Journal of the Pharmaceutical Society of Korea
19, 215-217 (1975)

The Association of Rhodium(II)(isobutyrate)$_4$L$_2$ to an Adenine Compound

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(Received May 18, 1975)

Rhodium(II)(isobutyrate)$_4$L$_2$ (Rh in short) was prepared by the reaction of rhodium(II) acetate with isobutyric acid. Green coloured powder was obtained. It dissolves in organic solvent such as chloroform comparatively well. Infrared spectra and visible ultra violet spectra were measured in the chloroform solutions of the compound, 9-ethyladenine (A, Cyclo Chemical Co.) and their mixtures, and also the deuterochloroform solutions.

The visible spectra of rhodium compound solution, 9-ethyladenine solution and mixed solutions were measured.

The colour of the mixed solutions changes with the quantity of the rhodium contents. From the results, it is clear that an association exists between the Rh and A.

In the IR spectrum of the 1×10^{-1} M solution of a Rh, a strong band due to the carboxylate anion asymmetrical stretching vibration is observed at 1575cm^{-1} and a broad band from the H_2O molecule which is ligand, appears at 3300~3500cm^{-1}. The spectrum of 1×10^{-3} M solution of A shows two strong bands at 3500 and 3400 cm^{-1} which are assignable to the antisymmetric stretching vibrations of the non-bonded amino group.

The association of the 9-ethyladenine molecules by themselves must be negligible because the association bands at 3485 and below 3350 cm^{-1} are hardly observed. It also shows strong band at 1630 cm^{-1} which is due to the bending vibration of the non-bonded amino group as previously reported[1].

When the both solutions are mixed together, however, the association bands become prominant. The A bands at 3500 and 3400 cm^{-1} decrease and new association bands appear at 3430 and 3335 cm^{-1} strong. When excess Rh is added to this mixed solution, the bands at 3400 and 3500 cm^{-1} disappear and shift to 3425 and 3335 cm^{-1}.

In order to get further information on the structure of Rh-A complex in solution, the spectra in the 6μ region were studied. As previously discussed, the solution of A shows

strong band at 1630 cm^{-1} and weak band at 1575cm^{-1}.

In the mixed solution, the band at 1630 cm^{-1} shifts 1640 cm^{-1} and the band at 1575 cm^{-1} increase in intensity. When excess Rh is added to this mixed solution, the band at 1630 cm^{-1} completely shifts to 1650cm^{-1} and the sharp band at 1575 cm^{-1} increase more in intensity (Fig. 1).

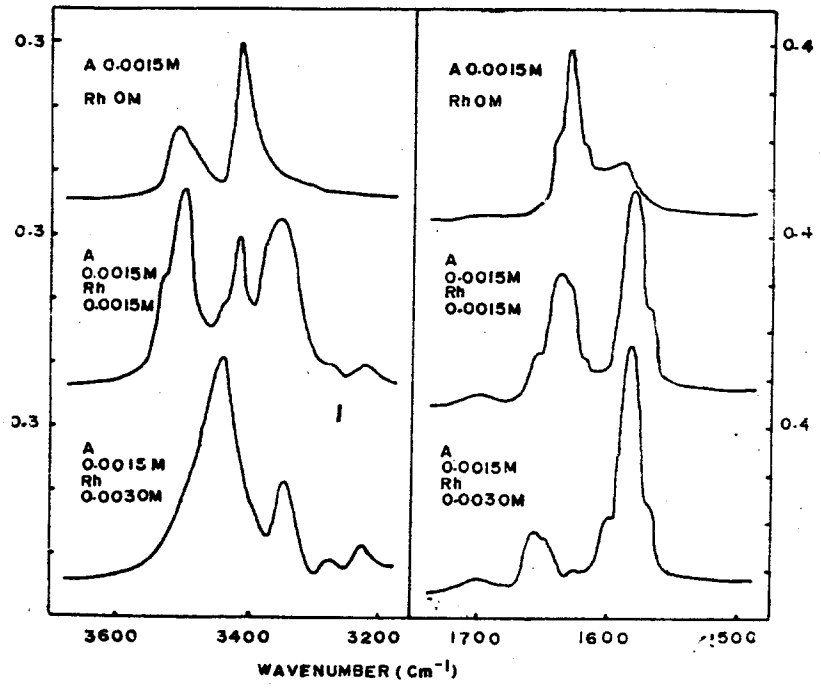

Fig. 1—Infrared spectra of the equimolar mixture solutions of rhodium(II)(isobutyrate)$_4L_2$ and 9-ethyladenine compounds in chloroform.

It was reported previously that rhodium(II)(isobutyrate)$_4L_2$ acts as DNA dependent, DNA enzyme inhibitor and that it associates with active sites of enzyme such as -NH, -SH, and -OH. In addition, it exhibits anticancer activity[2,3].

In these results, hydrogen atom of 6-NH_2 of 9-ethyladenine associates with the rhodium in the form of chelate.

By the fact that[4] rhodium is much of cobalt and behaves like metal group of oxidation number 6 and that infrared spectra of mixed solution show that bands at 3400, 3500 and 1630 cm^{-1} do not disappear but only shifts, it is suggested that nitrogen atom at 6-C of 9-ethyladenine gives two electron to the rhodium of rhodium(II)(isobutyrate)$_4L_2$ and that 9-ethyladenine associates with rhodium(II)(isobutyrate)$_4L_2$ in the form of adduct.

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