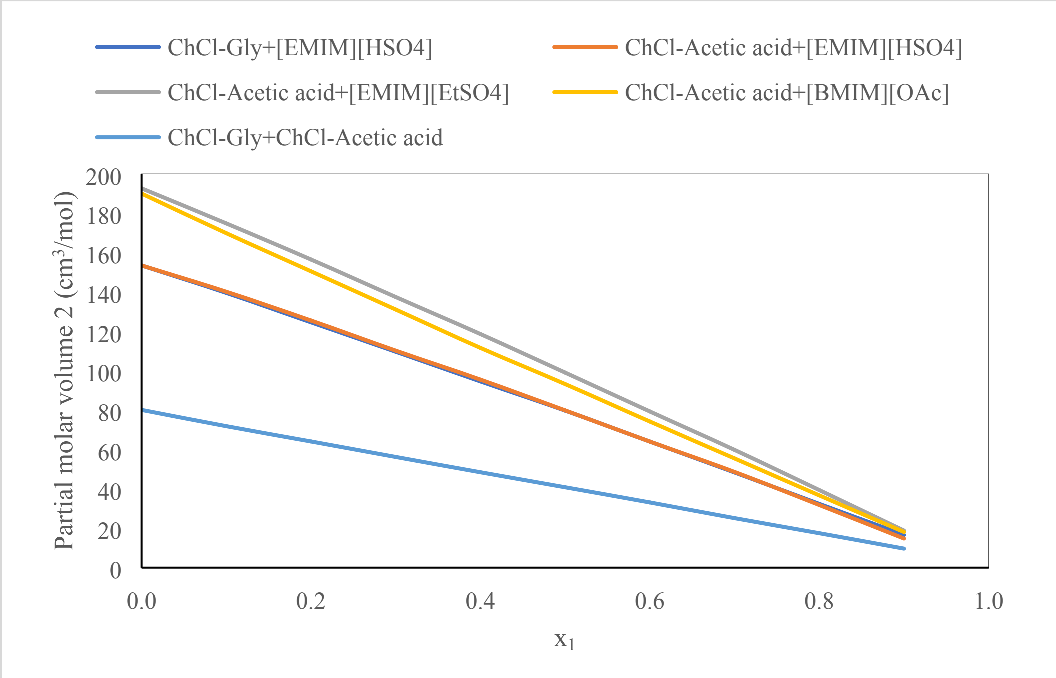


Figure S93: Partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 313.15 K.

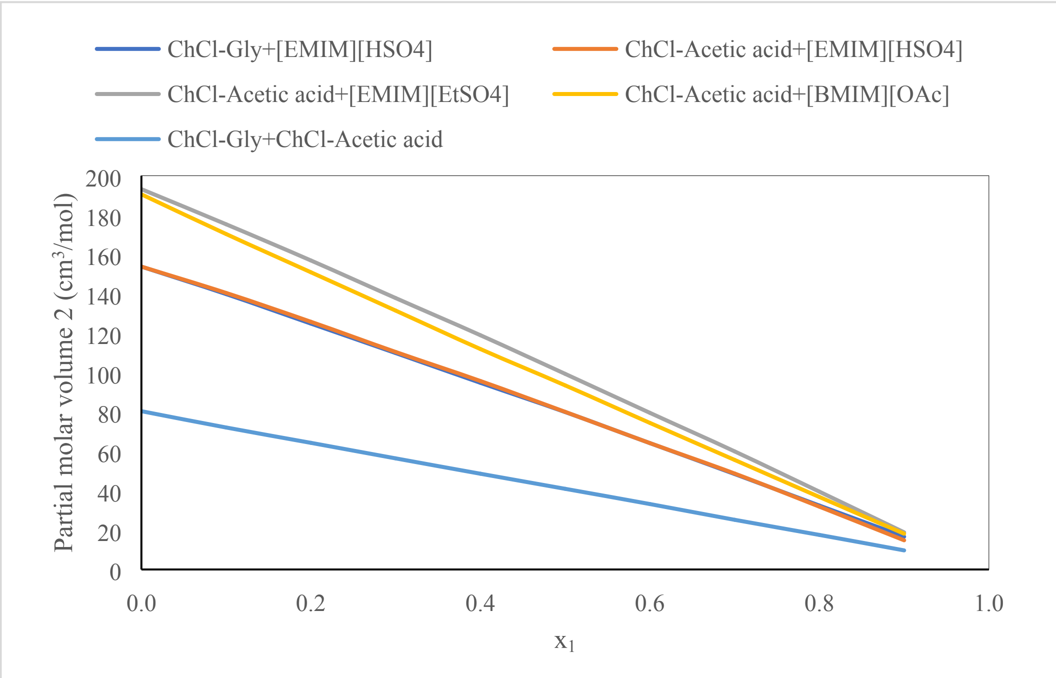


Figure S94: Partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 318.15 K.

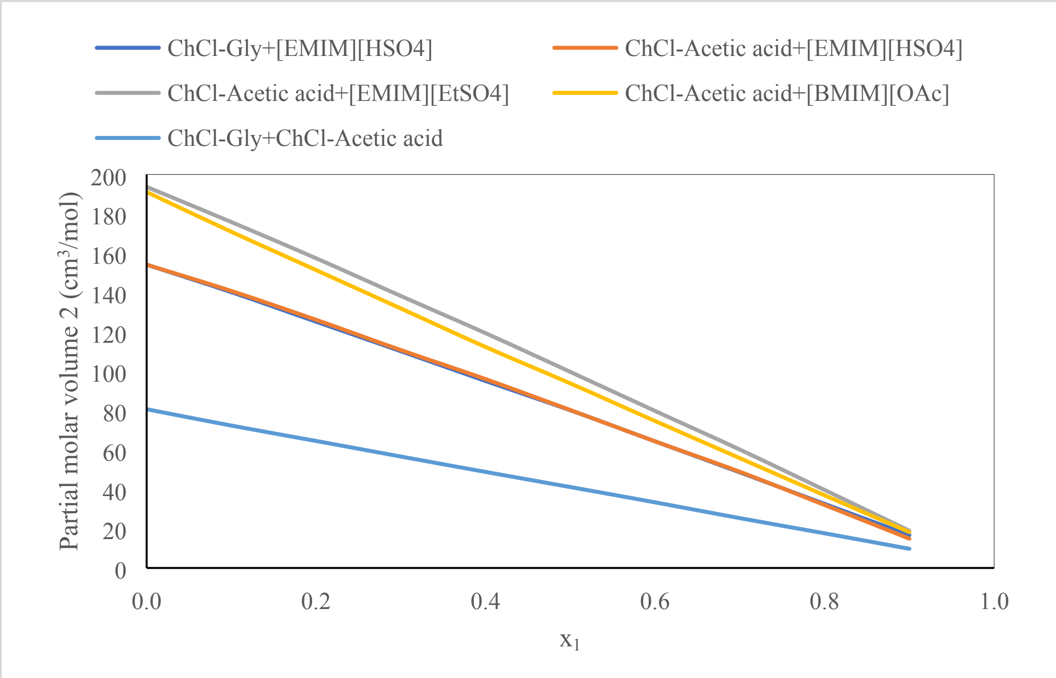


Figure S95: Partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 323.15 K.

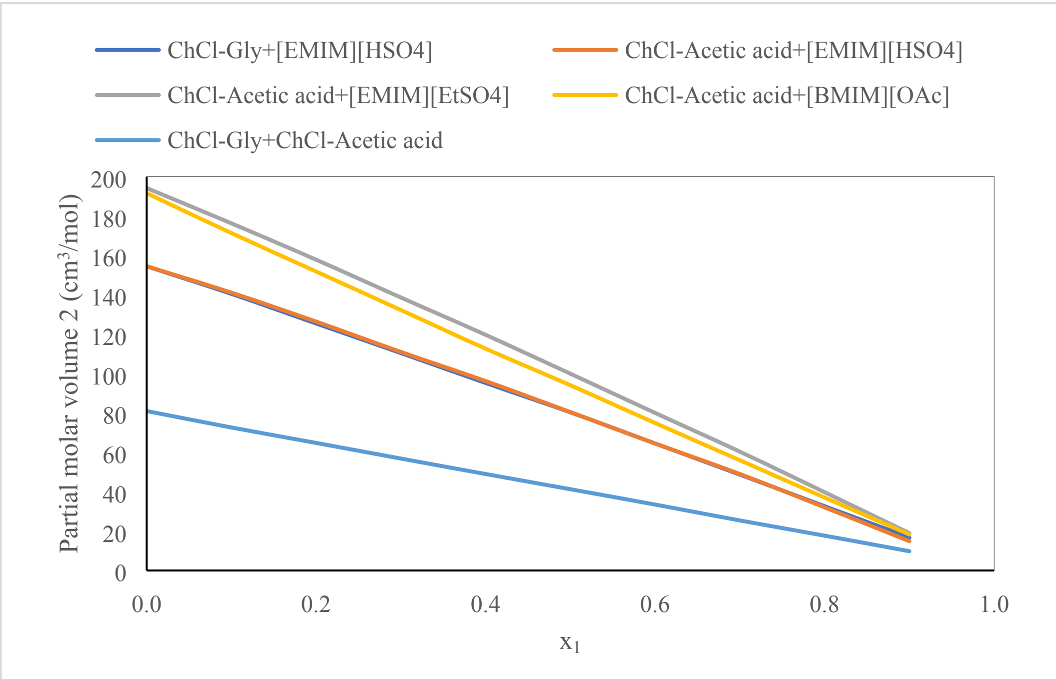


Figure S96: Partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 328.15 K.

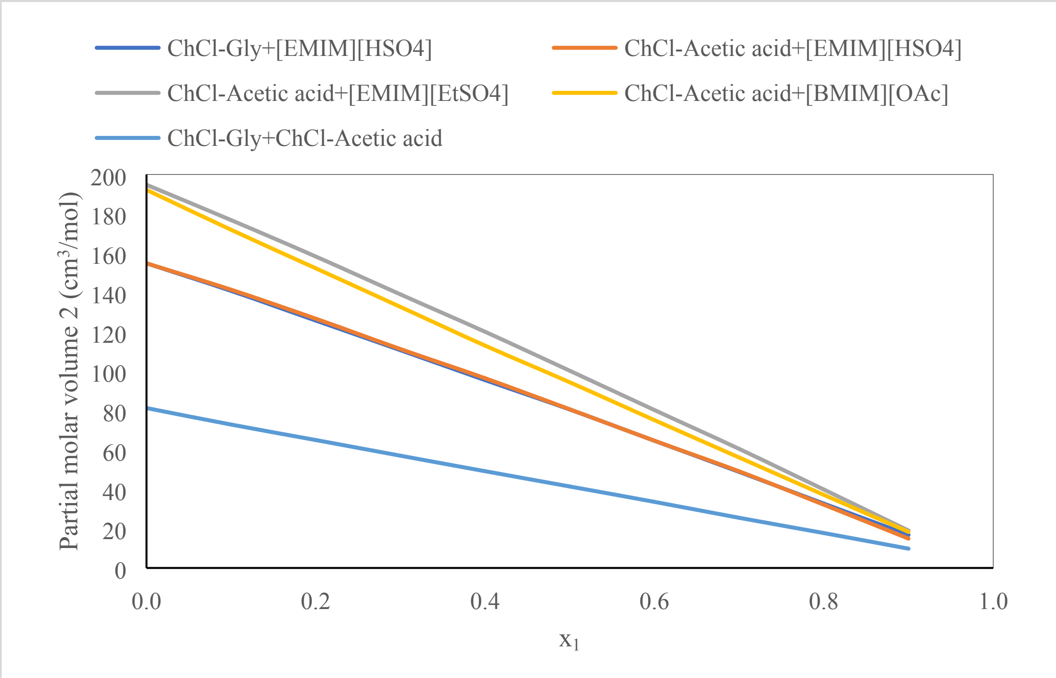


Figure S97: Partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 333.15 K.

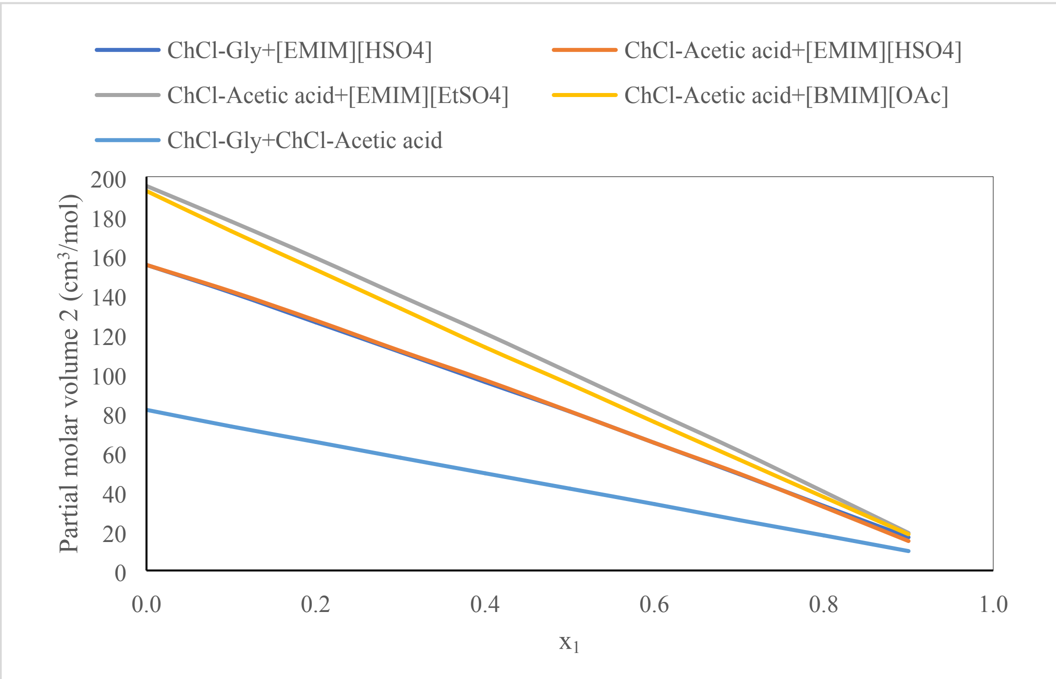


Figure S98: Partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 338.15 K.

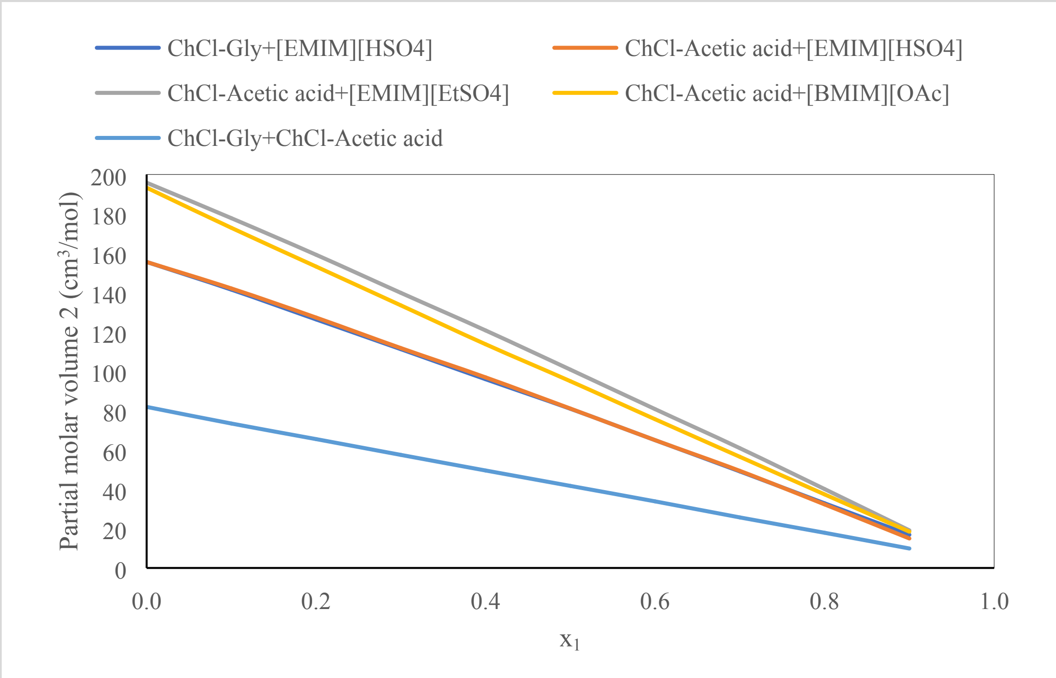


Figure S99: Partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 343.15 K.

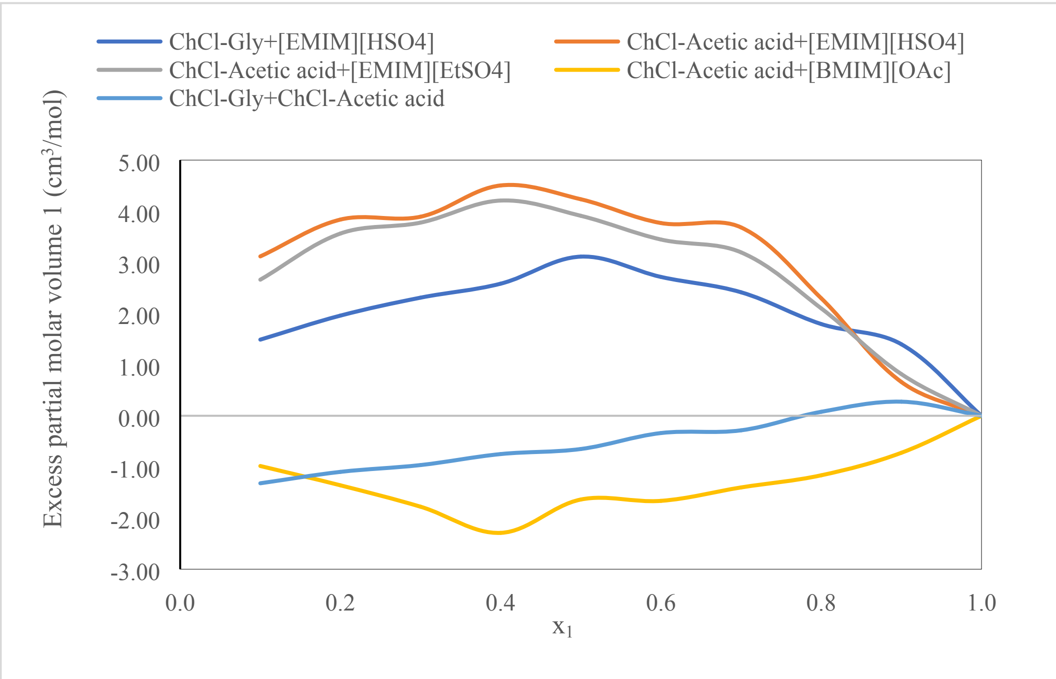


Figure S100: Excess partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 293.15 K.

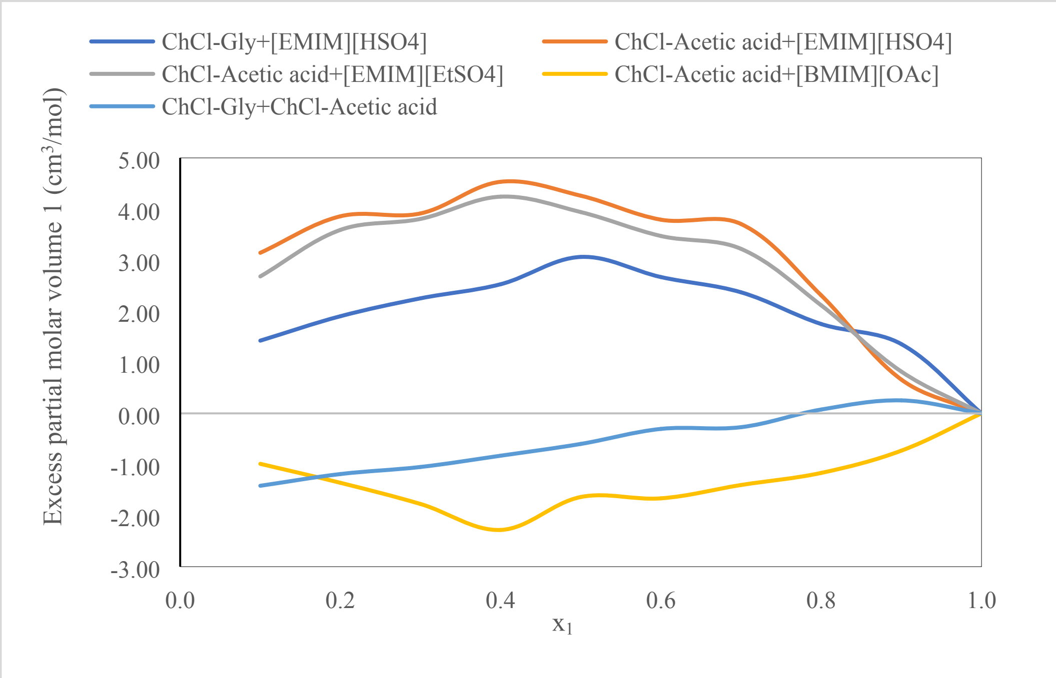


Figure S101: Excess partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 298.15 K.

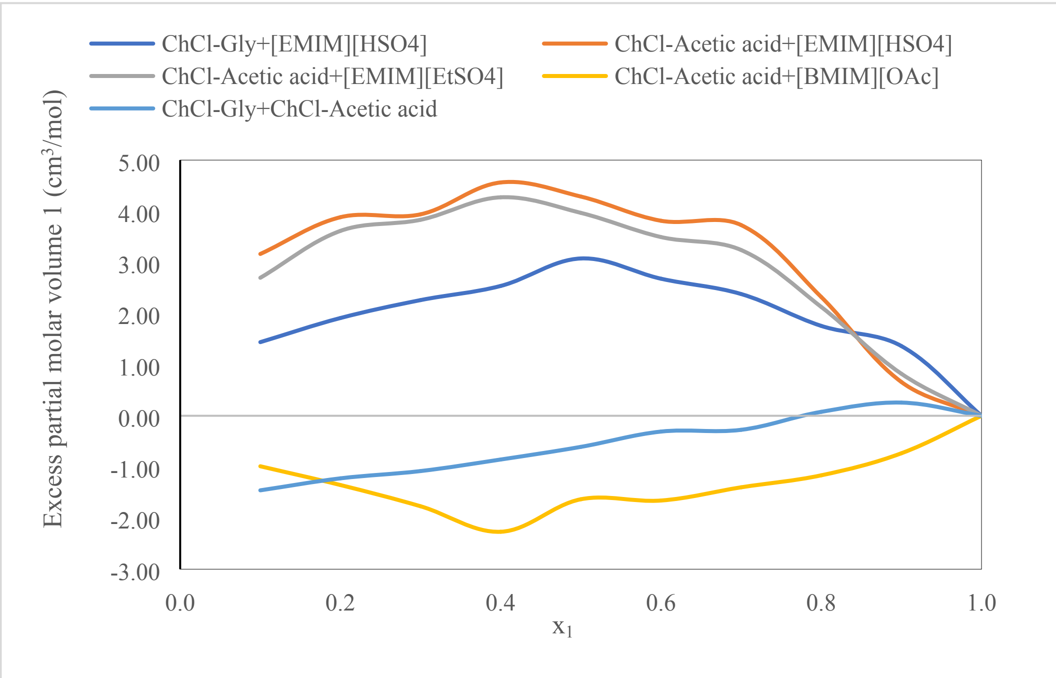


Figure S102: Excess partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 303.15 K.

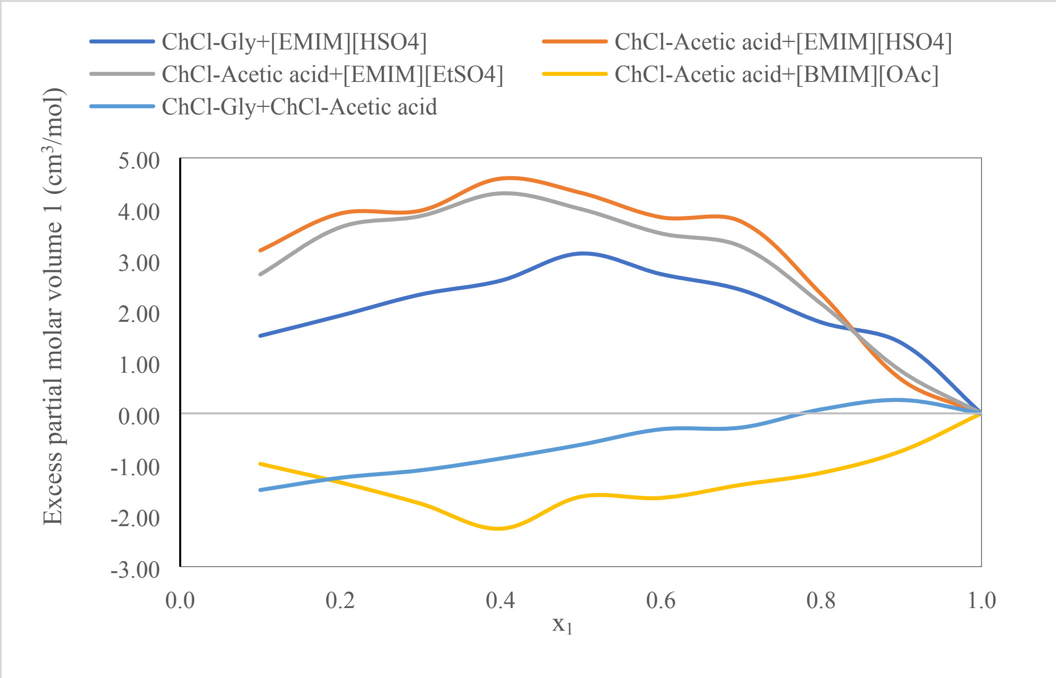


Figure S103: Excess partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 308.15 K.

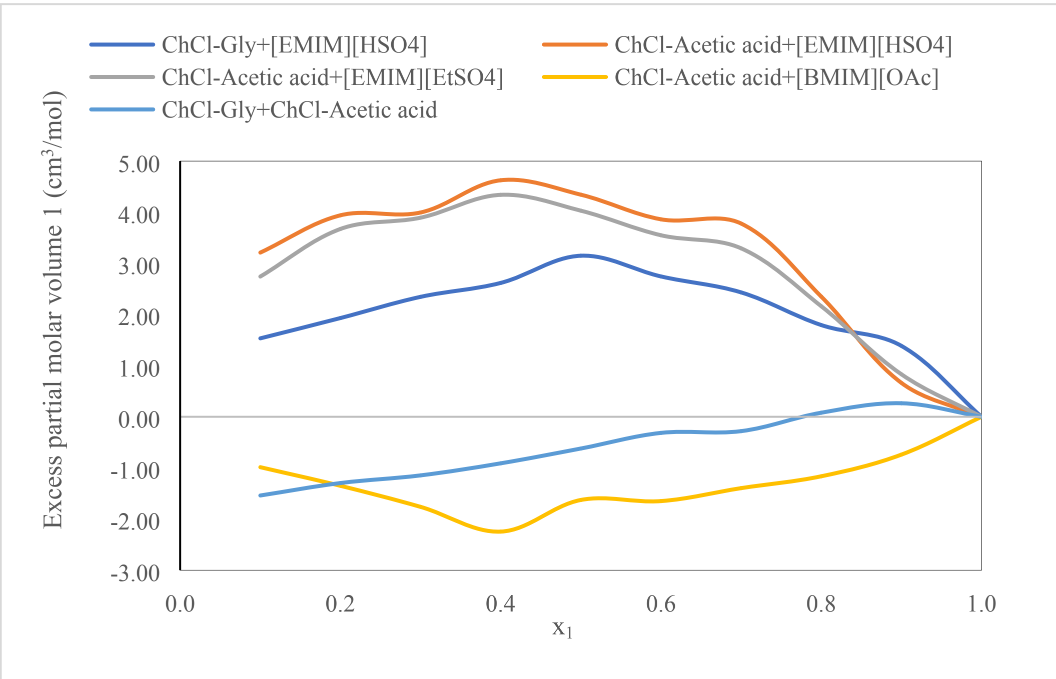


Figure S104: Excess partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 313.15 K.

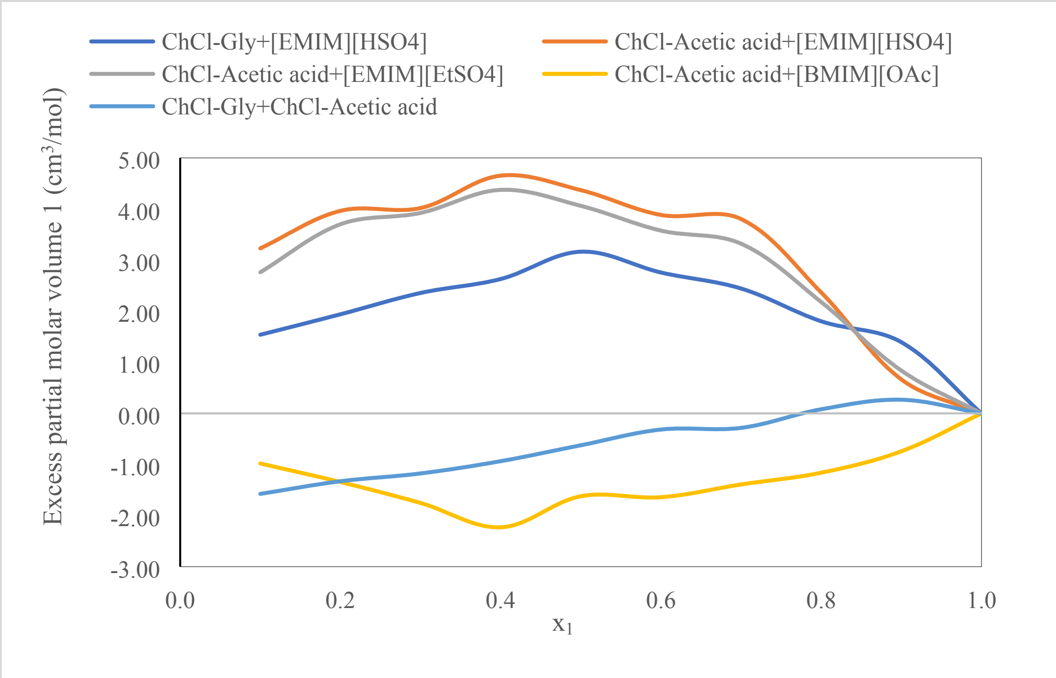


Figure S105: Excess partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 318.15 K.

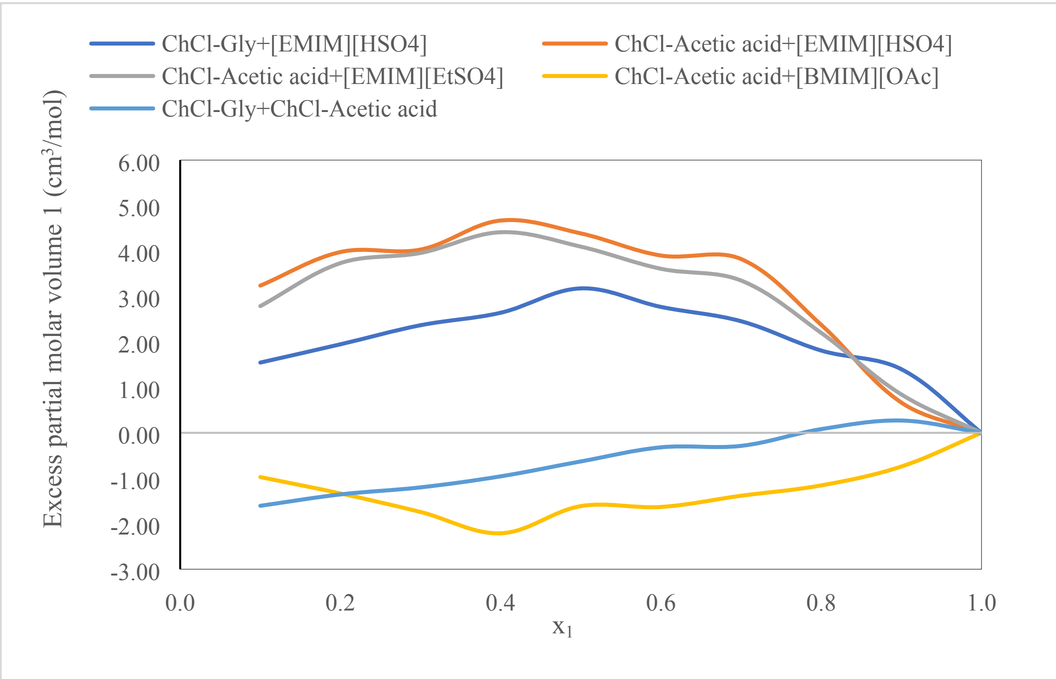


Figure S106: Excess partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 323.15 K.

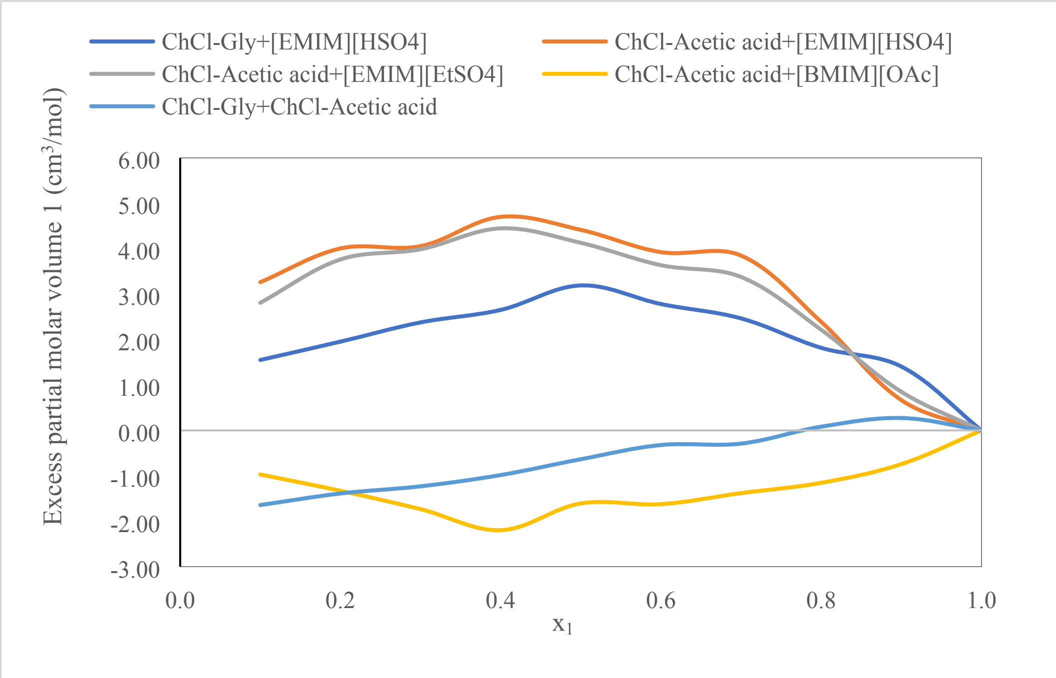


Figure S107: Excess partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 328.15 K.

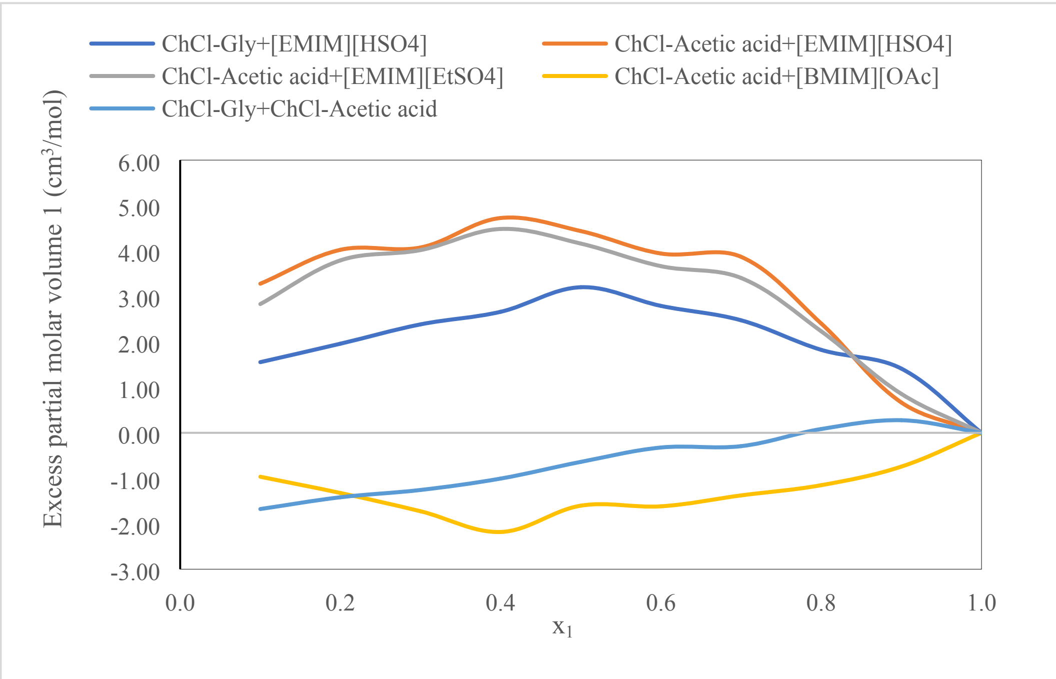


Figure S108: Excess partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 333.15 K.

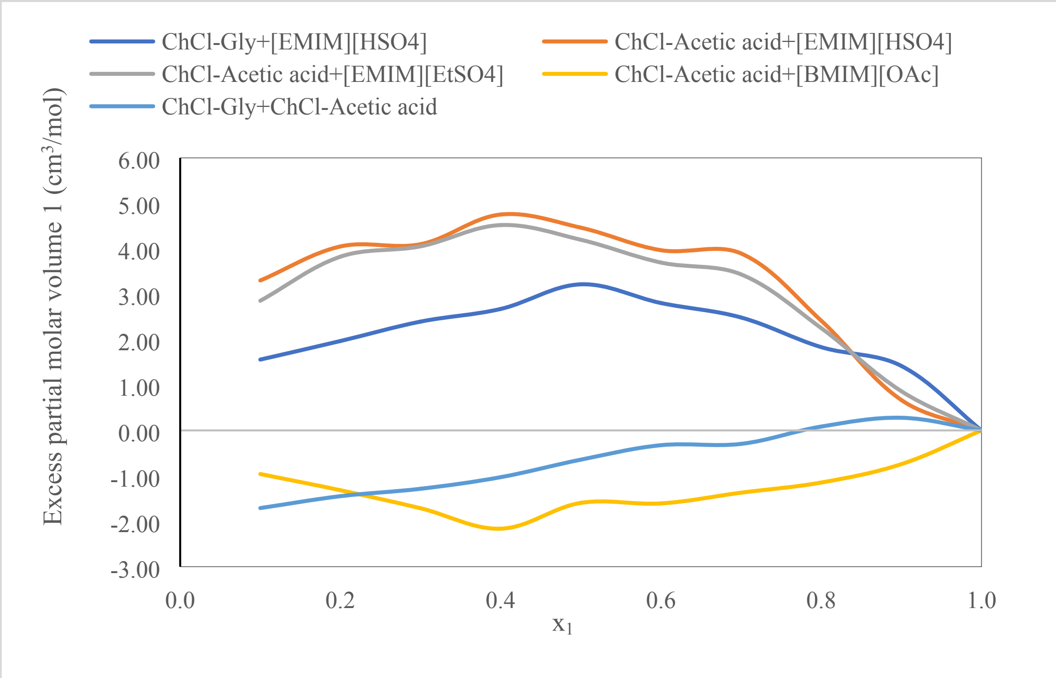


Figure S109: Excess partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 338.15 K.

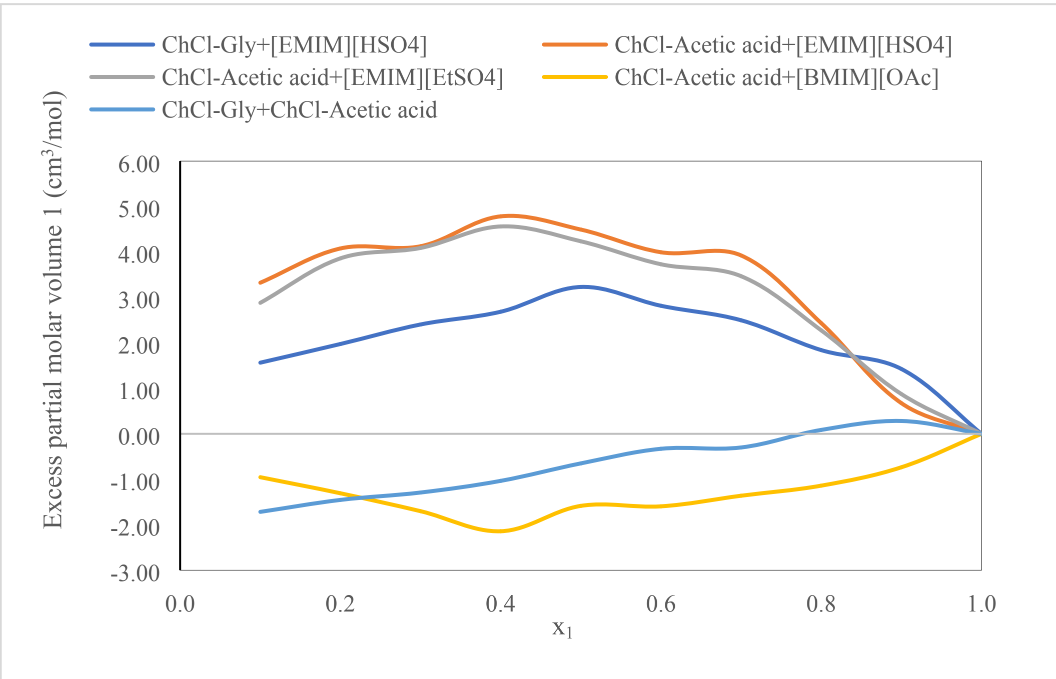


Figure S110: Excess partial molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 343.15 K.

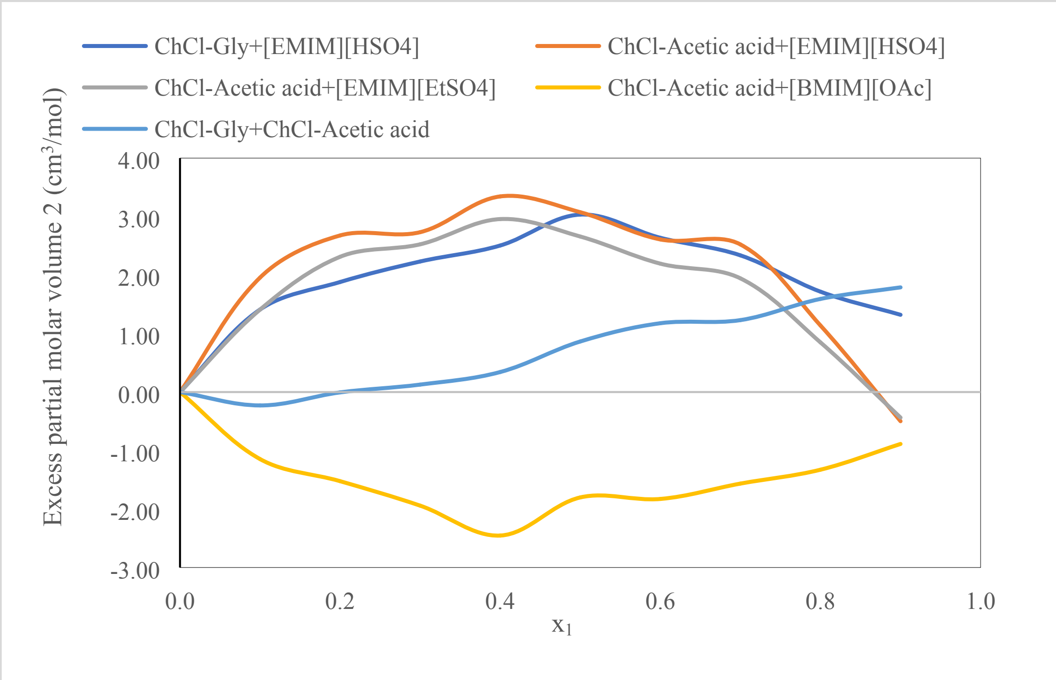


Figure S111: Excess partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 293.15 K.

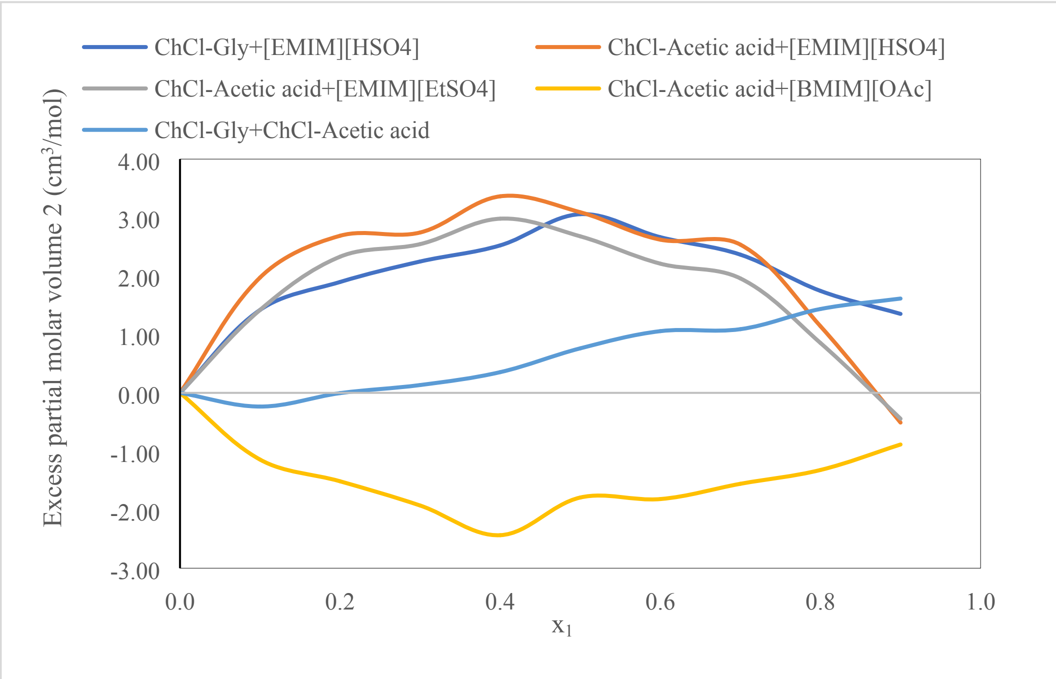


Figure S112: Excess partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 298.15 K.

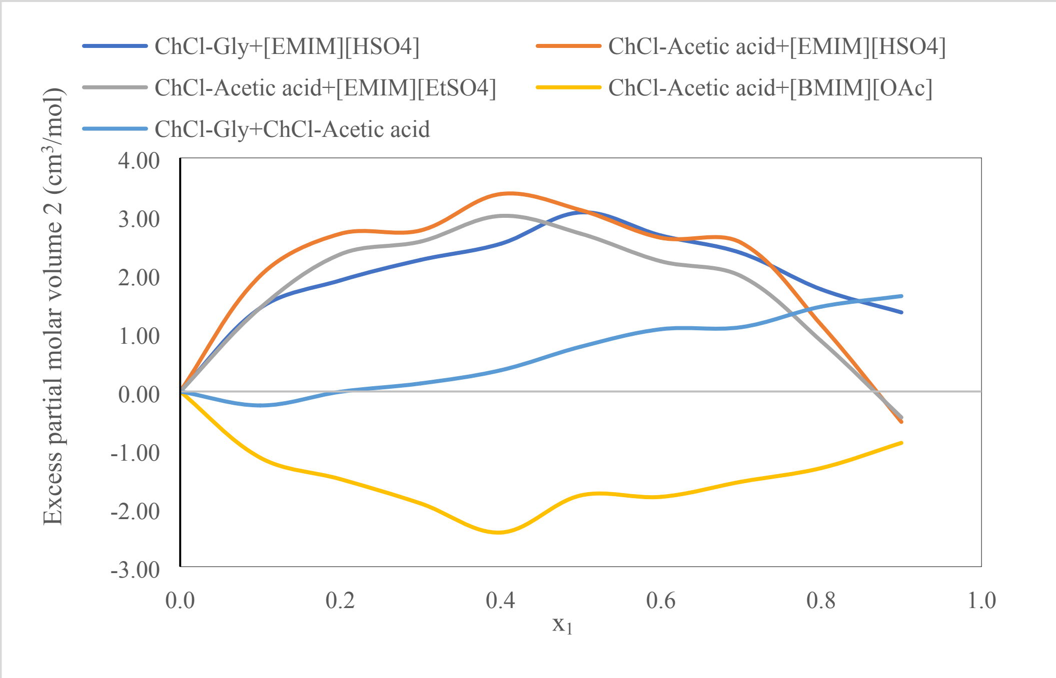


Figure S113: Excess partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 303.15 K.

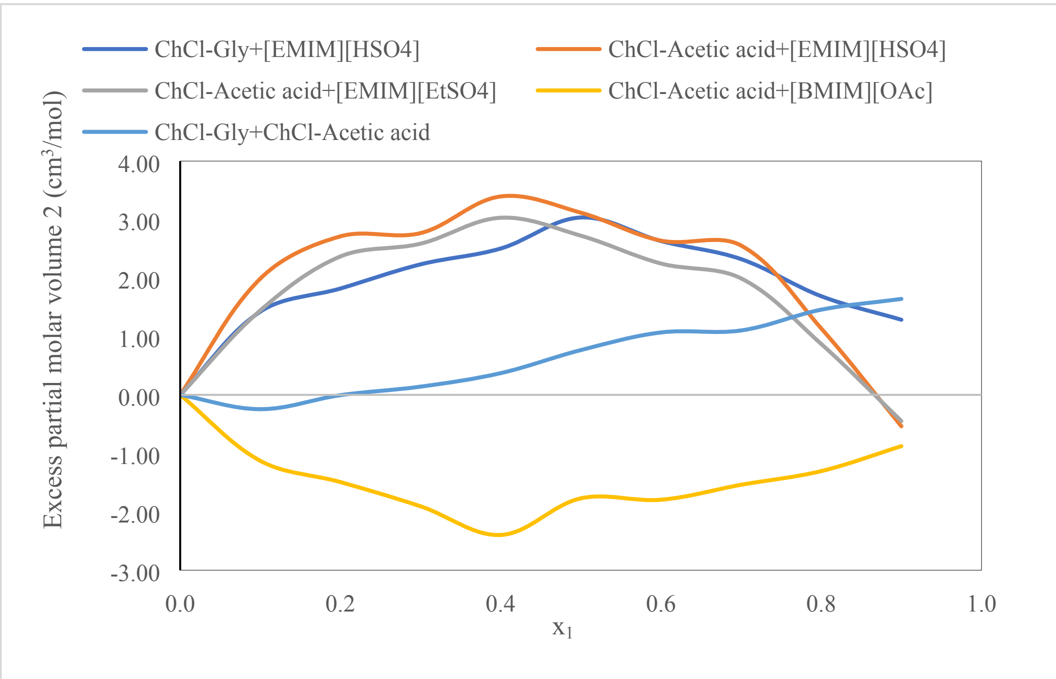


Figure S114: Excess partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 308.15 K.

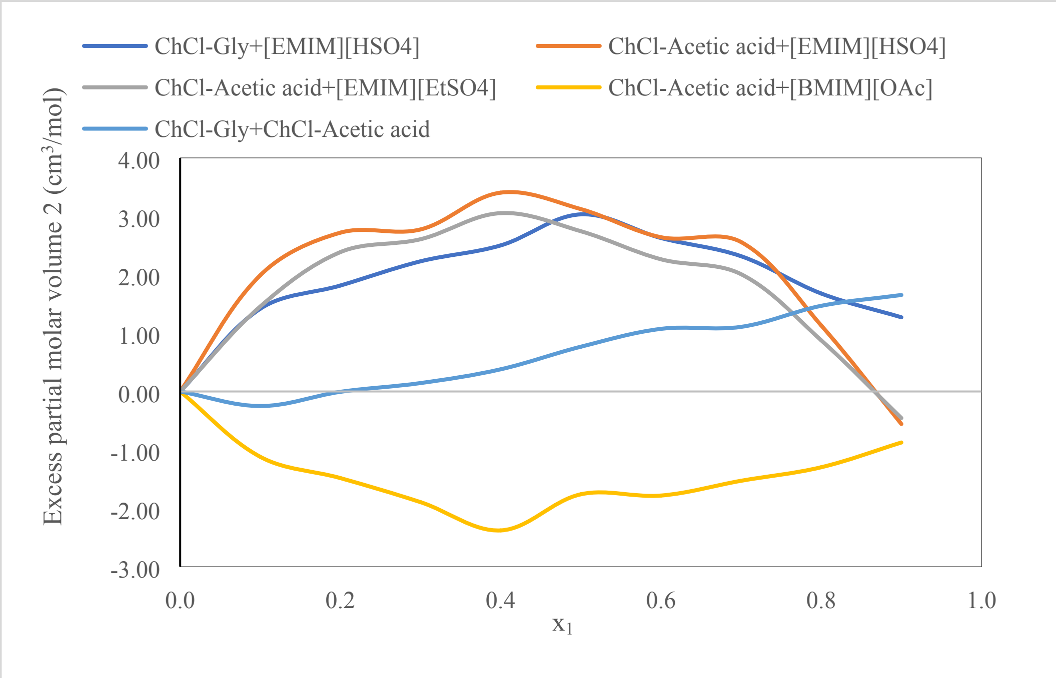


Figure S115: Excess partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 313.15 K.

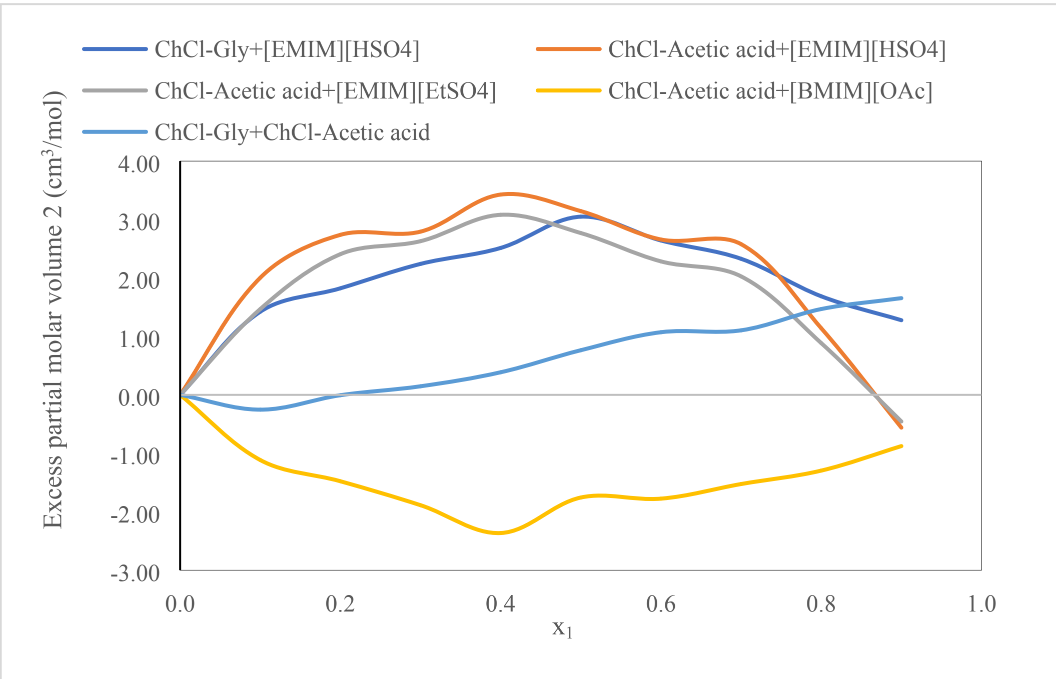


Figure S116: Excess partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 318.15 K.

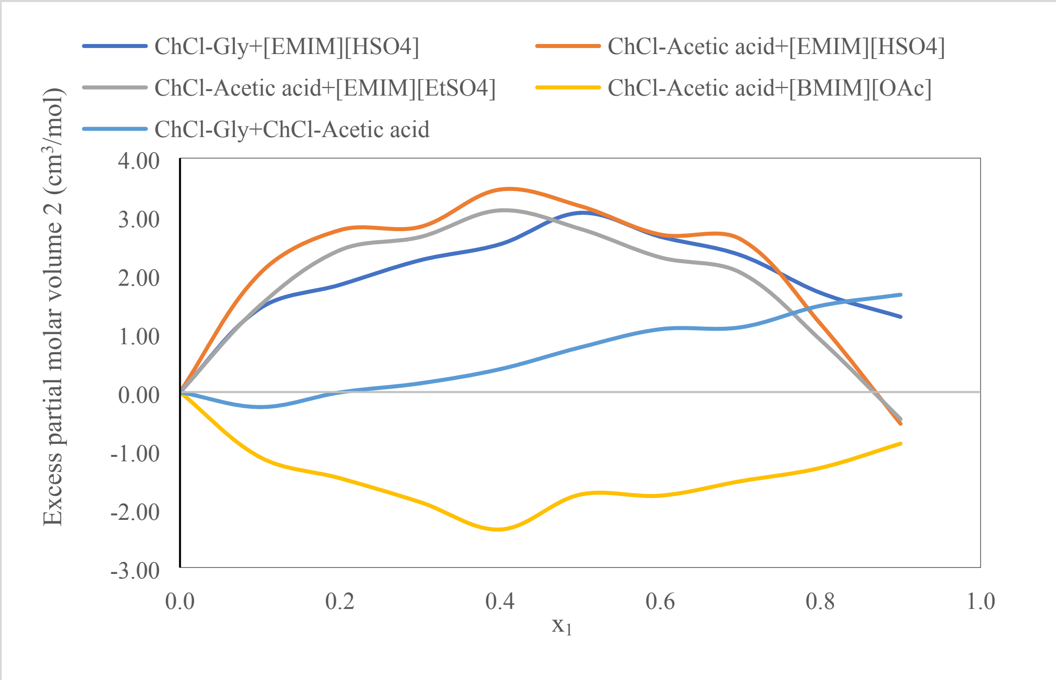


Figure S117: Excess partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 323.15 K.

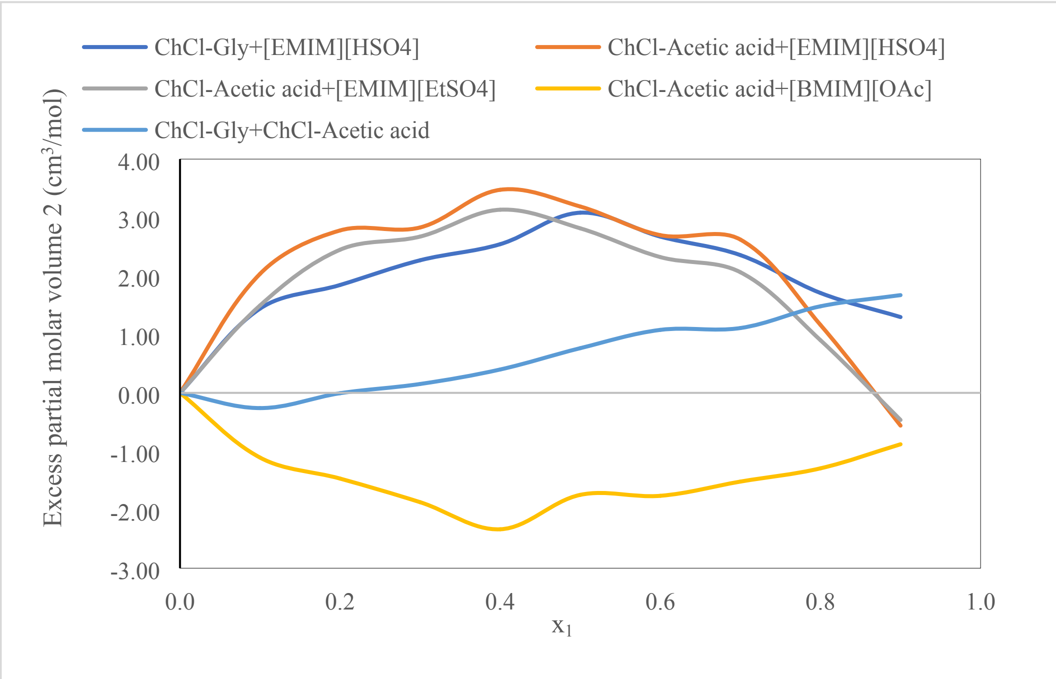


Figure S118: Excess partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 328.15 K.

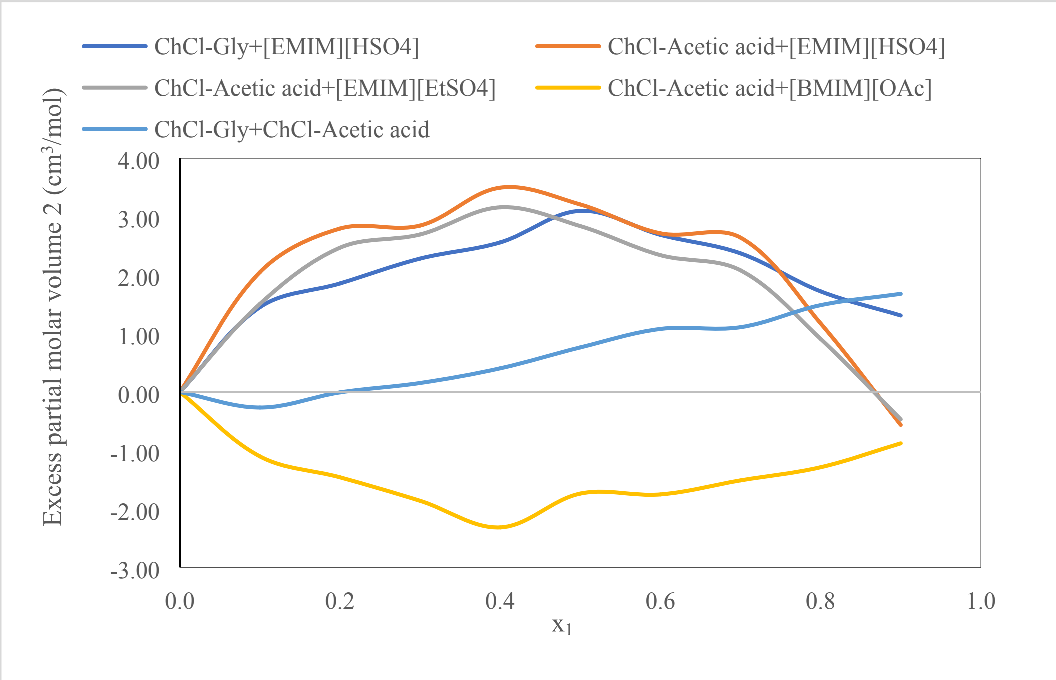


Figure S119: Excess partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 333.15 K.

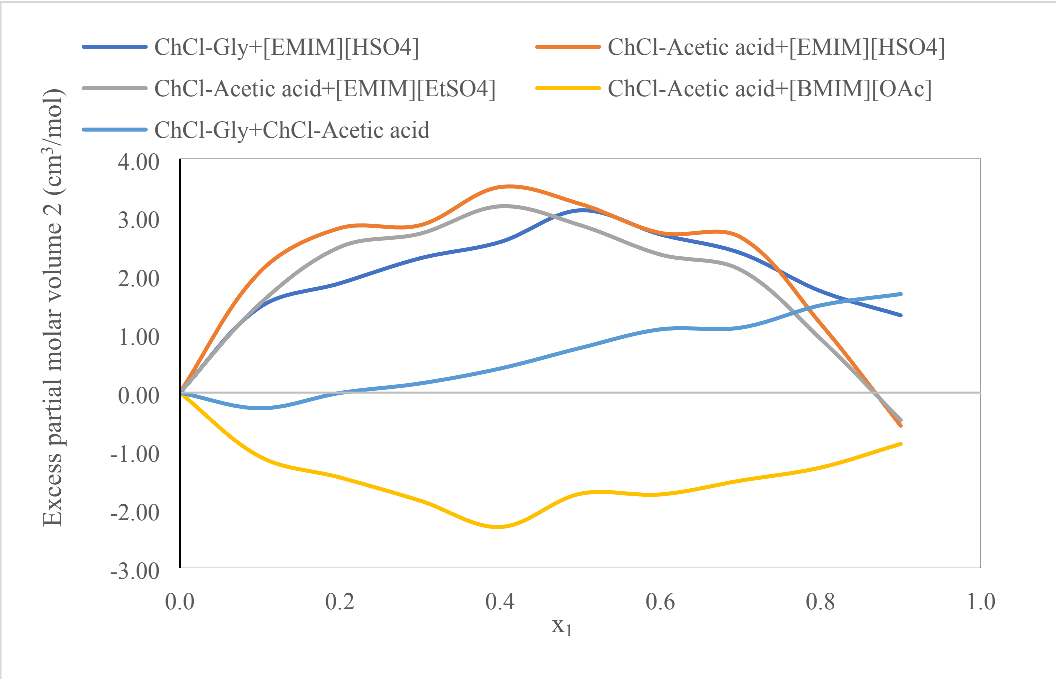


Figure S120: Excess partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 338.15 K.

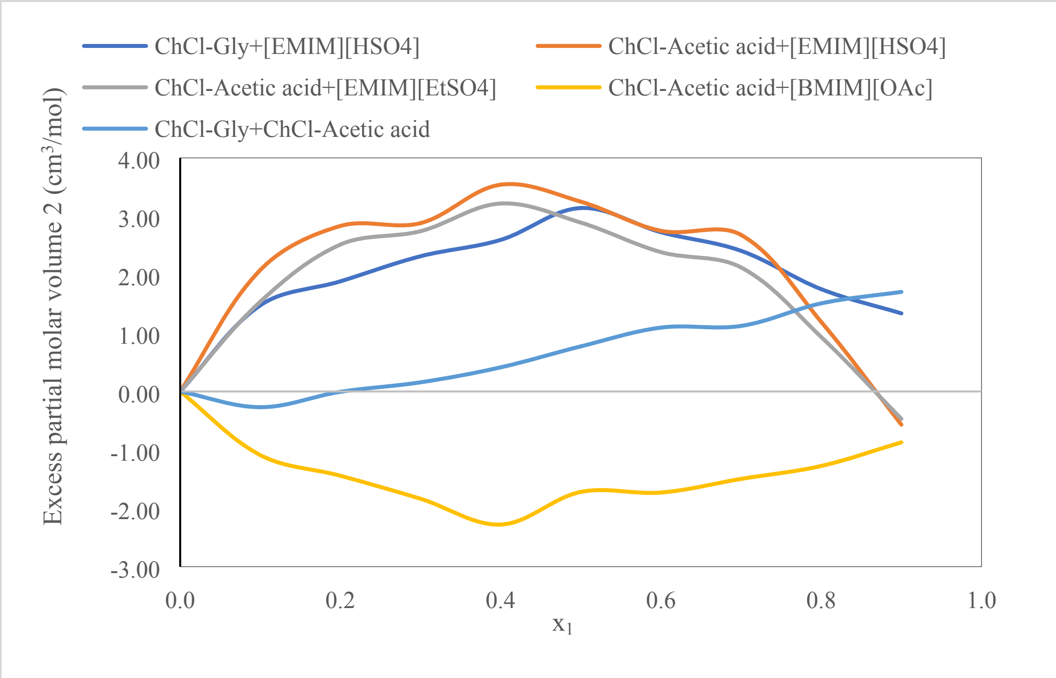


Figure S121: Excess partial molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 343.15 K.

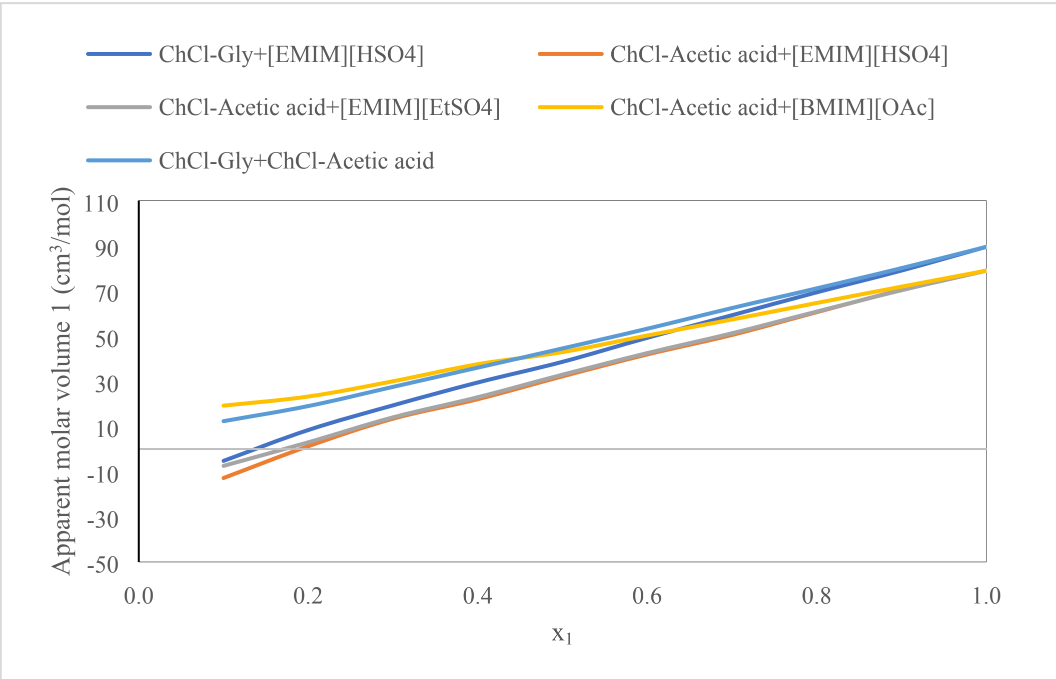


Figure S122: Apparent molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 293.15 K.

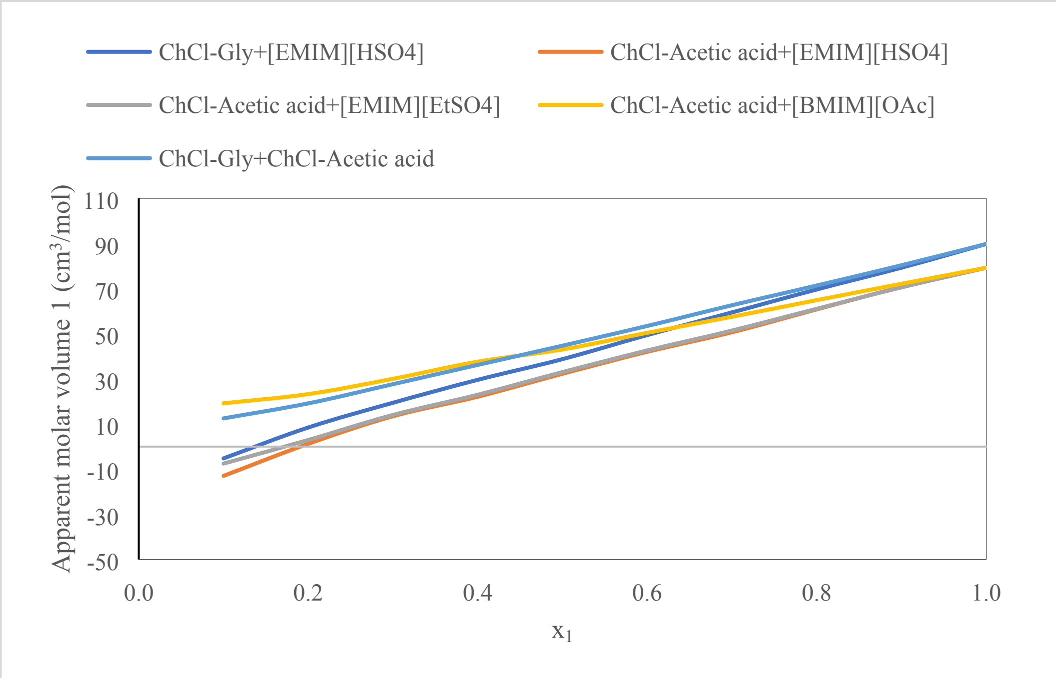


Figure S123: Apparent molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 298.15 K.

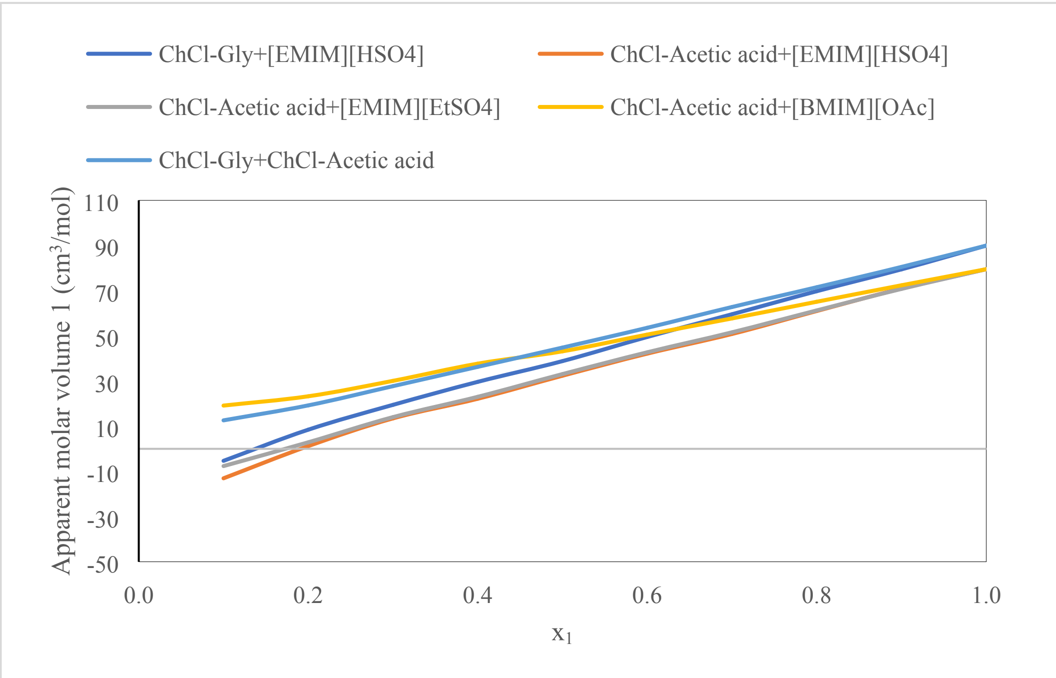


Figure S124: Apparent molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 303.15 K.

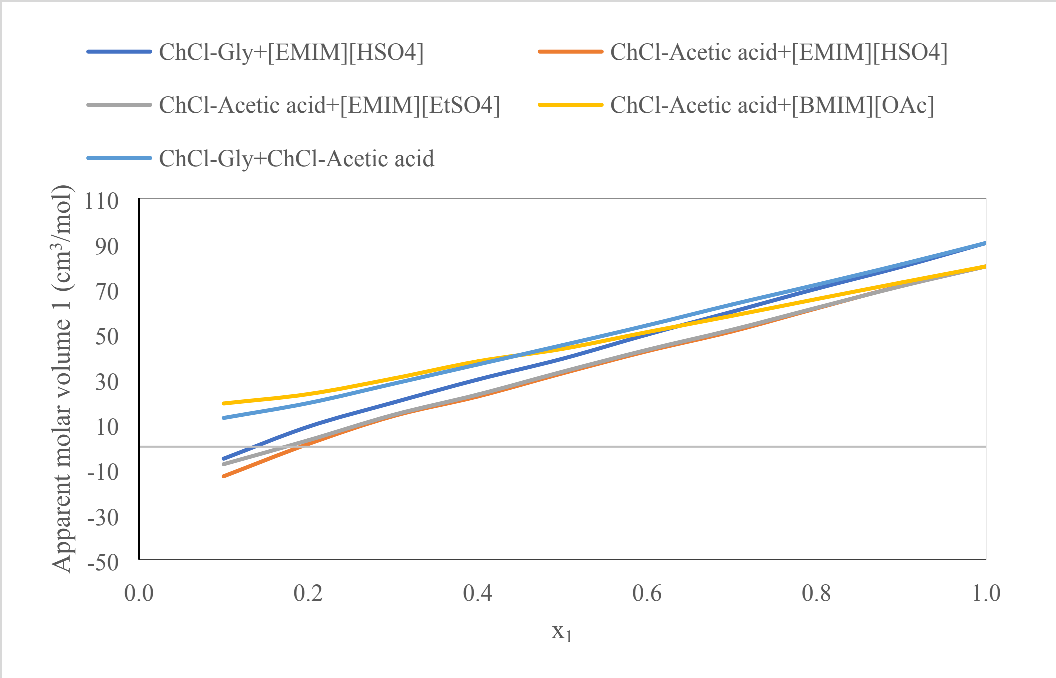


Figure S125: Apparent molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 308.15 K.

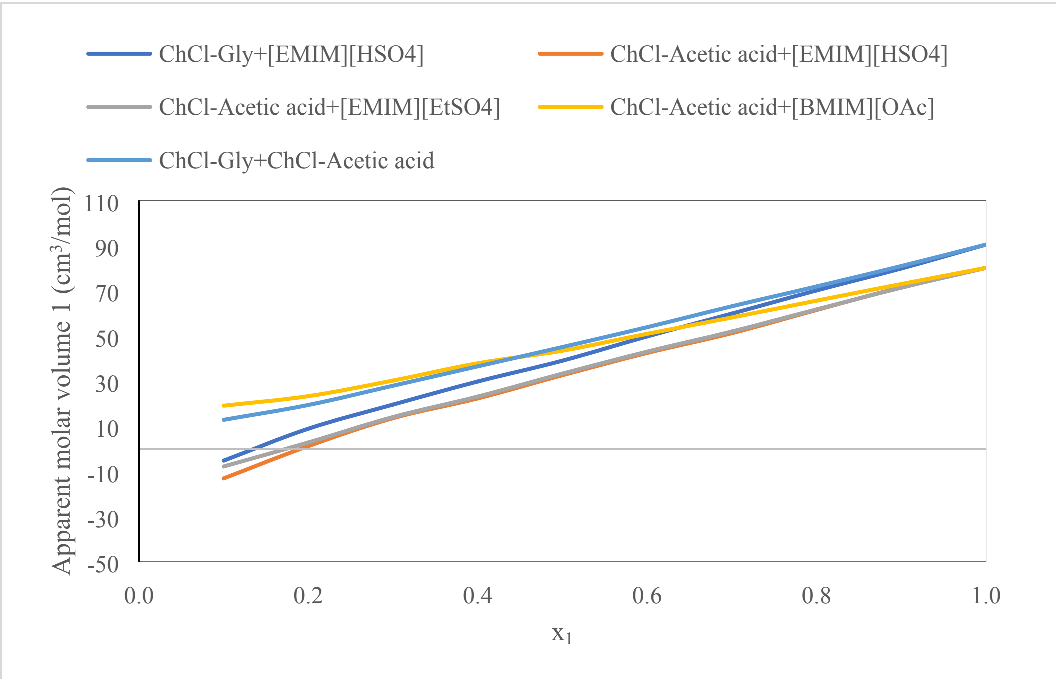


Figure S126: Apparent molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 313.15 K.

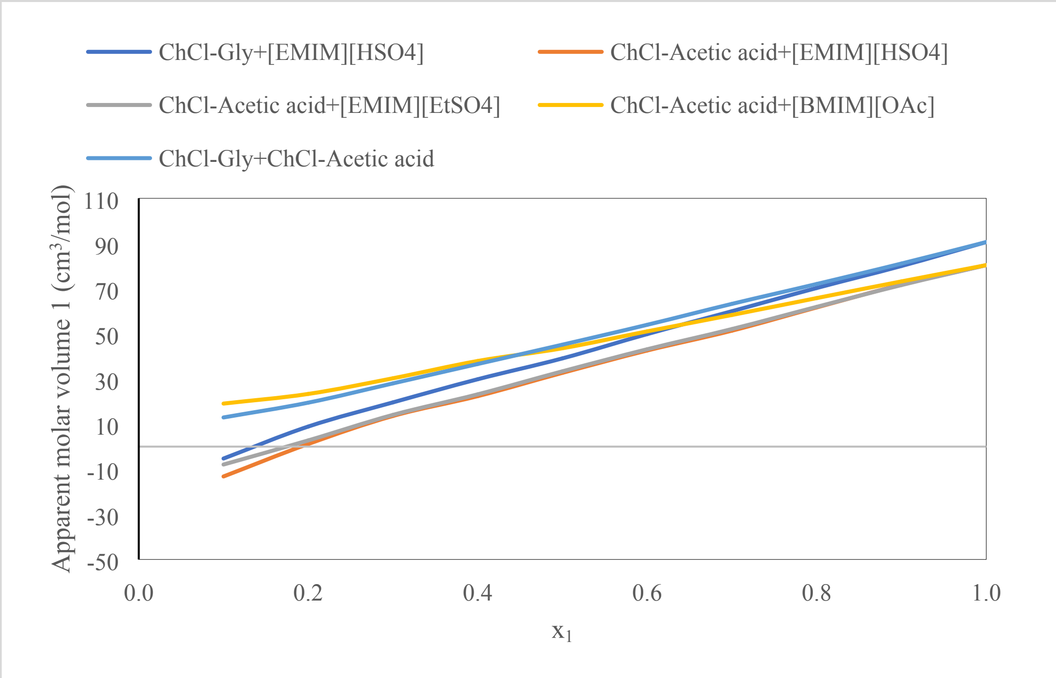


Figure S127: Apparent molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 318.15 K.

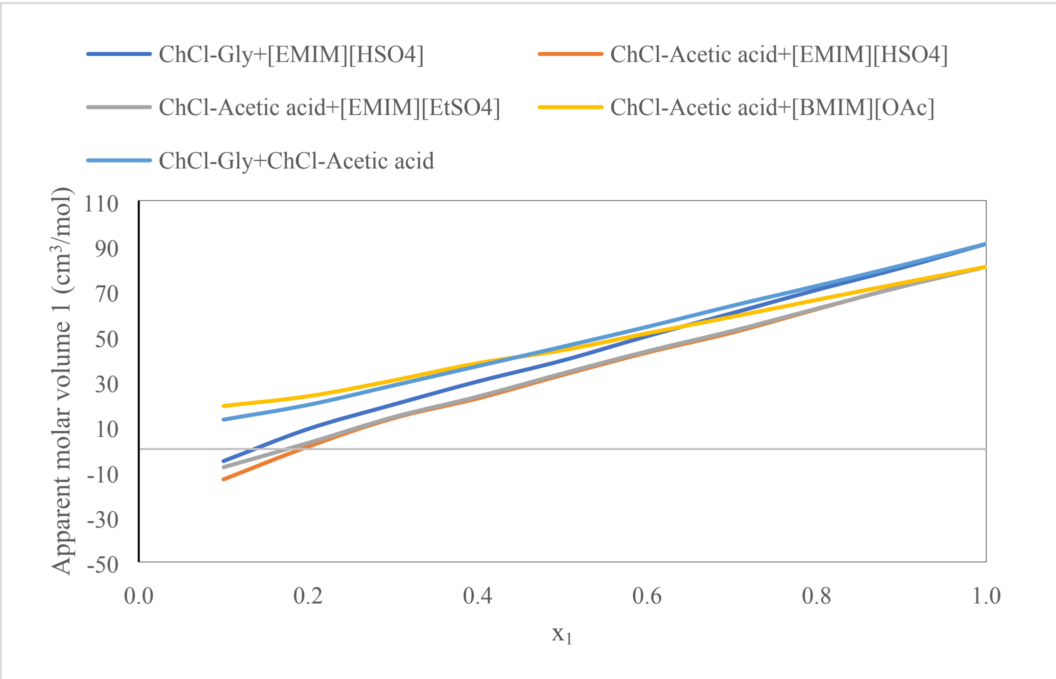


Figure S128: Apparent molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 323.15 K.

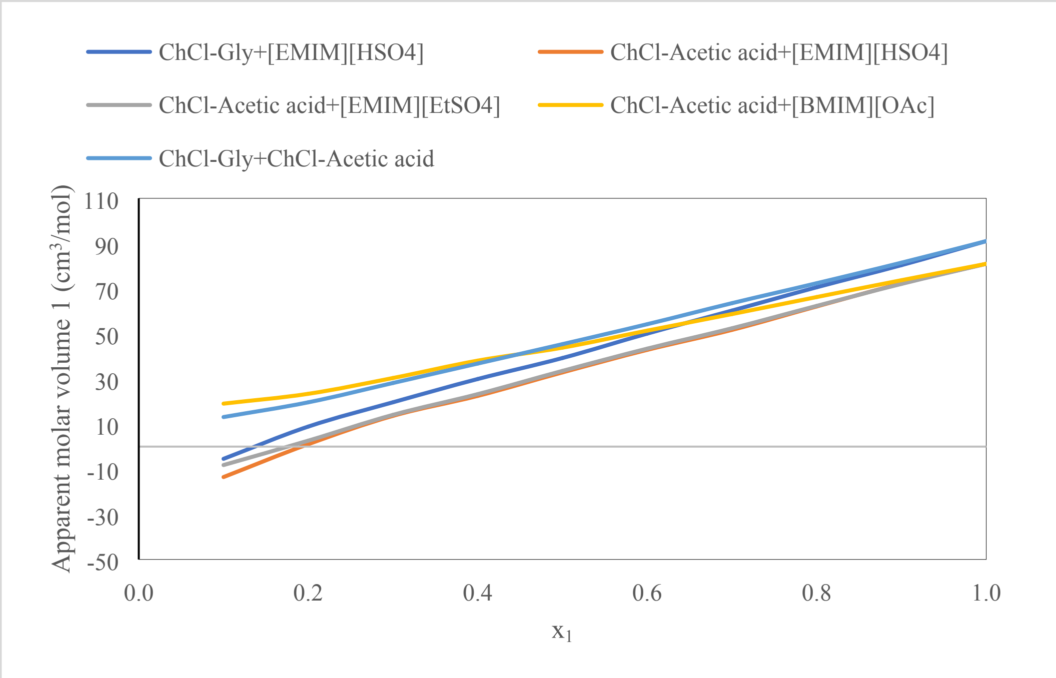


Figure S129: Apparent molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 328.15 K.

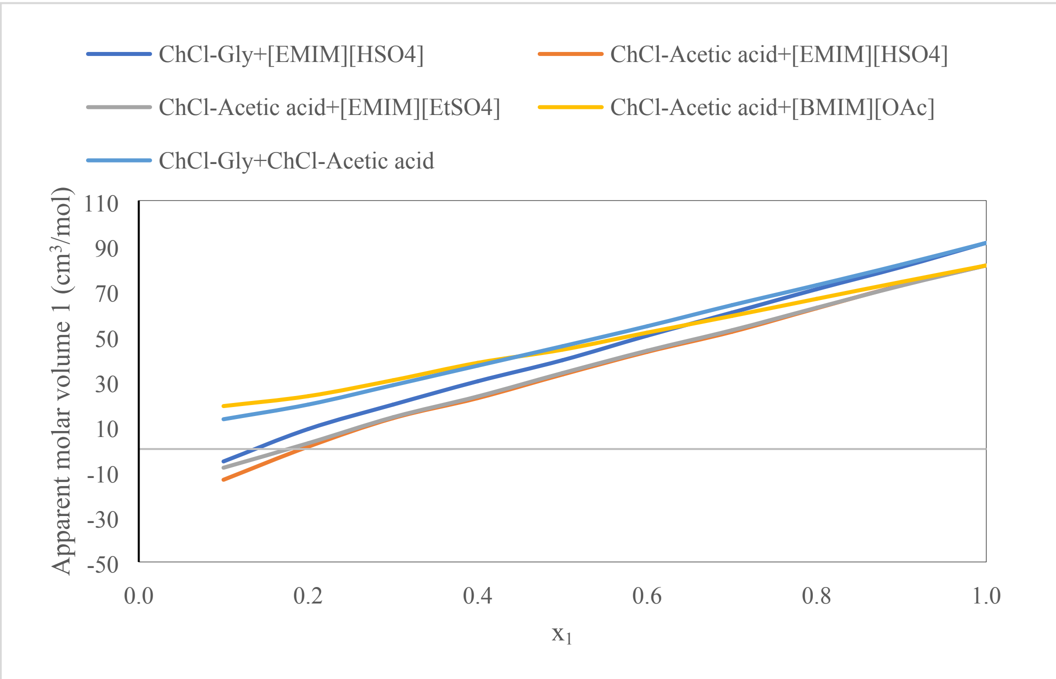


Figure S130: Apparent molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 333.15 K.

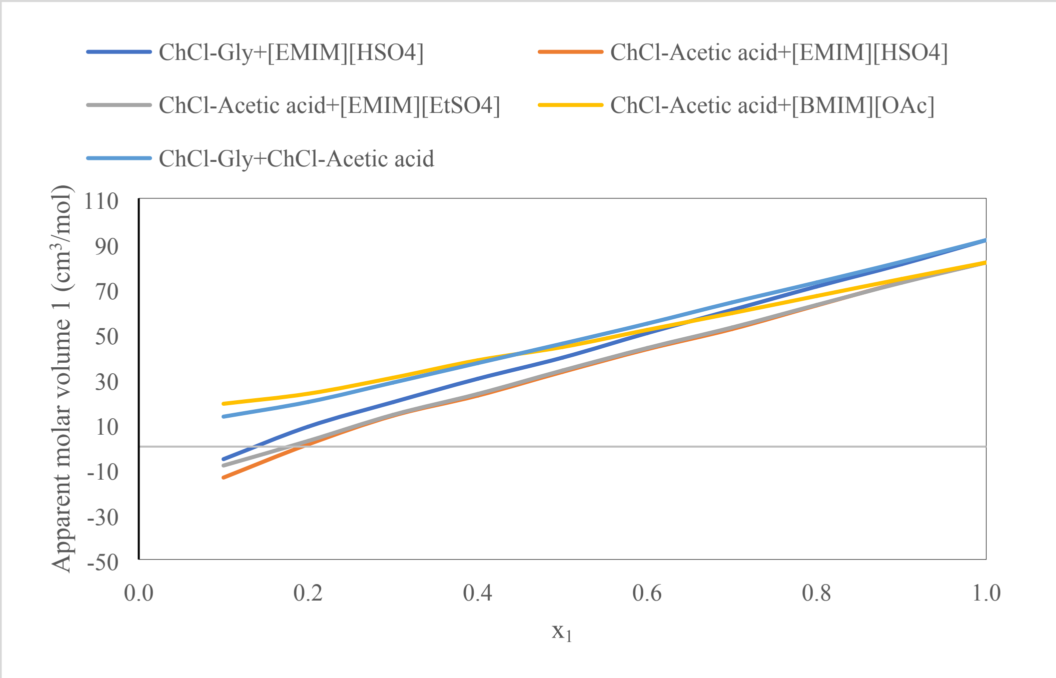


Figure S131: Apparent molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 338.15 K.

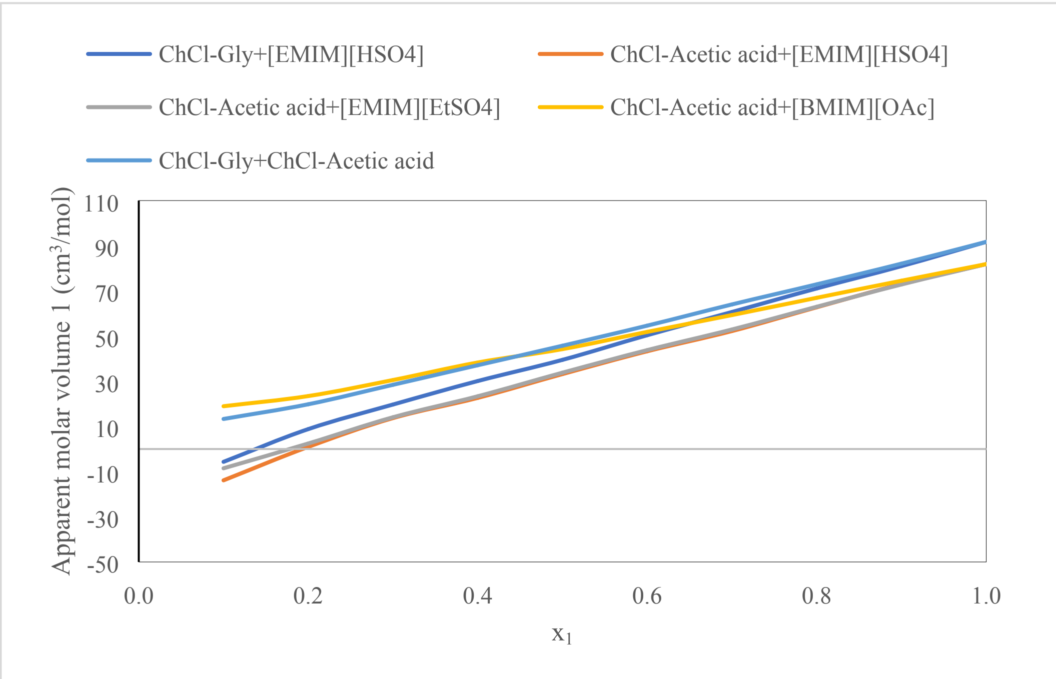


Figure S132: Apparent molar volume 1 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 343.15 K.

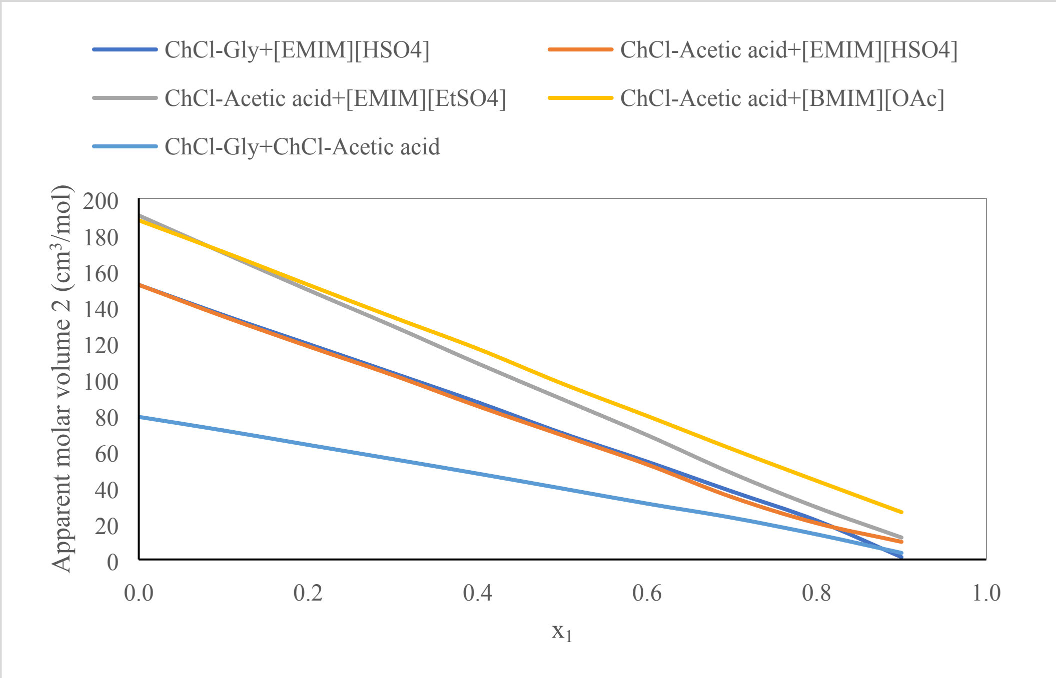


Figure S133: Apparent molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 293.15 K.

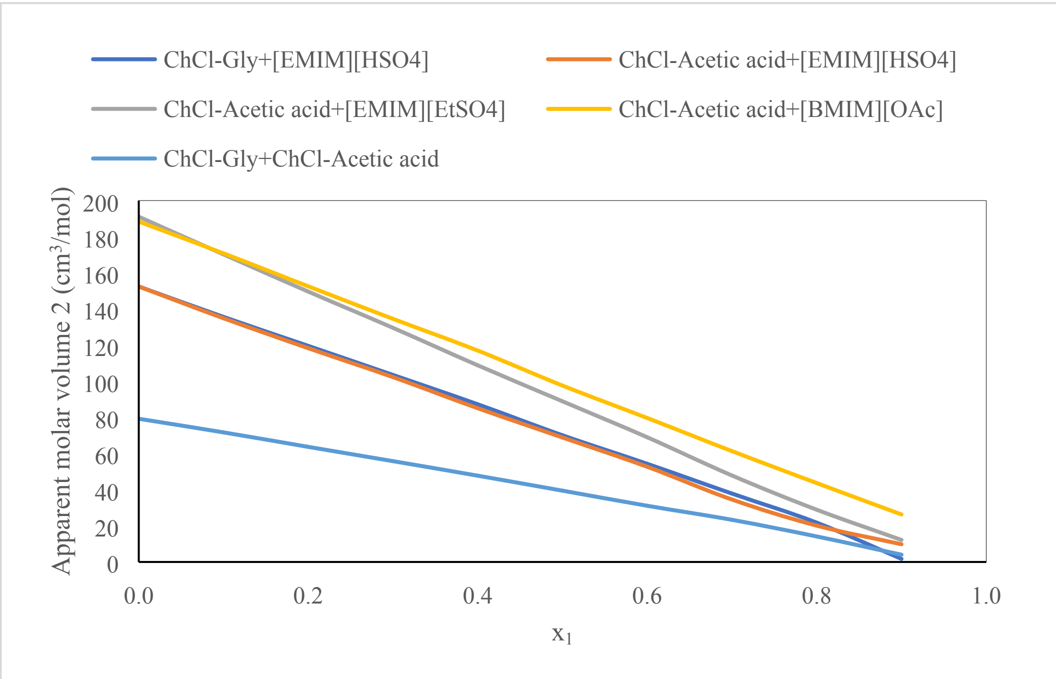


Figure S134: Apparent molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 298.15 K.

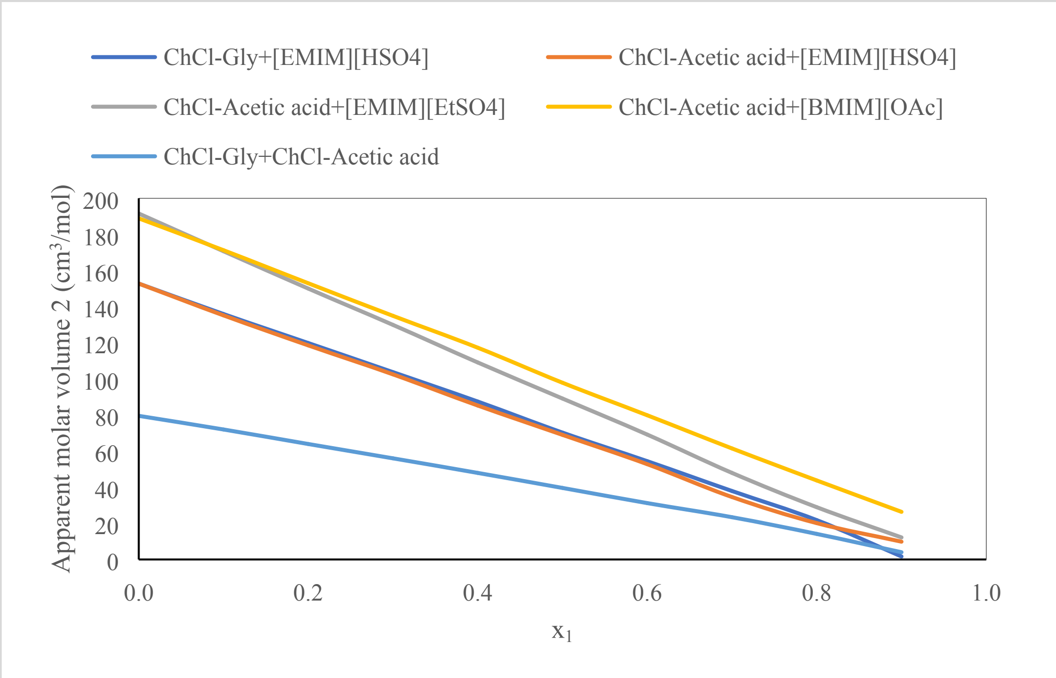


Figure S135: Apparent molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 303.15 K.

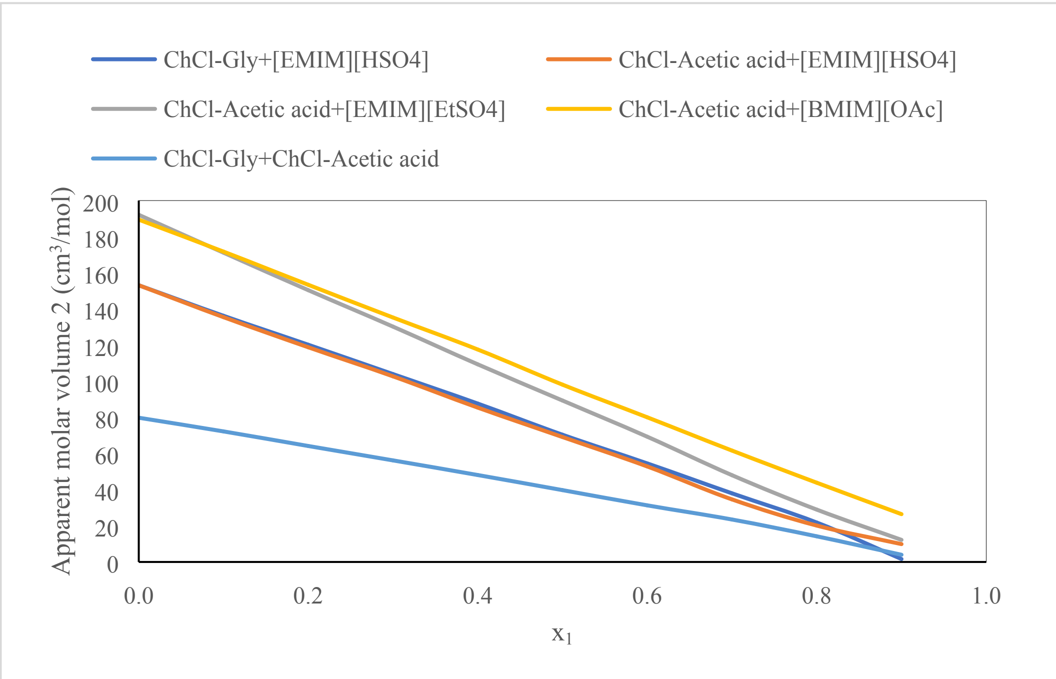


Figure S136: Apparent molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 308.15 K.

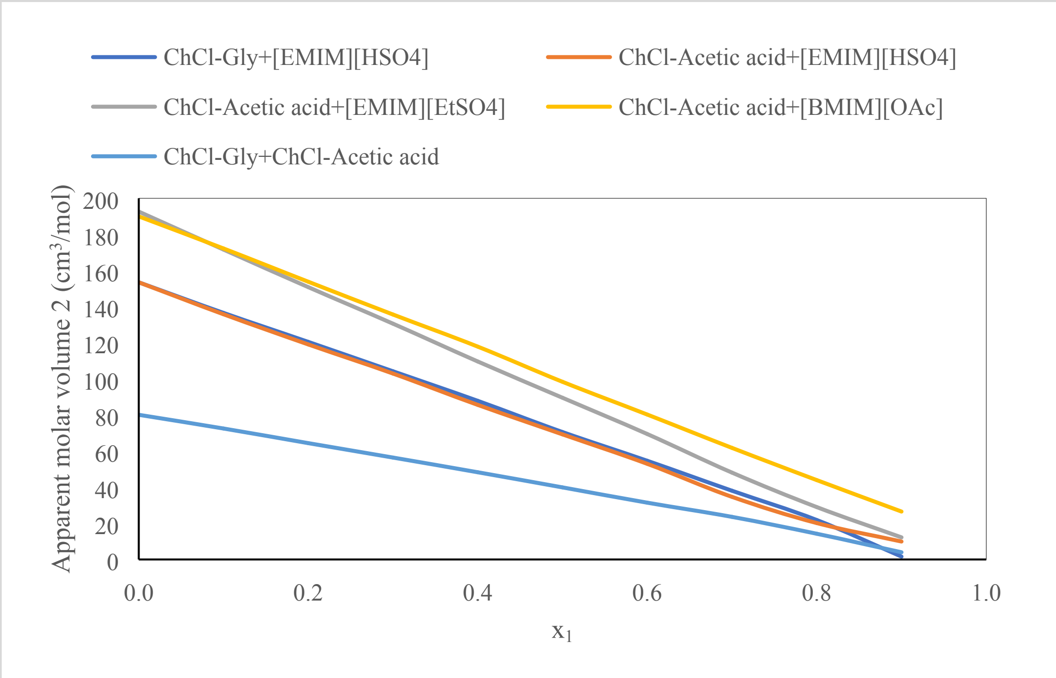


Figure S137: Apparent molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 313.15 K.

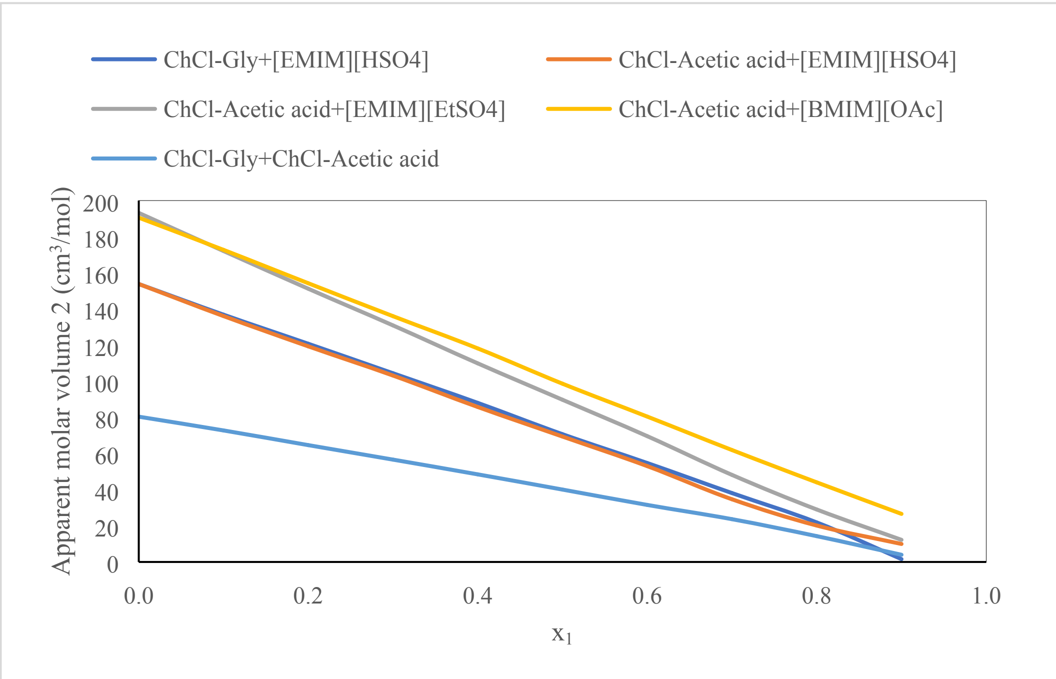


Figure S138: Apparent molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 318.15 K.

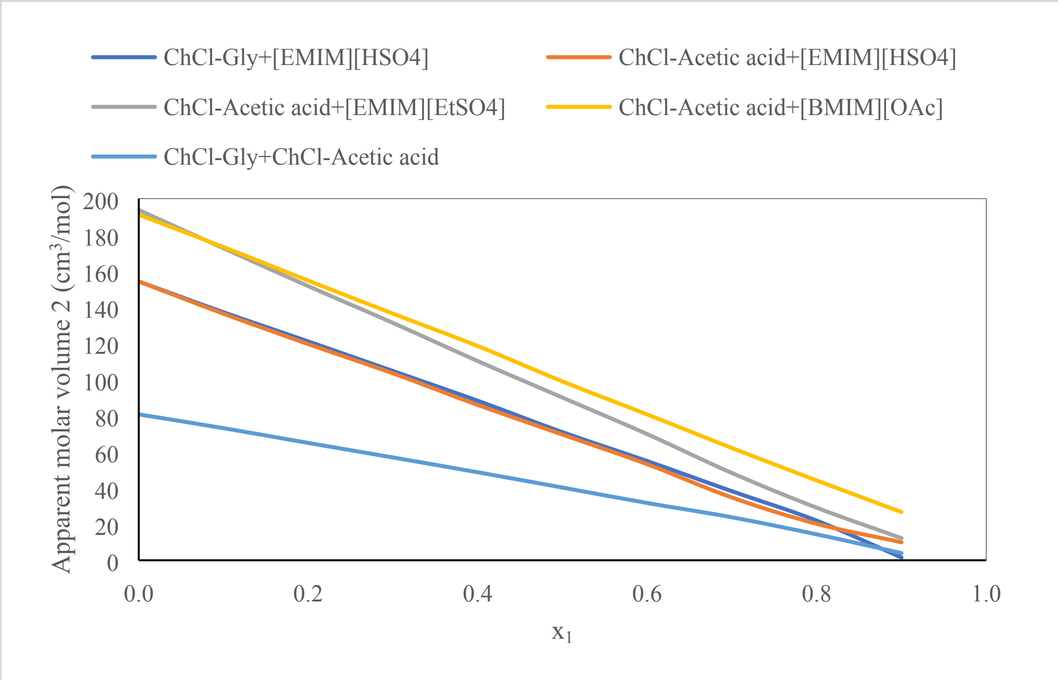


Figure S139: Apparent molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 323.15 K.

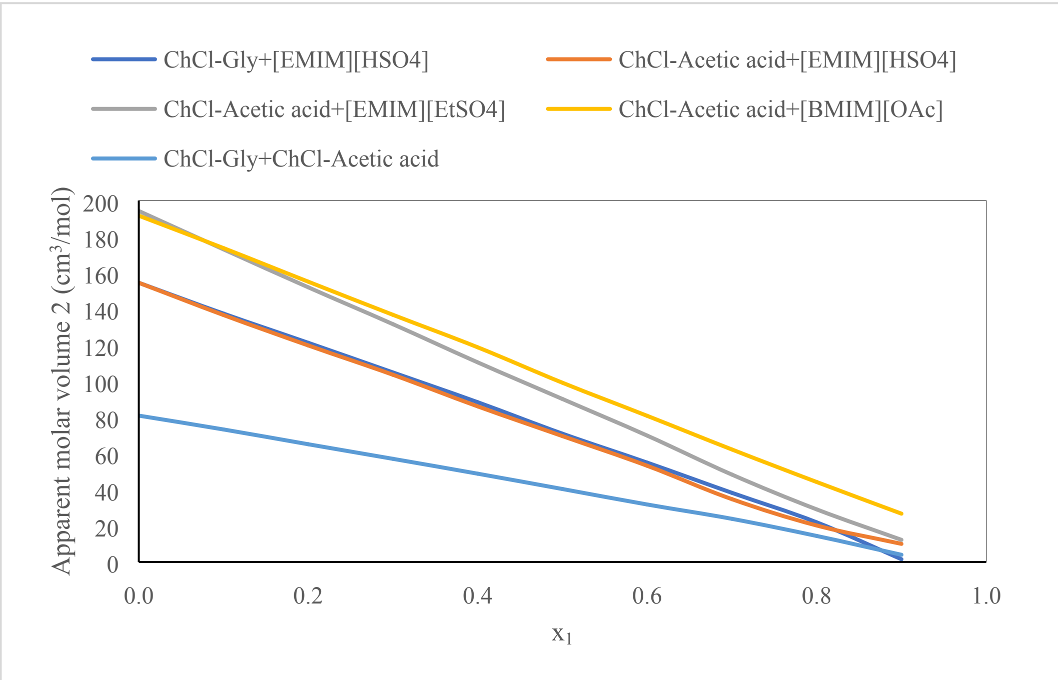


Figure S140: Apparent molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 328.15 K.

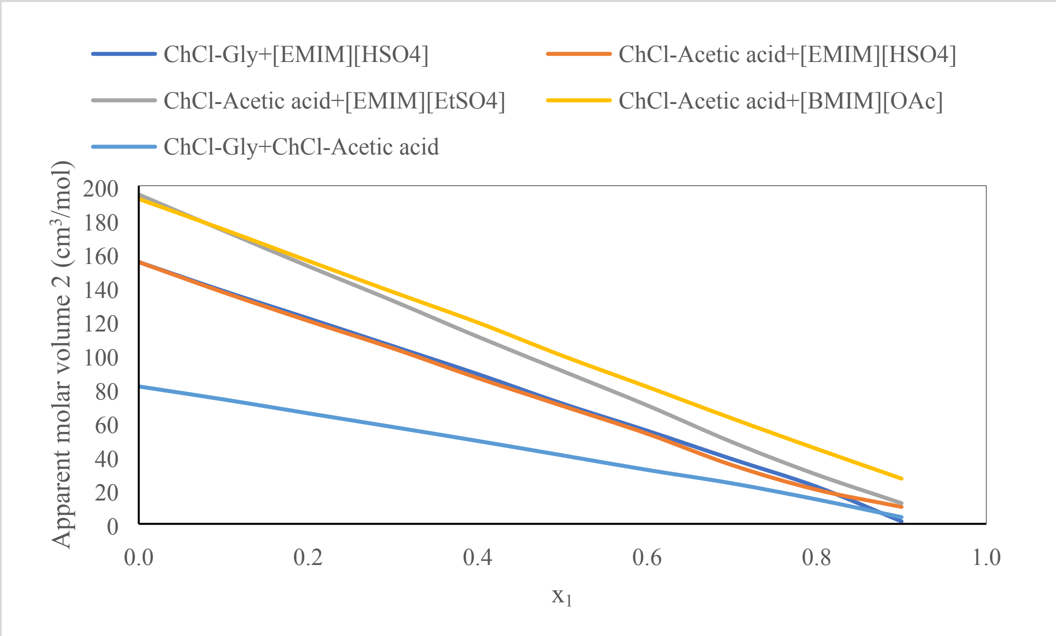


Figure S141: Apparent molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 333.15 K.

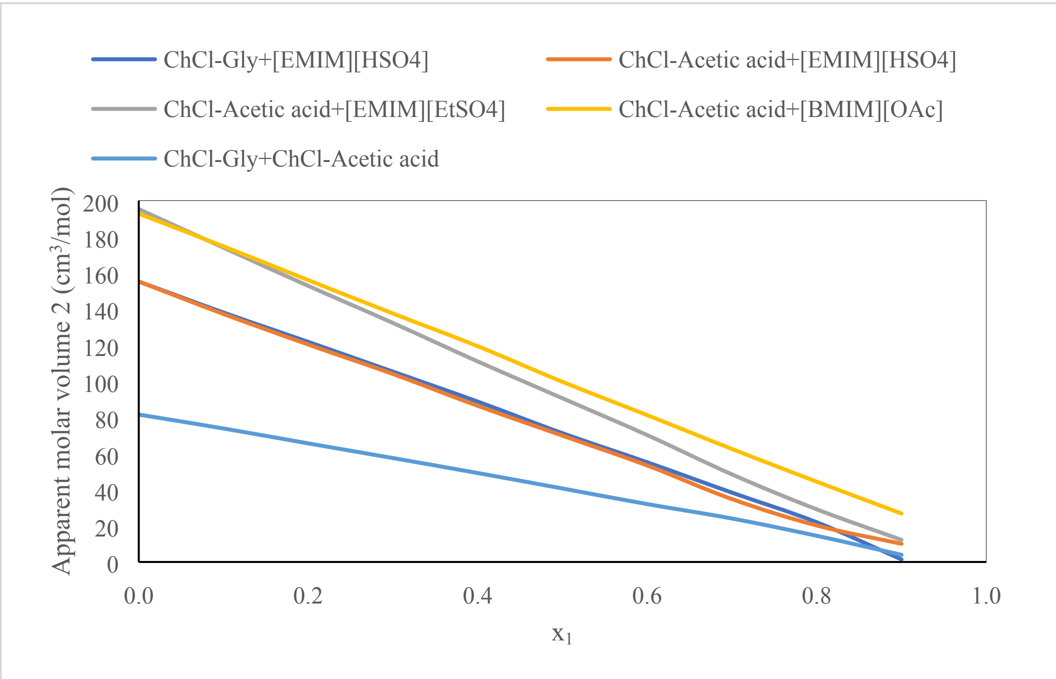


Figure S142: Apparent molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 338.15 K.

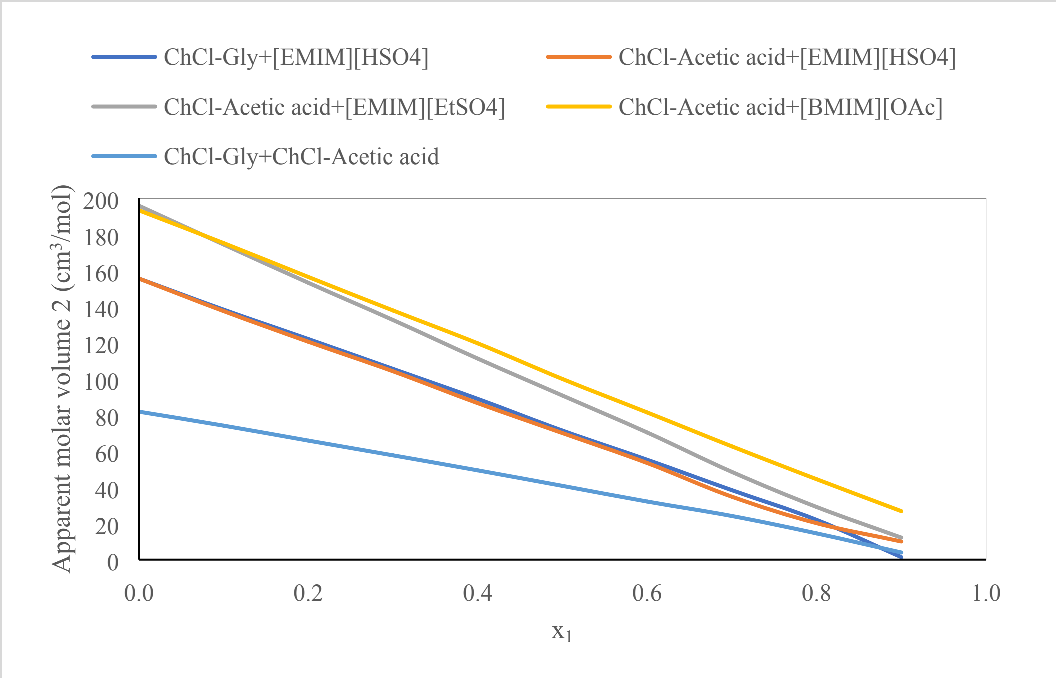


Figure S143: Apparent molar volume 2 of mixed systems with respect to mole fraction of component 1 from 0 to 1 at temperature 343.15 K.

Table S1: Isobaric thermal expansion coefficient for all the studied binary mixtures for entire mole fractions at different temperatures from 293.15 K to 343.15 K.

				α*10^{-4} K^{-1}					
T (K)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
				n-butyl acetate+n-butanol					
293.15	9.7385	10.8644	10.7980	10.7828	11.7959	11.7074	11.6496	11.5424	11.4701
298.15	9.7864	10.9197	10.8536	10.8388	11.8597	11.7719	11.7148	11.6082	11.5362
303.15	9.8354	10.9757	10.9105	10.896	11.9252	11.8381	11.7815	11.6756	11.6038
308.15	9.8853	11.0331	10.9687	10.9542	11.9918	11.9055	11.8493	11.744	11.6724
313.15	9.9363	11.0915	11.0278	11.0136	12.0597	11.974	11.9182	11.8136	11.7425
318.15	9.9883	11.1512	11.088	11.0742	12.1287	12.044	11.9887	11.8847	11.8136
323.15	10.0414	11.212	11.1495	11.136	12.1993	12.1153	12.0603	11.957	11.8861
328.15	10.0957	11.2742	11.2124	11.1992	12.2714	12.1881	12.1334	12.0307	11.96
333.15	10.1513	11.3379	11.2768	11.2637	12.3449	12.2624	12.2084	12.106	12.0353
338.15	10.2082	11.4031	11.3427	11.3299	12.4202	12.3384	12.2844	12.1826	12.1121
343.15	10.2667	11.4699	11.4102	11.3976	12.4972	12.4162	12.3623	12.2609	12.1905
				n-butyl acetate+acetic acid					
293.15	10.5955	10.7717	11.0300	11.1709	11.3837	11.5311	11.688	11.9573	12.1776
298.15	10.6517	10.8291	11.0904	11.2322	11.4472	11.5958	11.7531	12.0253	12.2475
303.15	10.7090	10.8875	11.1520	11.2947	11.5119	11.6617	11.8198	12.0948	12.3191
308.15	10.7669	10.9467	11.2143	11.358	11.5777	11.7286	11.8877	12.1655	12.3919
313.15	10.8256	11.0067	11.2775	11.4222	11.6443	11.7965	11.9564	12.2373	12.466
318.15	10.8852	11.0676	11.3417	11.4874	11.7117	11.8656	12.0265	12.3104	12.5415
323.15	10.9455	11.1294	11.4069	11.5538	11.7805	11.9358	12.0977	12.3847	12.6183
328.15	11.0066	11.1922	11.473	11.621	11.8503	12.0072	12.1703	12.4606	12.6967
333.15	11.0687	11.2560	11.5402	11.6896	11.9213	12.0798	12.2441	12.5379	12.7766
338.15	11.1318	11.3207	11.6085	11.7594	11.9935	12.1538	12.3195	12.6166	12.8581

343.15	11.1959	11.3867	11.6782	11.8302	12.0672	12.2292	12.3963	12.6969	12.9413
DES$_1$(ChCl-Gly) + IL$_1$([EMIM][HSO_4])									
293.15	4.4577	4.5110	4.5663	4.6254	4.7017	4.7508	4.8112	4.8661	4.9419
298.15	4.4679	4.5214	4.5767	4.636	4.7125	4.7618	4.8224	4.8775	4.9534
303.15	4.4782	4.5318	4.5872	4.6466	4.7235	4.7729	4.8338	4.8889	4.9652
308.15	4.4884	4.5398	4.5977	4.6574	4.7345	4.7842	4.8452	4.9005	4.977
313.15	4.4985	4.5502	4.6083	4.6682	4.7456	4.7955	4.8567	4.9122	4.9889
318.15	4.5086	4.5606	4.6189	4.6791	4.7568	4.8068	4.8683	4.924	5.0009
323.15	4.5189	4.5710	4.6296	4.69	4.7679	4.8182	4.8799	4.9357	5.013
328.15	4.5291	4.5814	4.6403	4.7009	4.7792	4.8296	4.8915	4.9475	5.025
333.15	4.5394	4.5919	4.651	4.7118	4.7904	4.8411	4.9032	4.9594	5.0372
338.15	4.5497	4.6024	4.6618	4.7228	4.8017	4.8526	4.9149	4.9713	5.0495
343.15	4.5600	4.6130	4.6726	4.7339	4.8131	4.8641	4.9267	4.9833	5.0618
DES $_2$(ChCl-Acetic acid) + IL$_1$([EMIM][HSO_4])									
293.15	4.4940	4.5800	5.4307	5.5559	5.6598	5.7723	5.9286	6.0372	7.0341
298.15	4.5049	4.5912	5.4446	5.5709	5.6757	5.7892	5.9470	6.0566	7.0576
303.15	4.5156	4.6026	5.4586	5.586	5.6917	5.8062	5.9655	6.0762	7.0813
308.15	4.5262	4.614	5.4727	5.6011	5.7078	5.8232	5.984	6.0958	7.1051
313.15	4.5369	4.6255	5.4868	5.6163	5.7238	5.8403	6.0026	6.1155	7.129
318.15	4.5477	4.6369	5.5009	5.6314	5.7399	5.8574	6.0212	6.1353	7.1529
323.15	4.5584	4.6484	5.515	5.6465	5.756	5.8746	6.0399	6.155	7.1771
328.15	4.5692	4.6599	5.5291	5.6617	5.7721	5.8918	6.0587	6.1749	7.2012
333.15	4.58	4.6713	5.5432	5.6769	5.7883	5.909	6.0775	6.195	7.2256
338.15	4.5908	4.6828	5.5573	5.6922	5.8045	5.9264	6.0964	6.215	7.2501
343.15	4.6016	4.6944	5.5715	5.7075	5.8208	5.9438	6.1155	6.2352	7.2746
DES$_2$(ChCl-Acetic acid) + IL$_2$([EMIM][$EtSO_4$])									

293.15	5.7217	5.7933	5.8508	5.9267	5.9851	6.0475	6.1355	7.0803	7.1539
298.15	5.7380	5.8102	5.8682	5.9449	6.0038	6.0668	6.1556	7.1041	7.1785
303.15	5.7544	5.8272	5.8858	5.9632	6.0226	6.0862	6.1759	7.1281	7.2033
308.15	5.7708	5.8442	5.9034	5.9815	6.0415	6.1058	6.1964	7.1522	7.2282
313.15	5.7872	5.8613	5.921	5.9998	6.0604	6.1253	6.2169	7.1764	7.2533
318.15	5.8037	5.8785	5.9387	6.0182	6.0795	6.1449	6.2375	7.2007	7.2784
323.15	5.8201	5.8956	5.9564	6.0367	6.0985	6.1647	6.2582	7.2251	7.3037
328.15	5.8366	5.9128	5.9741	6.0552	6.1176	6.1845	6.2789	7.2496	7.3291
333.15	5.8532	5.9300	5.9919	6.0738	6.1368	6.2043	6.2998	7.2742	7.3546
338.15	5.8697	5.9473	6.0098	6.0924	6.1561	6.2242	6.3207	7.2990	7.3803
343.15	5.8864	5.9646	6.0277	6.1111	6.1754	6.2443	6.3417	7.3239	7.4061
DES_2(ChCl-Acetic acid) + IL_3([BMIM][OAc])									
293.15	5.6384	5.6127	6.5124	6.4672	6.4721	6.4416	6.4224	6.3975	7.2932
298.15	5.6548	5.6295	6.5324	6.4877	6.4925	6.4625	6.4435	6.4191	7.3182
303.15	5.6715	5.6465	6.5525	6.5084	6.5132	6.4836	6.4650	6.4410	7.3436
308.15	5.6883	5.6636	6.5726	6.5292	6.5339	6.5047	6.4864	6.4629	7.3690
313.15	5.7052	5.6806	6.5929	6.5501	6.5547	6.5260	6.5080	6.4849	7.3946
318.15	5.7220	5.6977	6.6132	6.5710	6.5755	6.5474	6.5297	6.5070	7.4203
323.15	5.7389	5.7149	6.6336	6.5921	6.5965	6.5688	6.5514	6.5292	7.4462
328.15	5.7558	5.7321	6.6541	6.6131	6.6175	6.5903	6.5733	6.5516	7.4723
333.15	5.7728	5.7493	6.6745	6.6343	6.6386	6.6119	6.5952	6.5740	7.4985
338.15	5.7899	5.7666	6.6952	6.6556	6.6598	6.6337	6.6173	6.5966	7.5249
343.15	5.8070	5.7840	6.7159	6.6770	6.6810	6.6555	6.6394	6.6193	7.5515
DES_1(ChCl-Gly) + DES_2(ChCl-Acetic acid)									
293.15	6.2872	6.2295	6.1676	6.1146	6.0707	5.1650	5.1129	5.0808	5.0407
298.15	6.3084	6.2497	6.1868	6.1328	6.0883	5.1794	5.1266	5.0939	5.0532

303.15	6.3297	6.2700	6.2062	6.1513	6.1060	5.1940	5.1404	5.1073	5.0659
308.15	6.3512	6.2906	6.2257	6.1699	6.1239	5.2087	5.1542	5.1206	5.0786
313.15	6.3728	6.3111	6.2452	6.1886	6.1418	5.2234	5.1682	5.1341	5.0914
318.15	6.3946	6.3319	6.2649	6.2073	6.1598	5.2383	5.1822	5.1476	5.1043
323.15	6.4165	6.3527	6.2847	6.2262	6.1779	5.2531	5.1962	5.1611	5.1173
328.15	6.4385	6.3737	6.3045	6.2451	6.1962	5.2681	5.2104	5.1747	5.1303
333.15	6.4606	6.3948	6.3246	6.2642	6.2145	5.2832	5.2246	5.1885	5.1434
338.15	6.4829	6.4160	6.3447	6.2834	6.2330	5.2983	5.2389	5.2023	5.1565
343.15	6.5054	6.4374	6.3650	6.3028	6.2516	5.3136	5.2533	5.2162	5.1698

$u(T) = \pm 0.01K$, $u(\alpha^*) = \pm 4.5 \times 10^{-5} K^{-1}$.

Table S2: Excess isobaric expansivity for all the studied systems at different temperatures from 293.15 K to 343.15 K for entire mole fractions.

				α^E*10^{-4} K^{-1}					
T (K)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
				n-butyl acetate+n-butanol					
293.15	-0.1678	0.8628	0.6109	0.3306	1.0508	0.7074	0.4697	0.2578	0.1370
298.15	-0.1650	0.8714	0.6170	0.3330	1.0568	0.7105	0.4712	0.2583	0.1372
303.15	-0.1637	0.8784	0.6221	0.3344	1.0623	0.7132	0.4719	0.2584	0.1368
308.15	-0.1628	0.8853	0.6272	0.3362	1.0687	0.7171	0.4741	0.2599	0.1380
313.15	-0.1621	0.8921	0.6321	0.3375	1.0745	0.7203	0.4753	0.2606	0.1384
318.15	-0.1616	0.8988	0.6365	0.3384	1.0797	0.7229	0.4760	0.2604	0.1378
323.15	-0.1609	0.9058	0.6416	0.3401	1.0863	0.7270	0.4781	0.2620	0.1389
328.15	-0.1606	0.9127	0.6465	0.3415	1.0926	0.7305	0.4796	0.2627	0.1392
333.15	-0.1600	0.9199	0.6517	0.3431	1.0992	0.7345	0.4820	0.2641	0.1400
338.15	-0.1596	0.9271	0.6568	0.3445	1.1055	0.7380	0.4831	0.2645	0.1399
343.15	-0.1592	0.9344	0.6620	0.3462	1.1123	0.7423	0.4851	0.2654	0.1404
				n-butyl acetate+acetic acid					
293.15	0.0970	0.1877	0.2965	0.2557	0.3018	0.3264	0.4067	0.6347	0.8366
298.15	0.0966	0.1874	0.2976	0.2556	0.3021	0.3265	0.4065	0.6369	0.8406
303.15	0.0963	0.1871	0.2986	0.2552	0.3018	0.3260	0.4058	0.6386	0.8441
308.15	0.0961	0.1872	0.3001	0.2557	0.3029	0.3268	0.4068	0.6419	0.8493
313.15	0.0959	0.1872	0.3013	0.2555	0.3030	0.3267	0.4065	0.6443	0.8538
318.15	0.0959	0.1872	0.3023	0.2549	0.3022	0.3258	0.4055	0.6457	0.8573
323.15	0.0959	0.1876	0.3040	0.2553	0.3028	0.3263	0.4062	0.6488	0.8627
328.15	0.0959	0.1879	0.3054	0.2551	0.3026	0.3259	0.4059	0.6513	0.8674
333.15	0.0960	0.1883	0.3069	0.2552	0.3028	0.3259	0.4059	0.6542	0.8727
338.15	0.0965	0.1889	0.3084	0.2551	0.3023	0.3251	0.4053	0.6562	0.8772

343.15	0.0969	0.1896	0.3102	0.2550	0.3022	0.3247	0.4050	0.6588	0.8824
				DES$_1$(ChCl-Gly) + IL$_1$([EMIM][HSO_4])					
293.15	0.0710	0.1075	0.1260	0.1199	0.0994	0.0302	-0.0235	-0.0528	-0.0218
298.15	0.0712	0.1079	0.1260	0.1196	0.0987	0.0289	-0.0255	-0.0552	-0.0243
303.15	0.0716	0.1082	0.1264	0.1200	0.0990	0.0291	-0.0254	-0.0552	-0.0242
308.15	0.0718	0.1062	0.1268	0.1204	0.0994	0.0293	-0.0254	-0.0553	-0.0242
313.15	0.0717	0.1064	0.1270	0.1207	0.0997	0.0294	-0.0254	-0.0554	-0.0241
318.15	0.0720	0.1068	0.1276	0.1212	0.1001	0.0296	-0.0254	-0.0555	-0.0242
323.15	0.0724	0.1073	0.1282	0.1218	0.1006	0.0298	-0.0254	-0.0556	-0.0242
328.15	0.0728	0.1078	0.1288	0.1224	0.1011	0.0301	-0.0254	-0.0558	-0.0242
333.15	0.0732	0.1084	0.1294	0.123	0.1016	0.0302	-0.0254	-0.0559	-0.0242
338.15	0.0736	0.1089	0.1301	0.1236	0.1021	0.0305	-0.0254	-0.0561	-0.0242
343.15	0.0741	0.1096	0.1308	0.1243	0.1027	0.0307	-0.0253	-0.0562	-0.0242
				DES$_2$(ChCl-Acetic acid) + IL$_1$([EMIM][HSO_4])					
293.15	0.0930	0.106	0.7946	0.6271	0.2815	-0.1801	-0.6062	-0.9460	-0.1946
298.15	0.0938	0.1067	0.7968	0.6286	0.2810	-0.1829	-0.6107	-0.9517	-0.1972
303.15	0.0945	0.1075	0.7992	0.630	0.2805	-0.1858	-0.6152	-0.9573	-0.1998
308.15	0.0950	0.1082	0.8015	0.6314	0.2800	-0.1888	-0.6198	-0.9630	-0.2024
313.15	0.0955	0.1089	0.8037	0.6327	0.2793	-0.1918	-0.6244	-0.9686	-0.2050
318.15	0.0962	0.1098	0.8061	0.6341	0.2788	-0.1948	-0.629	-0.9742	-0.2075
323.15	0.0973	0.1111	0.8088	0.6358	0.2784	-0.1976	-0.6335	-0.9799	-0.2100
328.15	0.0978	0.1118	0.8109	0.6370	0.2776	-0.2007	-0.6382	-0.9857	-0.2126
333.15	0.0986	0.1127	0.8133	0.6384	0.2770	-0.2038	-0.6429	-0.9914	-0.2153
338.15	0.0994	0.1136	0.8157	0.6398	0.2763	-0.2069	-0.6477	-0.9974	-0.2179
343.15	0.1002	0.1146	0.8182	0.6413	0.2759	-0.2098	-0.6522	-1.0029	-0.2201
				DES$_2$(ChCl-Acetic acid) + IL$_2$([EMIM][$EtSO_4$])					

293.15	0.0691	0.1073	0.0897	0.0255	-0.1432	-0.3939	-0.6536	0.0004	-0.0947
298.15	0.0697	0.1083	0.0907	0.0262	-0.1436	-0.3958	-0.6568	-0.0009	-0.0962
303.15	0.0703	0.1093	0.0917	0.0269	-0.1439	-0.3977	-0.6600	-0.0022	-0.0977
308.15	0.0710	0.1104	0.0927	0.0276	-0.1443	-0.3995	-0.6632	-0.0035	-0.0992
313.15	0.0716	0.1114	0.0937	0.0283	-0.1446	-0.4014	-0.6664	-0.0048	-0.1006
318.15	0.0723	0.1125	0.0948	0.0291	-0.1449	-0.4032	-0.6695	-0.0061	-0.1020
323.15	0.0729	0.1136	0.0959	0.0299	-0.1452	-0.405	-0.6726	-0.0072	-0.1034
328.15	0.0737	0.1147	0.0970	0.0307	-0.1454	-0.4068	-0.6758	-0.0086	-0.1048
333.15	0.0743	0.1158	0.0981	0.0315	-0.1457	-0.4087	-0.6790	-0.0099	-0.1062
338.15	0.0750	0.1170	0.0992	0.0323	-0.146	-0.4106	-0.6823	-0.0112	-0.1077
343.15	0.0758	0.1182	0.1004	0.0333	-0.1461	-0.4122	-0.6852	-0.0120	-0.1087
DES_2(ChCl-Acetic acid) + IL_3([BMIM][OAc])									
293.15	-0.0544	-0.113	0.7124	0.5290	0.3106	-0.0263	-0.3839	-0.6902	0.0428
298.15	-0.0542	-0.1126	0.7155	0.5315	0.3116	-0.0270	-0.3863	-0.6938	0.0417
303.15	-0.0538	-0.1122	0.7184	0.5342	0.3126	-0.0275	-0.3885	-0.6974	0.0407
308.15	-0.0536	-0.1119	0.7213	0.5368	0.3136	-0.0280	-0.3909	-0.7009	0.0397
313.15	-0.0532	-0.1116	0.7243	0.5394	0.3147	-0.0285	-0.3932	-0.7045	0.0388
318.15	-0.0529	-0.1114	0.7272	0.5420	0.3156	-0.0290	-0.3955	-0.7080	0.0380
323.15	-0.0528	-0.1111	0.7301	0.5447	0.3167	-0.0295	-0.3978	-0.7115	0.0373
328.15	-0.0525	-0.1108	0.7332	0.5473	0.3177	-0.0300	-0.4002	-0.7150	0.0365
333.15	-0.0522	-0.1105	0.7362	0.5500	0.3187	-0.0306	-0.4026	-0.7187	0.0357
338.15	-0.0519	-0.1102	0.7393	0.5527	0.3197	-0.0311	-0.4049	-0.7222	0.0349
343.15	-0.0516	-0.1098	0.7425	0.5555	0.3209	-0.0313	-0.4070	-0.7255	0.0347
DES_1(ChCl-Gly) + DES_2(ChCl-Acetic acid)									
293.15	-0.9772	-0.9134	-0.7289	-0.4044	0.0072	-0.4644	-0.1865	-0.0163	0.0398
298.15	-0.9823	-0.9189	-0.7342	-0.4088	0.0045	-0.4679	-0.1889	-0.0180	0.0381

303.15	-0.9873	-0.9243	-0.7393	-0.4126	0.0028	-0.4698	-0.1892	-0.0173	0.0388
308.15	-0.9923	-0.9297	-0.7444	-0.4164	0.0011	-0.4718	-0.1896	-0.0167	0.0396
313.15	-0.9973	-0.9350	-0.7494	-0.4202	-0.0006	-0.4738	-0.1901	-0.0161	0.0402
318.15	-1.0022	-0.9403	-0.7545	-0.4239	-0.0023	-0.4758	-0.1906	-0.0156	0.0409
323.15	-1.0070	-0.9456	-0.7594	-0.4277	-0.0039	-0.4778	-0.191	-0.0151	0.0415
328.15	-1.0120	-0.9509	-0.7645	-0.4315	-0.0056	-0.4798	-0.1915	-0.0146	0.0422
333.15	-1.0170	-0.9563	-0.7696	-0.4353	-0.0074	-0.4818	-0.192	-0.0140	0.0429
338.15	-1.0219	-0.9616	-0.7747	-0.4391	-0.0090	-0.4838	-0.1924	-0.0134	0.0435
343.15	-1.0263	-0.9665	-0.7794	-0.4426	-0.0104	-0.4857	-0.1928	-0.0128	0.0443

$u(T) = \pm 0.01$K, $u(\alpha^{*E}) = \pm 7.2 \times 10^{-5}$ K^{-1}.

Table S3: Molar volumes of pure compounds at different temperatures from 293.15 K to 343.15 K.

T(K)	Molar volume V_i^0(cm^{3}mol^{-1})							
	n-butyl acetate	n-butanol	Acetic acid	DES_1(ChCl-Gly)	DES_2(ChCl-acetic acid)	IL_1([EMIM][HSO_4])	IL_2([EMIM][$EtSO_4$])	IL_3([BMIM][OAc])
293.15	131.79033	91.54460	57.18067	89.51326	78.95929	152.09992	190.52419	187.83159
298.15	132.55734	91.95916	57.48832	89.76712	79.24478	152.44398	191.05257	188.36697
303.15	133.34864	92.39706	57.80096	89.97739	79.53234	152.78848	191.58234	188.90540
308.15	134.13395	92.84846	58.11647	90.19092	79.82125	153.13454	192.11194	189.44874
313.15	134.94424	93.31017	58.43657	90.40545	80.11080	153.48669	192.64290	189.99157
318.15	135.78025	93.78361	58.75964	90.62254	80.40095	153.82797	193.17364	190.53935
323.15	136.61061	94.26667	59.08688	90.83990	80.69171	154.16963	193.70414	191.08845
328.15	137.46746	94.76201	59.41838	91.05831	80.98534	154.51051	194.23437	191.63702
333.15	138.33512	95.26870	59.75481	91.27855	81.28036	154.85291	194.76751	192.18689
338.15	139.23049	95.78950	60.09447	91.49985	81.57676	155.19567	195.30036	192.73805
343.15	140.13753	96.32354	60.43984	91.72145	81.86991	155.53763	195.83288	193.29050

Table S4: Regression coefficient for density of the mixed solvent systems with respect to mole fraction for temperatures from 293.15 K to 343.15 K.

x_1	DES_1+IL_1	DES_2+IL_1	DES_2+IL_2	DES_2+IL_3	DES_1+DES_2
0.0	0.9999	0.9999	1.0000	1.0000	1.0000
0.1	1.0000	1.0000	1.0000	1.0000	1.0000
0.2	0.9997	1.0000	1.0000	1.0000	1.0000
0.3	1.0000	1.0000	1.0000	1.0000	1.0000
0.4	1.0000	1.0000	1.0000	1.0000	1.0000
0.5	1.0000	1.0000	1.0000	1.0000	1.0000
0.6	1.0000	1.0000	1.0000	1.0000	1.0000
0.7	1.0000	1.0000	1.0000	1.0000	1.0000
0.8	1.0000	1.0000	1.0000	1.0000	1.0000
0.9	1.0000	1.0000	1.0000	1.0000	1.0000
1.0	0.9998	1.0000	1.0000	1.0000	0.9998

Table S5: Regression coefficient for excess molar volume for the mixed solvent systems with respect to mole fraction for temperatures from 293.15 K to 343.15 K.

T(K)	DES_1+IL_1	DES_2+IL_1	DES_2+IL_2	DES_2+IL_3	DES_1+DES_2
293.15	0.9734	0.9599	0.9864	0.9589	0.8894
298.15	0.9733	0.9594	0.9864	0.9590	0.8882
303.15	0.9729	0.9592	0.9863	0.9594	0.8886
308.15	0.9719	0.9591	0.9862	0.9599	0.8885
313.15	0.9721	0.9590	0.9861	0.9604	0.8890
318.15	0.9722	0.9587	0.9861	0.9611	0.8888
323.15	0.9722	0.9585	0.9860	0.9618	0.8883
328.15	0.9722	0.9582	0.9860	0.9623	0.8886
333.15	0.9722	0.9579	0.9859	0.963	0.8878
338.15	0.9722	0.9577	0.9859	0.9637	0.8883
343.15	0.9721	0.9575	0.9859	0.9644	0.8876

Table S6: Regression coefficient for Partial molar volume of component 1 for the mixed solvent systems with respect to mole fraction for temperatures from 293.15 K to 343.15 K.

T(K)	DES_1+IL_1	DES_2+IL_1	DES_2+IL_2	DES_2+IL_3	DES_1+DES_2
293.15	0.9991	0.9979	0.9982	0.9995	1.0000
298.15	0.9991	0.9979	0.9982	0.9995	1.0000
303.15	0.9991	0.9978	0.9982	0.9995	1.0000
308.15	0.9991	0.9978	0.9982	0.9995	1.0000
313.15	0.9991	0.9978	0.9982	0.9996	1.0000
318.15	0.9991	0.9978	0.9981	0.9996	1.0000
323.15	0.9991	0.9978	0.9981	0.9996	1.0000
328.15	0.9991	0.9978	0.9981	0.9996	1.0000
333.15	0.9991	0.9978	0.9981	0.9996	1.0000
338.15	0.9991	0.9978	0.9981	0.9996	1.0000
343.15	0.9991	0.9978	0.9980	0.9996	1.0000

Table S7: Regression coefficient for Partial molar volume of component 2 for the mixed solvent systems with respect to mole fraction for temperatures from 293.15 K to 343.15 K.

T(K)	DES_1+IL_1	DES_2+IL_1	DES_2+IL_2	DES_2+IL_3	DES_1+DES_2
293.15	0.9997	0.9992	0.9996	0.9999	0.9999
298.15	0.9997	0.9992	0.9996	0.9999	1.0000
303.15	0.9997	0.9992	0.9996	0.9999	1.0000
308.15	0.9997	0.9992	0.9996	0.9999	1.0000
313.15	0.9997	0.9992	0.9996	0.9999	1.0000
318.15	0.9997	0.9992	0.9996	0.9999	1.0000
323.15	0.9997	0.9992	0.9996	0.9999	1.0000
328.15	0.9997	0.9992	0.9996	0.9999	1.0000
333.15	0.9997	0.9992	0.9996	0.9999	1.0000
338.15	0.9997	0.9992	0.9996	0.9999	1.0000
343.15	0.9997	0.9991	0.9996	0.9999	1.0000

Table S8: Regression coefficient for excess partial molar volume of component 1 for the mixed solvent systems with respect to mole fraction for temperatures from 293.15 K to 343.15 K.

T(K)	DES_1+IL_1	DES_2+IL_1	DES_2+IL_2	DES_2+IL_3	DES_1+DES_2
293.15	0.9720	0.9761	0.9888	0.9355	0.9860
298.15	0.9721	0.9760	0.9888	0.9359	0.9878
303.15	0.9719	0.9758	0.9887	0.9366	0.9879
308.15	0.9726	0.9758	0.9887	0.9375	0.9879
313.15	0.9728	0.9756	0.9886	0.9384	0.9880
318.15	0.9728	0.9754	0.9886	0.9394	0.9878
323.15	0.9729	0.9752	0.9885	0.9401	0.9877
328.15	0.9728	0.9750	0.9885	0.9409	0.9876
333.15	0.9728	0.9748	0.9884	0.9420	0.9873
338.15	0.9728	0.9747	0.9884	0.9429	0.9872
343.15	0.9727	0.9746	0.9884	0.9439	0.9871

Table S9: Regression coefficient for excess partial molar volume of component 2 for the mixed solvent systems with respect to mole fraction for temperatures from 293.15 K to 343.15 K.

T(K)	DES_1+IL_1	DES_2+IL_1	DES_2+IL_2	DES_2+IL_3	DES_1+DES_2
293.15	0.9624	0.9815	0.9913	0.9459	0.9891
298.15	0.9627	0.9812	0.9913	0.9460	0.9905
303.15	0.9619	0.9812	0.9912	0.9466	0.9906
308.15	0.9599	0.9812	0.9912	0.9473	0.9908
313.15	0.9601	0.9812	0.9912	0.9480	0.9910
318.15	0.9603	0.9811	0.9912	0.9491	0.9911
323.15	0.9603	0.9810	0.9911	0.9500	0.9911
328.15	0.9603	0.9809	0.9911	0.9507	0.9911
333.15	0.9604	0.9808	0.9910	0.9517	0.9911
338.15	0.9605	0.9807	0.9910	0.9526	0.9911
343.15	0.9604	0.9806	0.9910	0.9534	0.9910

Table S10: Regression coefficient for apparent molar volume of component 1 for the mixed solvent systems with respect to mole fraction for temperatures from 293.15 K to 343.15 K.

T(K)	DES_1+IL_1	DES_2+IL_1	DES_2+IL_2	DES_2+IL_3	DES_1+DES_2
293.15	0.9987	0.9965	0.9993	0.9977	0.9991
298.15	0.9987	0.9965	0.9993	0.9977	0.9991
303.15	0.9986	0.9965	0.9993	0.9978	0.9991
308.15	0.9985	0.9965	0.9993	0.9978	0.9990
313.15	0.9986	0.9965	0.9993	0.9979	0.9990
318.15	0.9986	0.9965	0.9993	0.9979	0.9990
323.15	0.9986	0.9964	0.9993	0.9980	0.9989
328.15	0.9986	0.9964	0.9992	0.9980	0.9989
333.15	0.9985	0.9964	0.9992	0.9980	0.9989
338.15	0.9985	0.9964	0.9992	0.9981	0.9989
343.15	0.9985	0.9963	0.9992	0.9981	0.9989

Table S11: Regression coefficient for apparent molar volume of component 2 for the mixed solvent systems with respect to mole fraction for temperatures from 293.15 K to 343.15 K.

T(K)	DES_1+IL_1	DES_2+IL_1	DES_2+IL_2	DES_2+IL_3	DES_1+DES_2
293.15	0.9996	0.9983	0.9996	0.9999	0.9987
298.15	0.9996	0.9983	0.9996	0.9999	0.9989
303.15	0.9996	0.9982	0.9996	0.9999	0.9989
308.15	0.9996	0.9982	0.9996	0.9999	0.9989
313.15	0.9996	0.9982	0.9996	0.9999	0.9988
318.15	0.9996	0.9981	0.9996	0.9999	0.9988
323.15	0.9996	0.9981	0.9995	0.9999	0.9988
328.15	0.9996	0.9981	0.9995	0.9999	0.9988
333.15	0.9996	0.9981	0.9995	0.9999	0.9988
338.15	0.9996	0.9980	0.9995	0.9999	0.9987
343.15	0.9996	0.9980	0.9995	0.9999	0.9987