



Fig. 1. Chromatography of the transferrin/albumin fraction on a column of DEAE-Sephadex A-50'. Elution was started with 0.1 M 2-amino-2-hydroxymethylpropane 1 : 3 diol (*tris*) and its hydrochloride in 0.1 M sodium chloride, pH 8.0, followed by a gradient of 0.1 M-2.0 M NaCl in 0.1 M *tris*-HCl. The fraction volumes were about 3.5 ml. —, Transmission; ----, radioactivity

'Sephadex G-200' gel-filtration. Resolution of the albumin/transferrin fraction into its components by DEAE-Sephadex A-50' and subsequent delayed neutron counting showed plutonium to be present in the transferrin fraction only as depicted in Fig. 1. Additionally the protein fractions were characterized by electrophoresis on cellulose acetate strips, using veronal buffer at pH 8.6 and staining with Ponceau S (ref. 5). Autoradiography of the unstained electrophoresis strips demonstrated that the plutonium migrates at the same rate as the transferrin.

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Far-infra-red Spectra of some Square-planar Ions

THERE are three different assignments of the infra-red-active modes of K_2PtCl_4 in the literature¹⁻³. One was based on a low-resolution spectrum¹ and is thus misleading. The other two authors differed in their assignment of ν_2 and ν_7 , but their data are in good agreement except that Mathieu *et al.*³ reported a band at 160 cm^{-1} which was not found by either Sacconi *et al.*² or by ourselves. We have observed the spectrum of K_2PtCl_4 to 40 cm^{-1} and support Sacconi's results and assignment for the following reasons.

(1) The site symmetry of $[PtCl_4]^{2-}$ in the potassium salt is the same as that of the free ion. It is thus difficult to account for the triplet nature attributed to ν_7 by Mathieu *et al.* (2) The band near 110 cm^{-1} assigned by Mathieu *et al.* to ν_2 is absent in the spectrum of Magnus's green salt, and can be assigned to a translational lattice mode of the potassium ions, three of which should be infra-red-active. We find additional lattice modes at 87.5 and 59 cm^{-1} , which may also be associated with the potassium ions.

We have made the first observations of ν_2 and ν_7 for K_2PdX_4 ($X = Cl$ and Br), of ν_6 for $KAuI_4$, and of the

complete far-infra-red spectra of $[M(NH_3)_4][M'Cl_4]$ [$M, M' = Pd, Pt$]. Our assignments for the complex ions in these compounds are supported by the band width considerations: those bands assigned to a_{2u} modes are sharp and narrow, while those assigned to e_u modes are at least twice as broad. A similar band width effect is seen in $\nu(CO)$ bands for complexes of the type $M(CO)_3(\pi\text{-arene})$.

Table 1. INFRA-RED-ACTIVE FREQUENCIES (cm^{-1}) OF SOME SQUARE-PLANAR IONS

	$\nu_2(a_{2u})$	$\nu_6(e_u)$	$\nu_7(e_u)$	Other bands
K_2PtCl_4	174.5	326	194	108.5, 87.5, 59
K_2PdCl_4	168	332	190.5	111, 90
K_2PdBr_4	106	254	136	80.5
$[Pt(NH_3)_4]^{2+}$	141.5	—	234	266, 82.5, 74
$[PtCl_4]^{2-}$	175	310	198	—
$[Pd(NH_3)_4]^{2+}$	144	—	226	263, 93, 80.5
$[PtCl_4]^{2-}$	174	321	187.5	—
$[Pt(NH_3)_4]^{2+}$	136.5	—	245	364, 288, 93, 83
$[PdCl_4]^{2-}$	163.5	332.5	224	—
$KAuI_4$	—	190.5	—	—

All the ions in the complexes $[M(NH_3)_4][M'Cl_4]$ have site symmetry C_4 . There should not therefore be any splitting of existing degeneracies, but the Raman-active ν_1 in the free ions should become infra-red-active. We have not observed it, but we do find a weak-medium band at 266 cm^{-1} ($M = M' = Pt$), 263 cm^{-1} ($M = Pd, M' = Pt$) or 288 cm^{-1} ($M = Pt, M' = Pd$). This is very low for ν_1 for any of the complex ions and we tentatively assign it to a combination of ν_7 of the ammine complex ions with a lattice mode. There is no evidence that the metal-metal interaction in Magnus's green salt has any significant effect on the infra-red spectra of the complex ions, as compared with K_2PtCl_4 and $[Pt(NH_3)_4]Cl_2$. In particular, the a_{2u} out-of-plane deformation bands of $[PtCl_4]^{2-}$ are constant in both frequency and intensity.

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Methane-rich Perchloric Acid Flames

THE study of flames supported by the vapour of 72 per cent perchloric acid^{1,2} has been continued by an investigation into methane-rich premixed flames of perchloric acid. Perchloric acid flames have already been shown to have no effective lower flammability limit since a decomposition flame of the acid vapour alone can be stabilized². It has now been found that mixtures containing up to at least 84 per cent methane in perchloric acid are flammable; this corresponds to 20 times as much methane as in a stoichiometric mixture, whereas methane-oxygen mixtures are only flammable up to 61 per cent methane³, corresponding to 3.1 times as much methane as in a stoichiometric mixture.

The methane-perchloric acid flames were stabilized on cylindrical 'Pyrex' burners of internal diameter of 1.13-25.4 mm surrounded by a 65 mm jacket tube so that the flames were burning in an atmosphere of argon. The apparatus was preheated to 210° C by nichrome heating wire in order to maintain the perchloric acid in the vapour phase. All the flames were at atmospheric pressure.

Burning velocities, temperatures and burnt gas compositions were measured for flames containing 2-18 times as much methane as is required for a stoichiometric mixture. No carbon formation, as revealed by luminous yellow streaks or zones, was found with any of these flames. Burnt gas concentrations for methane, hydrogen, carbon monoxide, carbon dioxide and water in molecules per 100 molecules of initial methane are presented as a function of the mixture ratio, λ , in Fig. 1 (the diluent