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DECAY AND FORMATION RATES OF Xe* (3P<sub>1</sub>, 3P<sub>2</sub>) AND Xe*<sub>2</sub> (3 Σ<sup>+</sup><sub>u</sub>) 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 Xe* (3P<sub>1</sub>, 3P<sub>2</sub>) and Xe*<sub>2</sub> (3 Σ<sup>+</sup><sub>u</sub>) states in Ar-Xe high pressure laser mixtures (0.5-3 atm) with low Xe fractions 10<sup>-2</sup>-10<sup>-5</sup>. As an excitation source electron beam with II-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 Xe* (3P<sub>1</sub>, 3P<sub>2</sub>) with neutral particles. Two-body collisional deexcitation of the Xe* (3P<sub>1</sub>) and Xe* (3P<sub>2</sub>) by Ar is observed with the rate constants (9±3)·10<sup>-15</sup> and (2.5±0.8)·10<sup>-15</sup> cm<sup>3</sup>s<sup>-1</sup>. For the three-body reactions

\[
\text{Xe}^* (3P_1) + \text{Xe} + \text{Ar} \rightarrow \text{Xe}^* (1Σ^+_u) + \text{Ar}
\]

\[
\text{Xe}^* (3P_2) + \text{Xe} + \text{Ar} \rightarrow \text{Xe}^* (3Σ^+_u) + \text{Ar}
\]

we have obtained rate constants (2.8±0.9)·10<sup>-32</sup> and (1.8±0.6)·10<sup>-32</sup> cm<sup>6</sup>s<sup>-1</sup>. Most authors /1/ suppose that at the low Xe concentration second order reaction

\[
\text{Xe}^* + 2\text{Ar} \rightarrow \text{ArXe}^* + \text{Ar}
\]

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 [Ar]<sup>2</sup>. Also it is shown that the reaction discussed combined with the reverse one

\[
\text{ArXe}^* + \text{Ar} \rightarrow \text{Xe}^* + 2\text{Ar},
\]

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 [Ar].