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DECAY AND FORMATION RATES OF $\text{Xe}^*(^3\text{P}_1, ^3\text{P}_2)$ AND $\text{Xe}_2^*(^3\Sigma_u^+)$ FOR Ar-Xe HIGH PRESSURE LASER MIXTURES

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We used time resolved absorption measurements to investigate the decay and formation rates of the $\text{Xe}^*(^3\text{P}_{1,2})$, $\text{Xe}_2^*(^3\Sigma_u^+)$ states in Ar-Xe high pressure laser mixtures (0,5÷3 atm) with low Xe fractions 10^{-2} ÷ 10^{-5} . As an excitation source electron beam with Π -shaped pulses was used. From analyses of the dependence of the afterglow decay rates upon Xe and Ar partial concentrations we have obtained the effective rate constants for two- and three-body quenching collisions $\text{Xe}^*(^3\text{P}_{1,2})$ with neutral particles. Two-body collisional deexcitation of the $\text{Xe}^*(^3\text{P}_1)$ and $\text{Xe}^*(^3\text{P}_2)$ by Ar is observed with the rate constants $(9\pm3)\cdot 10^{-15}$ and $(2,5\pm0,8)\cdot 10^{-15} \text{ cm}^3\text{s}^{-1}$. For the three-body reactions

we have obtained rate constants $(2,8\pm0,9)\cdot 10^{-32}$ and $(1,8\pm0,6)\cdot 10^{-32} \text{ cm}^6\text{s}^{-1}$. Most authors [1] suppose that at the low Xe concentration second order reaction

would be the main quenching process. In our experiments, performed in the wide range of experimental conditions, we haven't noticed any decay rate components, proportional to the $[\text{Ar}]^2$. Also it is shown that the reaction discussed combined with the reverse one

the role of which is high enough due to the small binding energy of ArXe^* , can produce the definite part to the components, which are linear against $[\text{Ar}]$.

1. "Excimer Lasers", C.K. Rhodes, Ed. Berlin:Springer-Verlag, 1979.