Isomerization of Flavan-3, 4-diols during the Formation of Isopropylidene Derivatives

By Shin-ichiro FUJISE, Shinzaburo HISHIDA,
Toshio ONUMA, Koichiro ADACHI,
Yutaka FUJISE and Takashi MUNEKATA

(Received May 10, 1962)

The stereochemistry of flavan-3, 4-diols is being studied in recent years. Corey et al.[1] reported that *cis*- and *trans*-flavan-3, 4-diols could respectively be converted to cyclic carbonates and that one of these carbonates was a trans derivative. Bokadia et al.[2] have shown that *trans*-flavan-3, 4-diol, *trans*-5-methylflavan-3, 4-diol, and *trans*-5-methyl-4'-methoxyflavan-3, 4-diol afforded the isopropylidene derivatives of the corresponding *cis*-diols. These results show that the formation of a cyclic derivative could no longer be regarded as diagnostic for a *cis*-configuration.

TABLE I

Flavan-3, 4-diols			Isopropylidene derivatives	
		M. p. °C	M. p. °C	Yield[h] %
Non-substituted	I[a]	161.5~162.5	110~111	60
	II[a]	142.5~143.5	None	
	III[b]	152~153	135~136	70
4'-Methoxy-	IV[a]	158.5~159.9	114~115	55
	V[a]	173~174	None	
	VI[b]	134~136		
7-Methoxy-	VII[a]	135~136	None[c]	(50)
	VIII[a]	117~118	113~114	60
	IX[b]	107~108		
7, 3', 4'-Trimethoxy-	X[a]	172~173	135[d]	35 (55)
	XI[a]	149.5~150.5		3 (45)
	XII[b]	151~152	108~109[e]	(70)
5, 7, 3', 4'-Tetramethoxy-	XIII[a]	206.5~207.5	141~142[f]	70
	XIV[a]	165.5~166.5		75
	XV[b]	153~154	141~142	45
5, 7, 3', 4', 5'-Pentamethoxy-	XVI[a]	195~196	172~173[g]	50
	XVII[a]	184~185		60
	XVIII[b]	186~187	164~165	30 (60)

a Synthesized from 3-hydroxyflavanones.
b Synthesized from flavonols.
c The same isopropylidene derivative which was obtained from VIII, was obtained by the reaction with acetone in the presence of concentrated hydrochloric acid. Yield, 50%.
d Obtained from both X and XI.
e Obtained in the presence of concentrated hydrochloric acid.
f Obtained from both XIII and XIV.
g Obtained from both XVI and XVII.
h The yield in parentheses show that obtained in the presence of concentrated hydrochloric acid.

---

[1] E. J. Corey, E. M. Philbin and T. S. Wheeler, *Tetrahedron Letters*, No. 13, 429 (1961).

[2] M. M. Bokadia et al., *J. Chem. Soc.*, **1961**, **4663**.

Authors report analogous results shown below (Table I). The two stereoisomers of flavan-3, 4-diols (at C-4) were synthesized by the reduction (with $NaBH_4$, $LiAlH_4$, or catalytic hydrogenation) of the corresponding 3-hydroxyflavanones and the third isomers were synthesized by catalytic hydrogenation of the corresponding flavonols in the presence of copper chromium oxide, Raney nickel, or platinium oxide. The isopropylidene derivatives were obtained from flavan-3, 4-diols by the reaction with acetone in the presence of anhydrous cupric sulfate at room temperature.

Some pairs of flavan-3, 4-diols, X and XI, XIII and XIV, XVI and XVII, gave the same isopropylidene derivatives. The stereochemical change in the course of the formation of isopropylidene derivatives may be caused by the ionization of the benzylic 4-carbon atom.

Department of Chemistry,
Faculty of Science
Tohoku University
Katahira-cho Sendai