Based on the results and calculations for the room temperature setup, the average molarity of OH^- ions was 0.03681mol/L, the molar solubility of $Ca(OH)_2$ was 0.018405 mol/L, the Ksp value was 2.4938×10^{-5} and the ΔG was -26.348 kJ/mol. For the boiled setup, the average molarity of OH^- ions was 0.02208 mol/L, the molar solubility of $Ca(OH)_2$ was 0.01104 mol/L, the Ksp value was 5.3823×10^{-6} and the ΔG value was -36.817 KJ/mol. The calculated ΔH of aqueous $Ca(OH)_2$was 1.8656 kJ, while its ΔS was -0.064593 kJ.

IV. Sample Calculations

1) Moles KHP = 0.0425g ÷ 204.09 g/mol = 0.00020813 mol KHP
2) $M_{HCl}V_{HCl} = M_{OH}V_{OH}$ → M NaOH = 0.0425 ÷ (204.2 x 0.01515L) = 0.01378 M NaOH
3) $M_{HCl}V_{HCl} = M_{OH}V_{OH}$ → M $Ca(OH)_2$ = (0.01455x0.0253L) ÷ 0.01L = 0.03681 M Ca(OH)
4) Ksp = $[Ca^{2+}] \times [OH^-]^2$ → $Ksp_{\text{room temp}} = (0.03681 \div 2) \times (0.03681)^2 = 2.4938 \times 10^{-5}$
5) Ksp = $[Ca^{2+}] \times [OH^-]^2$ → $Ksp_{\text{boiling temp}} = (0.02208 \div 2) \times (0.02208)^2 = 5.382 \times 10^{-6}$
6) $\Delta G = -RT\ln K_{sp}$ → ΔG = -(8.314)(299)ln(2.4938×10^{-5}) =-26,348.199 → -26.348 KJ/mol
7) Average M OH^- = 0.03681mol/L → Molar solubility of $Ca(OH)_2$ = 0.03681÷2 = 0.018405 mol/L
8) 21.179 = ΔH - 299ΔS (solve algebraically)
9) 24.990 = ΔH - 358ΔS

V. Literature Cited

1) Bishop, M. Titration Problems. *An Introduction to Chemistry.* Retrieved 12 August 2014 from < http://preparatorychemistry.com/bishop_titration.htm>
2) Solubility Product Constant near 25°C. Retrieved 12 August 2014 from < http://bilbo.chm.uri.edu/CHM112/tables/KspTable.htm>