ated to dryness at atmospheric pressure and next the remaining solvent was removed at reduced pressure.

For the analysis the lipid material was dissolved in light petroleum ether (40°–60° C.) and made up to volume. A number of ml. of the solution were transferred to the reaction vessels and the petroleum ether evaporated under nitrogen. 11 gm. of ethylene glycol–potassium hydroxide reagent were added, the contents mixed by shaking and for 15 min. nitrogen was led in (in later experiments 5 gm. of the reagent were used). A vessel containing only the reagent served as blank. The vessels were then placed in the oil bath maintained at 180° C. After being heated for exactly 15 min., the vessels were chilled in water. The reaction mixture was diluted with absolute methanol and made up to volume. Absorbancies of these solutions were measured at 233, 268, 315, 346 and 374 mμ against the blank.

For the measurement of the absorption before isomerization the lipid material was dissolved in iso-octane or absolute methanol. A ten-fold dilution was usually necessary for the determination of the absorbancy at 233 mμ. The blank consisted of iso-octane or absolute methanol.

The extinction coefficients of the sample before and after isomerization are calculated:

$$k_b = \frac{A}{l\,c} \text{ and } k_i = \frac{A}{l\,c}$$

c is expressed as gm. lipids per l. solution. The differences, $k = k_i - k_b$, at 233, 268, 315 and 346 mμ are substituted in the following equations:

Percentage of dienoic acid $= 1{\cdot}092\,k_{233} - 0{\cdot}573\,k_{268} - 0{\cdot}259\,k_{315} + 0{\cdot}021\,k_{346}$

Percentage of trienoic acid $= 1{\cdot}105\,k_{268} - 0{\cdot}879\,k_{315} + 0{\cdot}306\,k_{346}$

Percentage of tetraenoic acid $= 1{\cdot}650\,k_{315} - 1{\cdot}555\,k_{346}$

Percentage of pentaenoic acid $= 1{\cdot}144\,k_{346}$

Latex tapped from several *Hevea* clones was used for the present investigation. In Table 1 the polyunsaturated acids contents of *Hevea* latex are listed. The standard deviations of the calculated values are also given.

Table 1. POLYUNSATURATED ACIDS CONTENT OF *Hevea* LATEX, TOTAL LIPIDS (PER CENT)

Sample	Pentaene	Tetraene	Triene	Diene	No. of determinations
PB 186	0·14 ± 0·09	0·50 ± 0·16	1·75 ± 0·21	22·76 ± 3·23	5
Tjir 16	0·56 ± 0·35	0·88 ± 0·14	1·95 ± 0·90	14·62 ± 0·10	3
Tjir 1	0·14	0·32	2·90	19·08	1
PR 162	0·18	0·37	1·77	8·04	1
Pilm B 84	0·84	0·22	10·04	61·26	1
Av. 385	—	—	0·23	11·46	1
Mixed clonal	—	0·83	1·80	17·24	1

It is noteworthy that the polyunsaturated acids content of *PB* 186 are significantly different from those of *Tjir* 16, with the exception of trienoic acid ($0{\cdot}05 > P > 0{\cdot}02$). It is further interesting to note that the clone *Pilm B* 84 has an exceptionally high dienoic acid content. The findings clearly show that the polyenoic acids contents of *Hevea* latex vary with the clone from which the latex is obtained.

I thank Miss Liem Jan Ing for her assistance in the experimental work and Miss Tan Jan Nio for computing the results.

NG TET SOEI

Balai Penjelidikan dan Pemakaian Karet,
Bogor, Indonesia.

[1] Altman, R., *Arch. Rubber Cult.*, **24**, 58 (1940); *Rubber Chem. and Tech.*, **13**, 750 (1940).

[2] Bertram, S. H., *Chem. Weekblad*, **24**, 141, 288 (1927).

[3] Mitchell, jun., J. H., Kraybill, H. R., and Zscheile, F. P., *Indust. Eng. Chem., Anal. Ed.*, **15**, 1 (1943).

[4] Spectroscopy Committee Rep., *J. Amer. Oil Chemists' Soc.*, **26**, 399 (1949).

[5] Hammond, E. G., and Lundberg, W. O., *J. Amer. Oil Chemists' Soc.*, **30**, 433 (1953).

[6] Herb, S. F., and Riemenschneider, R. W., *Anal. Chem.*, **25**, 953 (1953).

[7] Holman, R. T., and Hayes, H., *Anal. Chem.*, **30**, 1422 (1958).

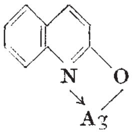
Silver (I) Complexes with 2-Quinolinol and 4-Methyl-2-Quinolinol : a Possible 4-Membered Ring Chelate System

ALTHOUGH the silver (I) complexes of 8-quinolinol (8-hydroxyquinoline) have been the subject of several investigations[1–4], little is known about the complexes formed with 2-quinolinol and its derivatives. The 8-quinolinol complexes of silver are rather unusual in that two chelating groups, per metal ion, are present in the complex, or $Ag(C_9H_6NO){\cdot}C_9H_6NOH$. To complicate matters, both a yellow and a green form of the above are known. However, we have recently shown that the green form is identical to the yellow except that it contains a small amount of free silver[5]. With the above information available, it was thought that the silver (I) 2-quinolinol complexes would be similar to those of 8-quinolinol.

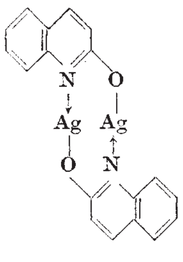
It was found, however, that the composition of the 2-quinolinol complex corresponded to a 1 : 1 formula, or $Ag(C_9H_6NO)$, rather than a 1 : 2 composition. The complexes were prepared as follows: approximately 1·2 gm. of silver acetate was dissolved in 250 ml. of water, heating the mixture to effect solution. The solution was cooled to about 60° C., buffered with 1 gm. of sodium acetate, and then 1 gm. of 2-quinolinol or 4-methyl-2-quinolinol dissolved in about 30 ml. of 95 per cent ethyl alcohol was added. Immediately on mixing, a white flocculent precipitate of the silver complex was formed. The mixture was then digested for about 30 min. on a steam bath. After digestion, the precipitate was filtered off, washed several times with water, and then dried in a vacuum desiccator for 24 hr. The yield, based on silver ion present, was not quantitative, but averaged about 45 per cent. Analysis of the complexes gave: $Ag(C_9H_6NO)$, Ag: 42·80 per cent theor., 42·10 per cent found; N, 5·56 per cent theor., 5·37 per cent found; $Ag(C_9H_5NOCH_3)$, Ag: 40·55 per cent theor., 40·58 per cent found; N: 5·27 per cent theor., 5·23 per cent found. The silver contents were determined by ignition of the complexes at 800° C.; the nitrogen contents by the Dumas method as determined by the Schwarzkopf Laboratory, Woodside, New York.

The thermal properties of the complexes were studied by thermogravimetric analysis and differential thermal analysis. Both complexes exhibited similar thermogravimetric analysis curves in that they began to lose weight at about 300° C. The silver residue weight-levels were obtained at about 700° C. The differential thermal analysis thermograms revealed that the decomposition reactions were exothermic as evidenced by a single sharp exothermic peak at 275° and 300° C., for the 4-methyl- and 2-quinolinol chelates, respectively.

It was not possible to determine the molecular weight of either complex due to their insolubility in all the common organic solvents. However, it is of interest to speculate as to their possible structures:



(I)



(II)

Structure (I) would be unique in that a 4-membered ring chelate system is present. This type of ring system is rather rare, with the exception of carbonatoamminecobalt (III) complexes[6]. Recent investigations have shown that the copper 1,3-diphenyltriazen complexes[7] and copper acetate 1-hydrate[8,9] are binuclear structures, and do not involve 4-membered ring chelate systems.

The dimer, as shown in structure (II), is also possible due to the *sp* hybridization of Ag (I) to form linear complexes such as $[H_3N\rightarrow Ag\leftarrow NH_3]^+$. At the present time it is not possible to differentiate between these two possible structures.

WESLEY W. WENDLANDT
JOHN HASCHKE

Department of Chemistry,
Texas Technological College,
Lubbock, Texas.

[1] Vis, G. N., *J. prakt. Chem.*, **45**, 530 (1892).
[2] Nakatsuka, Y., *Bull. Chem. Soc. Jap.*, **11**, 45 (1936).
[3] Block, B. P., Bailar, J. C., and Pearce, D. W., *J. Amer. Chem. Soc.*, **73**, 4971 (1951).
[4] Wendlandt, W. W., and Van Tassel, J. H., *Science*, **127**, 242 (1958).
[5] Wendlandt, W. W., and Haschke, J., *Nature*, **193**, 1174 (1962).
[6] Barclay, G. A., and Hoskins, B. F., *J. Chem. Soc.*, 586 (1962).
[7] Brown, I. D., and Dunitz, J. D., Intern. Conf. Co-ordination Chemistry, London (April 1959).
[8] French, H. S., and Lowry, T. M., *Proc. Roy. Soc.*, A, **106**, 489 (1924).
[9] van Niekerk, J. N., and Schoening, F. R. L., *Acta Cryst.*, **6**, 227 (1953).

Assignment of *cis–trans* Configuration to 1,2-Dialkyl*cyclo*hexanes

PREVIOUS work carried out at the Mass Spectrometry Centre of the University of Liège has shown the specific behaviour under electron impact of *cis* and *trans* isomers in a series of pairs of cyclanic stereoisomers. It has been especially pointed out in 1,2-dialkyl derivatives of *cyclo*propane[1], *cyclo*butane[2], *cyclo*pentane[3] and *cyclo*hexane[4] that in the ionized state the *cis* isomer is less stable than the corresponding *trans* isomer (that is, the relative abundance, expressed as a fraction of total ionic current for 70 V. energy electrons, of molecular ions of a *cis* isomer is smaller than that for the corresponding *trans* molecule).

This observation being quite general for the 15 pairs investigated in the works cited gives a rule enabling the *cis–trans* assignment on the basis of the mass spectra in the case of cyclanic stereoisomers for which the assignment has not yet been done.

In 1959 the National Bureau of Standards[5] published mass spectral data for 8 pairs of *cyclo*hexane isomers disubstituted in position 1 by a *cyclo*hexyl or methylene*cyclo*hexyl group and in position 2 by a methyl, ethyl, propyl or butyl group. Those isomers were characterized by their relative boiling points, that is to say one of them was labelled 'high boiling' and the other 'low boiling'. For each isomer of each of those 8 pairs we calculated the abundance of the molecular ions in percentage of total ionization. The results are presented in Table 1.

Table 1. RELATIVE ABUNDANCES OF MOLECULAR IONS IN SEVERAL 1,2-DIALKYL*cyclo*HEXANES (PERCENTAGE OF TOTAL IONIC CURRENT)

Pair No.	Nature of alkyl group		Abundance in low boiling isomer	Abundance in high boiling isomer
1	$—CH_3$	—*cyclo*C_6H_{11}	2·33	1·01
2	$—C_2H_5$	—*cyclo*C_6H_{11}	1·54	0·66
3	—*n*C_3H_7	—*cyclo*C_6H_{11}	1·24	0·51
4	—*i*C_3H_7	—*cyclo*C_6H_{11}	0·49	0·08
5	—*n*C_4H_9	—*cyclo*C_6H_{11}	1·03	0·42
6	—*i*C_4H_9	—*cyclo*C_6H_{11}	0·95	0·41
7	$—CH_3$	$—CH_2$—*cyclo*C_6H_{11}	3·35	2·00
8	$—C_2H_5$	$—CH_2$—*cyclo*C_6H_{11}	1·60	1·02

This shows that molecular ions of so-called 'high boiling' isomers are all less abundant than those of the corresponding so-called 'low boiling' isomers. Referring to the preceding results concerning the 1,2-dialkyl*cyclo*alkanes, as mentioned previously, I suggest, in the present cases, attributing the *cis* structure to the isomers for which the molecular ions are the least abundant and the *trans* structure to the corresponding isomers for which the molecular ions are the most abundant.

This conclusion agrees very well with the *cis–trans* assignment of the isomers already investigated. In the 1,2-disubstituted derivatives of *cyclo*propane, *cyclo*butane, *cyclo*pentane and *cyclo*hexane, the *cis* isomer is always the high boiling one, as has been shown by experimental[6,7] and theoretical[8,9] investigation.

I thank Prof. L. D'Or for his advice.

This work was supported by the Fonds National de la Recherche Scientifique.

P. NATALIS

Faculty of Sciences,
University of Liège.

[1] D'Or, L., Momigny, J., and Natalis, P., *Symp. Mass Spectrometry* (Oxford, September, 1961).
[2] Laune, J., thesis, University of Liège (1961).
[3] Natalis, P., *Bull. Soc. Chim. Belg.*, **66**, 5 (1957).
[4] Natalis, P., *Bull. Soc. Chim. Belg.*, **69**, 519 (1960).
[5] Amer. Petroleum Inst. Res. Project 44, *Mass Spectral Data.*
[6] Beckett, C. W., Pitzer, K. S., and Spitzer, R., *J. Amer. Chem. Soc.*, **69**, 2488 (1947).
[7] Johnson, W. H., Prosen, E. J., and Rossini, F. D., *J. Res. Nat. Bur. Stand.*, **42**, 251 (1949).
[8] Pitzer, K. S., *J. Chem. Phys.*, **8**, 711 (1940).
[9] Haresnape, J. N., *Chem. and Indust.*, 1091 (1953).

BIOCHEMISTRY

Adaptation of the Small Intestine to a High-Fat Diet containing Saturated and Unsaturated Fatty Acids

THE role of exogenous fat is generally evaluated with regard to its caloric value, digestion, deposition, etc. It was, however, revealed that it is of great importance whether or not the fatty component of the diet contains saturated or unsaturated fatty acids.

Marked differences as regards the influence exerted by these substances can be observed, for example, when investigating the weight-curves of realimented