# HIGH PRESSURE SPECTROSCOPY OF URANIUM DOPED $CS_2NAYCL_6$

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We measured the luminescence and the excitation spectra of the $Cs_2NaYCl_6:U^{4+}$ in pressure range form ambient to 113 kbar at temperature form ambient to 7K. We observed the $U^{4+}$ luminescence peaked at 29600 $cm^{-1}$, 27200 $cm^{-1}$, 26500 $cm^{-1}$ related to the $5f^16d(t_{2g})^1 \rightarrow {}^3H_4$ transition and emission peaked at 23600 $cm^{-1}$, related to $5f^16d(t_{2g})^1 \rightarrow {}^3F_2 + {}^3H_5$ transition.

At pressure from ambient to 37kbar large red pressure shifts of these bands, of the order of -50 $cm^{-1}$/kbar was observed and related to decrease energy of $5f^16d(t_{2g})^1$ electronic manifold. For pressure range above 50 kbar the spectrum rapidly changed and the bands were shifted to higher energies. The pressure shifts stayed negative but its absolute values decreased to 10 $cm^{-1}$/kbar. We considered that $U^{4+}$ occupied octahedrally coordinated Y site. Observed structural change of the luminescence bands at pressure 40-50 kbar was related to rotational distortions (octahedral tilts) of $UCl_6$ octahedra.

Apart of the $5f^16d(t_{2g})^1 \rightarrow f^2$ emission of $U^{3+}$ the sharp lines luminescence peaked at 19800$cm^{-1}$, 19000 $cm^{-1}$, 18180 $cm^{-1}$ and 17360 $cm^{-1}$ were observed and related to the luminescence of $UO_2$ center.