

aerosols. Till now 13 different inorganic aerosols have been already described^{1,2} (see Table I and Fig. 5). The most suitable for laboratory investigation in aerosol physics and chemistry are aerosols of Pt-oxides, Ag, Au, WO₃, NaCl, Se, Te, Re₂O₇ and AgI.

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REACTION OF POTASSIUM CARBONATO-BIS(GLYCINATO) COBALTATE III WITH (S)-(+)-GLUTAMIC ACID; ISOLATION OF WATER SOLUBLE PRODUCTS

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The expulsion of the carbonate group from the racemic [Co(en)₂CO₃] (ClO₄) (where en is ethylenediamine) by (S)-(+)-glutamic acid has the stereospecific formation of Λ-[Co(en)₂(S-(+)-Glu)] · (ClO₄)¹ as a consequence. The stereospecificity, consisting in the interaction of the γ-carboxyl with the NH₂ group of ethylenediamine, is of a kinetic character¹. Similarly, the CO₃²⁻ group in K[Co(AB)CO₃] (where AB is glycine or (S)-valine) also can be expelled. This reaction with (S)-alanine, (S)-valine, and (R)-valine was employed by Shibata and coworkers² for the preparation of mixed chelates of amino acids of the [Co(AB)(A'B')₂] or [Co(AB)₂(A'B')] type. The reaction gives both *cis* and *trans* isomers. In the case of (S)-leucine we have shown³ that the reaction leads to a mixture of all mixed forms, of both *cis* and *trans* isomers. A special position of glutamic acid with respect to the γ-carboxyl led us to an investigation of the reaction products of racemic K[Co(Gly)₂CO₃] with the mentioned acid.

The reaction with (S)-(+)-glutamic acid ([α]_D +30° in conc. hydrochloric acid) was studied under the conditions used by Shibata and coworkers². The course of the reaction was followed by paper electrophoresis. After filtering off the insoluble products from the reaction mixture (probably *cis* isomers) we proved the presence of four substances with different mobility, but all four moved to the anode (Table I). Therefore we separated the reaction mixture further on a pre-

TABLE I
Analyses, Electrophoretic Mobility, and the Yields of *trans*-Complexes

Conc. LiCl mol/l	Complex	Calculated/Found			Mobility mm (yield) ^a
		% C	% H	% N	
0	[Co(Gly) ₃]	25.64	4.30	14.95	0
	CoC ₆ H ₁₂ N ₃ O ₆	25.08	4.58	14.13	(40)
0.05	Li[Co(Gly) ₂ (<i>S</i> -Glu)] · 3 H ₂ O	26.16	5.12	10.17	12
	LiCoC ₉ H ₂₁ N ₃ O ₁₁	25.89	5.24	10.01	(25)
0.1	Li ₂ [Co(Gly)(<i>S</i> -Glu) ₂] · 3 H ₂ O	29.34	4.93	8.56	24
	Li ₂ CoC ₁₂ H ₂₄ N ₃ O ₁₃	29.18	5.06	8.26	(27)
1.5	Li ₃ [Co(<i>S</i> -Glu) ₃] · 3 H ₂ O	31.65	4.78	7.38	30
	Li ₃ CoC ₁₅ H ₂₇ N ₃ O ₁₅	31.12	5.00	7.11	(8)

^a Determined from electrophoretic measurement by determining Co in eluted spots.

parative scale by chromatography on a column of Dowex 2 X 8 in Cl⁻ cycle. Washing with water and evaporation of the eluate gave a substance the properties of which (for example on chromatography on a cellulose layer buffered according to ⁴) corresponded to cobaltic *trans*-glycinate. Other reaction components were separated by gradient elution using lithium chloride. The purity of the obtained eluates was controlled electrophoretically and the selected eluates were evaporated to dryness *in vacuo* at 30°C. The residues were extracted in a Soxhlet extractor with ethanol (elimination of lithium chloride). The elemental composition of the residue of the obtained fractions and the electron absorption spectra measured in the region of *d-d* transitions (all complexes described had maxima at 370 and 535 nm) corresponded to *trans* isomers (chromophor CoN₃O₃, rhombic symmetry, splitting of the band in the region of low energy) of the composition: [Co(Gly)₃], Li[Co(Gly)₂(*S*-(+)-Glu)] · 3 H₂O, Li₂[Co(Gly)(*S*-(+)-Glu)₂] · 3 H₂O, and Li₃[Co(*S*-(+)-Glu)₃] · 3 H₂O.

The characteristics of single compounds and the yields are given in Table I. It follows from the table that the substitution of the carbonate group gives a mixture of possible combinations of complexes. The results also indicate the absence of intramolecular interactions of γ -carboxyls, as was already shown in the case of [Co(*S*-(+)-Asp)₃]³⁻ (ref. ⁵).

EXPERIMENTAL

Apparatus: The electrophoresis was carried out on a Tatrachema apparatus (Kuklov, Czechoslovakia). Paper Whatman No 1 and the buffers 0.05M-NaClO₄ or 0.01M-CH₃COOH were used. The voltage was 320 V. For the measurement of electronic absorption spectra in the visible region an Optica-Milano apparatus was used.

Chemicals: (*S*)-(+) -Glutamic acid was a product of Lachema. K[Co(Gly)₂CO₃] · H₂O was prepared according to ref. ².

Preparation of complexes: To an aqueous solution (70 ml volume) of 3.24 g (0.01 mol) of $K[Co(Gly)_2CO_3] \cdot H_2O$ 1.47 g (0.01 mol) of (*S*)-(+)-glutamic acid were added and the mixture was heated at 58°C for 4 hours. It was then cooled and concentrated to a small volume and poured on a Dowex 2 X 8 (50 × 4 cm) column (particles 50–100 mesh, Cl^- cycle). Elution was carried out with water and with lithium chloride solutions of various concentrations (Table I).

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SELEKTIVE KUPFERELEKTRODE

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Die in der letzten Zeit beobachtete Entwicklung der selektiven Ionenelektroden brachte mehrere Elektrodentypen, die die direkte potentiometrische Messung der Cu^{2+} -Ionenaktivität ermöglichen. Es sind dies vor allem Elektroden, deren Funktion von einige Kupferchalkogenide enthaltenden¹⁻³ Kristallen, ggf. Preßtabletten besorgt wird. Von anderen Materialien wurden bisher zur Konstruktion von Kupferelektroden flüssige Ionenaustauscher⁴ und Kupferchelate⁵ herangezogen.

Eine selektive Kupferelektrode aus dem Sulfidgemisch von $CuS + Ag_2S$ wurde von Ross² beschrieben und Elektroden mit solchen Funktionsschichten werden kommerziell von der Firma Orion (USA) erzeugt. Sie dienen bisher zu chelatometrischen Titrationsbestimmungen^{6,7} und im nichtwäßrigen Medium⁸. Von Veselý, Grégr und Jindra wurden vor einiger Zeit reine Metallchalkogenide, sowie ihre verschiedenen festen Lösungen und ternäre Verbindungen^{3,9} zur Konstruktion selektiver Elektroden eingesetzt. Auf Grund dieser Arbeiten wird im Institut "Monokrystal", Turnov (ČSSR) kommerziell eine selektive Kupferelektrode erzeugt, deren Funktionsschicht auf dem Monokristall des Kupfer(I)-selenids mit der annähernden Zusammensetzung $Cu_{1,8}Se$ beruht. Die Grundeigenschaften dieser Elektrode werden in der vorliegenden Arbeit behandelt.