Title:	Hydrolysis of Potassium Cyanate Under Vibrational Ultra-Strong Coupling
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Abstract:	In this thesis, we try to study the effect of vibrational ultra-strong coupling (USC) on the kinetics of K + OCN - hydrolysis reaction. K + OCN - is an ionic compound having a strong vibrational transition at 2169 cm -1 and H 2 O has broad -OH stretching vibrational band at 3400 cm -1 . K + OCN - on reaction with H 2 O forms carbonate, bicarbonate and ammonium hydroxide. In the course of reaction due to the formation of the products, the refractive index of the solution changes, and this change was used to monitor the apparent reaction rates. To compare the reaction rates under the effect of USC, non-cavity/reference experiments were carried out by obtaining the second-order kinetic rate from the decrease in the absorbance of -OCN - stretching band and compared it with the refractive index change of the medium during the course of the reaction. Inhomogenously broad -OH stretching band of H 2 O was coupled to the FP Cavity mode and the reaction rate was monitored under USC condition. In cavity the rate was measured by plotting the temporal shift in higher order cavity mode position which strongly depends on the refractive index of the system. In non-cavity experiments, apparent reaction rate was found to be 7.472×10 -7 sec -1 which changed to 5.325×10 -6 Sec -1 under the ON-resonance condition of H 2 O stretching band. Further experiments are required to rationalise the results and to understand the effect of USC on the reaction dynamics of the coupled system.
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