

out in the presence of the products acetone and hydrogen, with nitrogen as diluent. The results given in figure 2 for Gd_2MnNiO_6 show that (i) acetone suppresses the dehydrogenation reaction rate at all partial pressures. (ii) hydrogen does not affect the dehydrogenation reaction.

The effect of products on the other catalysts is also the same. Hence it is possible that acetone desorption is the rate-determining step of the reaction on these catalysts.

A plot of $\log A$ versus E_a shows a linear relationship (figure 3), which indicates that the active centre is

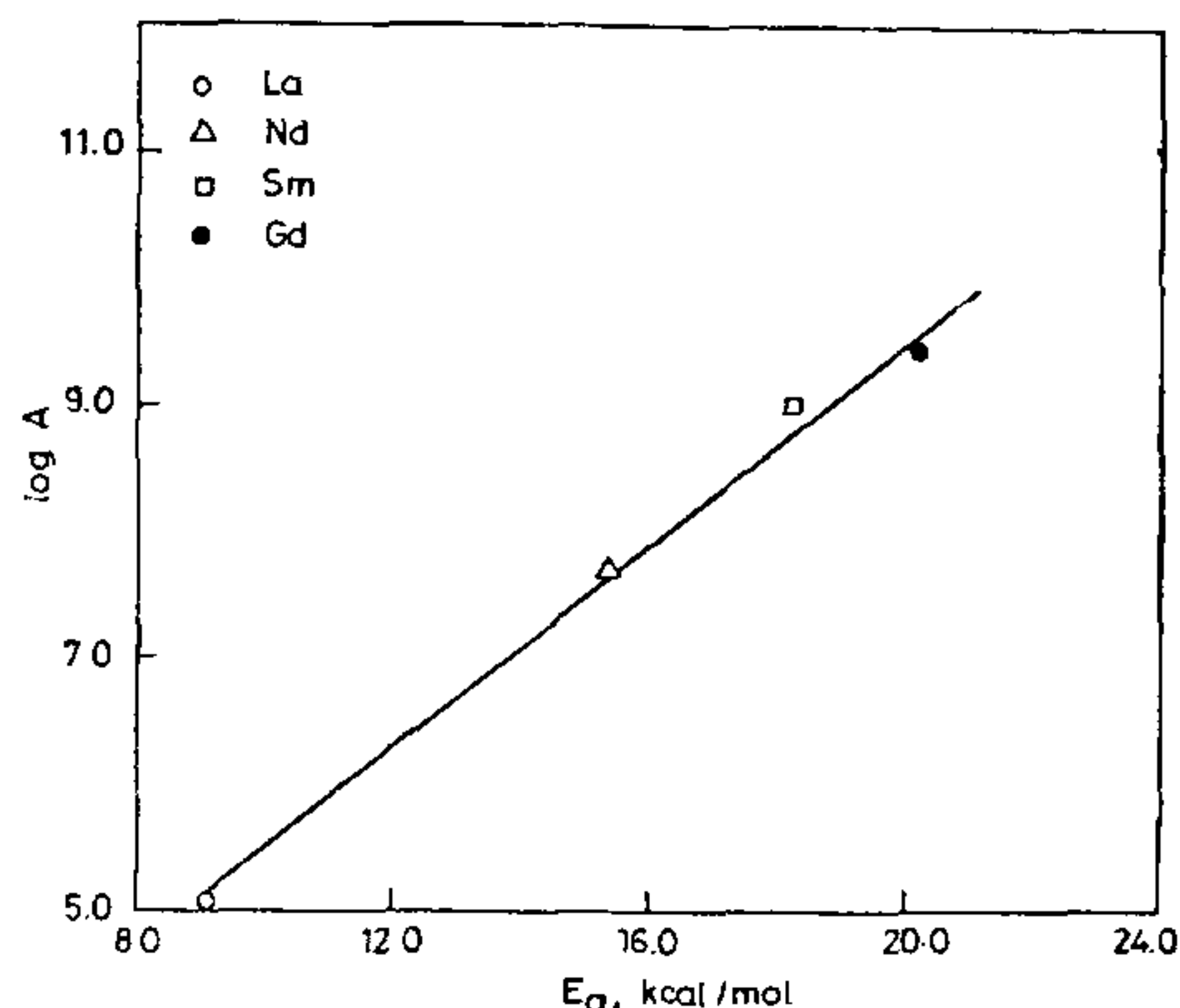


Figure 3. Compensation effect for the decomposition of iso-propyl alcohol in the system Ln_2MnNiO_6 ($Ln = La, Nd, Sm, Gd$).

primarily the divalent transition metal ion, *i.e.*, Ni^{2+} . It has been reported earlier² on a similar series of catalysts *viz* La_2TiMO_6 ($M = Cu, Ni$ and Zn) that the acetone desorption is the rate-determining step for isopropanol decomposition and that the transition metal ions are the active centres. The present investigation suggests that the alcohol decomposition involves a similar type of mechanism in the case of Ln_2MnNiO_6 catalyst and the rare earth ions seem to modify the activity of the transition metal ions in the reaction.

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1. Sastri, V. R., Pitchai, R. and Swamy, C. S., *Indian J. Chem.*, 1979, **A18**, 213.
2. Ramanujachary, K. V., Gowri, D. K., Radha, R. and Swamy, C. S., *Indian J. Chem.*, 1982, **A21**, 241.

3. Blasse, G., *J. Phys. Chem. Solids.*, 1965, **26**, 1969.
4. Ganguly, P., *Bull. Mater. Sci.*, 1981, **3**, 255.
5. Narasimhan, C. S. and Swamy, C. S., *Appl. Catal.*, 1982, **2**, 315.

STUDIES ON TELLURIUM (IV) CHLORIDE COMPLEXES WITH N, N' - SUBSTITUTED THIOUREAS.

G. L. TEMBER AND A. S. R. MURTY*

Department of Chemistry, Karnatak University, Dharwad 580 003, India.

ALTHOUGH thiourea and its derivatives generally reduce $Te(IV)$ in acid solution to form divalent tellurium complexes, stable complexes of tetravalent tellurium have also been isolated in the case of tetramethyl thiourea¹⁻³. No reports are available on the complexes of $Te(IV)$ with N,N'-disubstituted thioureas. The present paper deals with the synthesis of $TeCl_4$ complexes with benzoyl thiourea (bztu), N-benzoyl N'-methyl thiourea (bzmetu), N-benzoyl N'-ethyl thiourea (bzetu), N-benzoyl N'-phenyl thiourea (bzPtu), N-benzoyl N'-o-chlorophenyl thiourea (bz-o-ClPtu), N-benzoyl N'-m-tolyl thiourea (bz-m-totu), N-benzoyl N'-o-tolyl thiourea (bz-o-totu), N-benzoyl N'-o-nitrophenyl thiourea (bz-o- NO_2 Ptu), N-benzoyl N'-o-methoxyphenyl thiourea (bz-o-MeOtu), N-benzoyl N'-2,5 diethoxyphenyl thiourea (bz-2,5 diEtoPtu), N-benzoyl N'- β -hydroxyethyl thiourea (bz- β -OHetu), N-benzoyl N'-furfuryl thiourea (bz-fur. tu) and morpholine 4-thiocarbonic acid benzamide (MTBzA). These adducts have been analyzed and further characterized with the aid of conductance, spectral and thermoanalytical data.

The ligands were synthesised in accordance with published methods⁴.

The complexes were prepared by stirring a solution of ligand and $TeCl_4$ in 1:2 mole ratio in dry benzene for 2-3 hr (26-27°C) at room temperature when they precipitated completely. The products were quickly filtered under vacuum, washed with the solvent and dried in vacuo over P_2O_5 . Care was taken to exclude moisture throughout the synthesis. The complexes were analyzed for tellurium, nitrogen, sulphur and chlorine by standard procedures⁵. The analytical data are presented in table I.

The molar conductivity was measured in DMSO ($1 \times 10^{-3} M$) using HICO conductivity bridge. The infrared spectra were recorded on PF-597 spectrometer; The NMR spectra in $CDCl_3$ and d_6 DMSO were recorded on Varian I-60 instrument and the thermograms (0-500°C) were recorded on a Stanton balance at a heating rate of 6°C/min.

TABLE I
 Elemental analysis.

Complex	Te %	N %	S %	Cl %
TeCl ₄ . 2bztu	20.07 (20.27)	8.78 (8.89)	9.98 (10.16)	22.39 (22.53)
TeCl ₄ . 2bzmetu	19.23 (19.41)	8.41 (8.51)	9.83 (9.73)	21.45 (21.54)
TeCl ₄ . 2bzetu	18.82 (18.62)	8.06 (8.17)	9.11 (9.33)	20.52 (20.68)
TeCl ₄ . 2bzPtu	16.21 (16.33)	7.14 (7.20)	8.08 (8.18)	18.01 (18.15)
TeCl ₄ . 2bz- <i>o</i> -ClPtu	14.97 (15.00)	6.39 (6.58)	7.49 (7.52)	16.44 (16.66)
TeCl ₄ . 2bz- <i>m</i> -ClPtu	14.89 (15.00)	6.34 (6.58)	7.38 (7.52)	16.49 (16.66)
TeCl ₄ . 2bz- <i>o</i> -totu	15.59 (15.76)	6.79 (6.92)	7.94 (7.90)	17.45 (17.52)
TeCl ₄ . 2bz- <i>o</i> -NO ₂ Ptu	14.45 (14.54)	6.38 (6.51)	7.20 (7.29)	16.30 (16.16)
TeCl ₄ . 2bz- <i>o</i> -meoPtu	15.00 (15.16)	6.52 (6.65)	7.48 (7.64)	16.67 (16.85)
TeCl ₄ . 2bz- <i>o</i> -2,5diato Ptu	13.20 (13.33)	5.78 (5.85)	6.57 (6.68)	14.61 (14.81)
TeCl ₄ . 2bz-βOHetu	17.68 (17.78)	7.67 (7.51)	8.78 (8.91)	19.67 (19.76)
TeCl ₄ . 2bz-furtu	15.99 (16.19)	7.05 (7.10)	8.00 (8.12)	17.77 (17.99)
TeCl ₄ . 2MTBzA	16.44 (16.58)	6.95 (7.28)	8.28 (8.31)	18.31 (18.42)

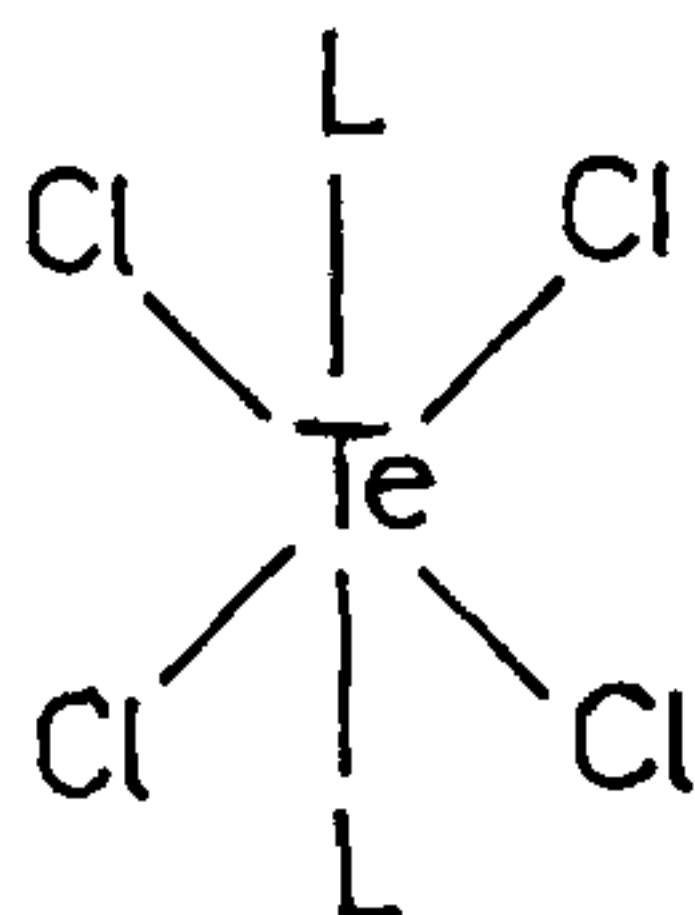
Values in parenthesis are calculated values.

The complexes are red to reddish brown in colour and are amorphous in nature. They are insoluble in common organic solvents but soluble in DMF and DMSO. The molar conductance value (4-12 Ω cm² mole⁻¹) is too small to account for any anion dissociation of these complexes.

The ν_{NH} of the ligand (3300-3100 cm⁻¹) in general shows a slight blue shift on complexation and in many cases broadening of the band is observed suggesting intense intramolecular hydrogen bonding⁶, consistent

with the transformation of intermolecular N-H-S (0) hydrogen bonding of ligands into N-H-Cl interaction in the case of complexes. The band at 1650-1680 cm⁻¹ is attributed to C=O stretching mode. A positive shift of the above band (10-15 cm⁻¹) on complexation indicates the absence of coordination through carbonyl oxygen⁷. A strong band in the region 700-800 cm⁻¹ assigned to $\nu_{\text{C-S}}$ vibration with slight contribution of ν_{CN} is characteristic of arylthioureas⁸. Further, sulphur coordination has been suggested from the nega-

tive shift with the decrease in intensity suffered by ν_{CS} band ($600-700\text{ cm}^{-1}$) in the complexes. It shows a slight red shift with reduction in intensity in the complex spectrum. From the far IR spectra the bands at ~ 280 and $\sim 310\text{ cm}^{-1}$ are tentatively assigned to Te-Cl and Te-S absorptions⁹. The NMR spectra of $\text{TeCl}_4 \cdot 2(\text{bz}\eta\text{tu})_2$, $\text{TeCl}_4 \cdot 2(\text{bz}-\beta\text{-OH}\eta\text{tu})$ and $\text{TeCl}_4 \cdot 2(\text{MTBzA})$ overrules the possibility of N coordination as there is no lowering in the chemical shifts of amido protons ($\sim 8.5\delta$) in the complexes. The TG curves of $\text{TeCl}_4 \cdot 2\text{bz}\eta\text{tu}$, $\text{TeCl}_4 \cdot 2\text{bz}\eta\text{tu}$ and $\text{TeCl}_4 \cdot 2\text{bz}-m\text{-ClPt}$ reveal a single-step oxidative decomposition to the dioxide, TeO_2 around 450°C and the percentage loss in weight supports the formation of 1:2 adducts. From the above discussion it is evident that octahedral coordination is the best fit for these complexes as indicated below.



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1. Foss, O. and Johannessen, W., *Acta. Chem. Scand.*, 1961, **15**, 1939.
2. Katsaros, N. and George, J. W., *J. Inorg. Nucl. Chem.*, 1969, **31**, 3503.
3. Aravamudan, G. and Janakiram, C., *Curr. Sci.*, 1978, **47**, 851.
4. Horning, E. C., *Organic synthesis*, John Wiley and Sons., New York, 1967, Vol. 3, p. 735.
5. Vogel, A. I., *A textbook of quantitative inorganic analysis.*, Longmans, London, 1968.
6. Piovesana, O. and Furlani, C., *J. Inorg. Nucl. Chem.*, 1970, **32**, 879.
7. Mohapatra, B. B., Sahu, H., Mohapatra, B. K. and Guru, S., *J. Indian Chem. Soc.*, 1978, 229.
8. Jensen, K. A. and Nielsen, P. H., *Acta. Chem. Scand.*, 1966, **20**, 597.
9. Hendra, P. J. and Jovic, Z., *J. Chem. Soc. A.*, 1967, **5**, 735.

INITIATION FACTOR IF3 PARTIALLY DISSOCIATES 16S.23S RNA COMPLEX

B. NAG, D. S. TEWARI AND D. P. BURMA
Department of Biochemistry, Institute of Medical Sciences, Banaras Hindu University, Varanasi 221 005, India.

IT has been demonstrated earlier that naked 16S and 23S ribosomal RNAs form a binary complex under two well-defined conditions¹⁻⁴. The first one is the reconstitution condition necessary for the assembly of 30S subunit from 16S RNA and 21 different proteins⁵. This condition is also similar to that used for the reconstitution of 50S ribosome by the two-step procedure^{6,7}. The second one (1 M alcohol and some specific ionic condition) is what makes naked 16S and 23S RNAs assume shapes having structural features of 30S and 50S ribosomes respectively^{8,9}. Naturally the question arises whether such RNA-RNA interaction plays a role in the association of the two ribosomal subunits under physiological condition. To answer this, several approaches are being made in this laboratory. On the one hand, it has been shown that 5S RNA is incorporated into the complex only in association with those ribosomal proteins which are responsible for the incorporation into 50S ribosome¹⁰. On the other hand, studies with kethoxal have shown that the sites of rRNAs implied in the association of 30S and 50S subunits¹¹⁻¹⁴ are also involved in the association of naked 16S and 23S RNAs (manuscript under preparation). The preliminary experiments presented here will show that the initiation factor IF3 which dissociates 70S ribosome to its subunits under physiological condition¹⁵⁻¹⁷ also induces the dissociation of 16S.23S complex, although partially, to its constituents.

Figure 1 shows the dissociation activity of IF3 (partially purified from the 1M NH_4Cl wash of *E. coli* 70S ribosome upto DEAE cellulose step according to the method of Schiff *et al*¹⁸) on ribosome as well as 16S.23S RNA complex, as measured by light scattering method described earlier². The dissociation of 70S ribosome is about 70% in the presence of 6mM magnesium acetate whereas that of 16S.23S RNA complex is 50% in the presence of 15 mM magnesium acetate. Different Mg^{2+} concentrations had to be used as the associations of rRNAs and ribosomal subunits require different conditions².

The effect of IF3 on the 16S.23S RNA complex was studied by sucrose density gradient centrifugation as well. As shown already by light scattering method, the association is about 50% at 10 mM Mg^{2+} concentration and practically complete at 20 mM concentra-