PREDISSOCIATION DYNAMICS OF HCP: ROTATIONAL DISTRIBUTION OF PRODUCT CP RADICAL

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In order to analyze the predissociation dynamics of HCP molecule, rotational distributions of the product, CP radical, generated from single rovibronic levels of the parent molecule were measured. The CP radical was detected with LIF method using a $B\ ^2\Sigma^+ - X\ ^2\Sigma^+$ transition. The CP radical generation was observed above a dissociation threshold to $\mathrm{H}(\ ^2S) + \mathrm{CP}(X\ ^2\Sigma^+)$ ($D_0 = 41662 \pm 2\ \mathrm{cm}^{-1}$). In the present study, the predissociation in a very small excess energy region ($\leq 300\ \mathrm{cm}^{-1}$), *i.e.* just above the dissociation threshold, was carefully examined. Rotational distribution observed was compared with statistical one calculated by phase space theory.
Two distinct types of rotational distributions were found; one of them exhibits non-statistical distribution while the other is statistical one expected by phase space theory. In the case that a vibronic energy of the initial level of HCP is less than or nearly equal to the dissociation energy, the CP radicals with large N levels ($N \approx J$) are preferrentially generated and a non-statistical distribution of the rotational levels is produced. On the other hand, when HCP is pumped to the initial levels in which the vibronic energy is dominant to the dissociation threshold, the rotational distribution becomes statistical one. It was found that the rotational distribution depends on the origin of the excess energy.