*Syntheses of Kinetin-analogs. I**

By F. Shigeo OKUMURA, Mitsuo MASUMURA, Toshiyuki MOTOKI, Tadashi TAKAHASHI and Susumu KURAISHI**

(Received November 2, 1956)

The discovery of kinetin[1], 6-(2-furfuryl)-aminopurine (isolated from autoclaved

* Presented at the meeting of the Chugoku-shikoku Branch of the Chemical Society of Japan, Niihama, Oct. 18 th. 1956.

** Botanical Institute, Faculty of Science, Univ. of Tokyo.

1) C. O. Miller, F. Skoog, F. S. Okumura, M. H. Von Saltza and F. M. Strong, *J. Am. Chem. Soc.*, **77**, 1392, 2662 (1955) ; **78**, 1375 (1956).

TABLE I

SYNTHESES OF 6-SUBSTITUTED PURINES

Purine	Temp. (°C) and time (hr.) of run	Yield (%)	M. p. (°C)	Analysis C Calcd	C Found	H Calcd	H Found	N Calcd	N Found
6-(2-Thenyl)-amino[a]	120-30[e], 12 hr.	19.3	247-7.5[i]	52.17	51.94	3.48	3.70	30.43	30.18
	120-5[f], 10.	39.9							
6-Benzylamino-[b]	120-5[f], 10.	44.3	229-30[i]	64.29	64.01	4.46	4.76	31.25	31.00
6-(α-Phenylethyl)-amino-[c]	120-30[e], 8.	54.2	240-1[i]	65.55	65.29	5.04	5.27	29.41	29.19
6-(*n*-Amyl)-amino-	90-100[e], 15.	36.7	164-5[j]	58.82	58.50	6.86	7.03	34.31	34.15
6-(*n*-Hexyl)-Amino-	130-5, 9.	31.0	177-8[k]	60.23	60.13	7.82	7.70		
6-(*p*-Methoxybenzyl)-amino-	120-30[e], 8.	48.2	233-4[i]	61.42	61.15	4.72	5.00	27.56	27.28
6-(3,4-Dimethoxy-benzyl)-amino	120-5[f], 10.	48.1	240.5-1[i]	59.16	59.41	4.93	5.10	24.65	24.58
6-(3,4-Methylenedioxy-benzyl)-amino-	120-30[g], 12.	40.3	259-60[i]	58.21	57.95	3.73	4.02	26.12	25.90
6-Furfurylthio-[d]	[h]	26.2	174-5[k]	51.72	52.56	3.47	3.70		

TABLE II
SYNTHESES OF 6-SUBSTITUTED 3-METHYLPYRIDAZINES

3-Methylpyridazine	Temp. (°C) and time (hr.) of run	Yield (%)	M. p. (°C)	Analysis C Calcd	C Found	H Calcd	H Found	N Calcd	N Found
6-(2-Furfuryl)-amino-	125°, 24 hr.	66.0	161-2[j]	63.49	63.68	5.82	6.06	22.22	22.05
6-Benzylamino-	100-30°, 18.	59.0	138.5-9[j]	72.36	72.10	6.53	6.68	21.11	21.01
6-Anilino-	100°, 1.	56.0	167.5-8[l]	71.35	71.51	5.95	6.14	22.70	22.82
6-(2-Thenyl)-amino-	130°, 20.	81.0	178-9[m]					20.49	20.21
6-(*p*-Methoxybenzyl)-amino-	125°, 18.	79.5	142-3[j]					18.34	18.25
6-(3,4-Dimethoxybenzyl)-amino-	135-40°, 16.	49.6	127-8[l]					16.22	16.01

a) M. p., 241.5-2°C[3], M. p., 250°C[4]. b) M. p. 231°C[3], M. p. 229°C[4], M. p. 216-8°C[2].
c) M. p., 199-202°C[3]. d) M. p., 178-8.5°C[3]. e) In H_2-Stream. f) In sealed tube.
g) In air without CO_2. h) Prepared with 6-mercaptopurine and furfurylchloride in air.
(Solvents of recrystallization) i) Absolute alcohol j) Benzene
k) 60% alcohol l) Water m) Alcohol

sperm deoxyribonucleic acid as a cell division factor for tobacco callus tissue), has stimulated an interest in preparing various 6-substituted purines through the use of 6-chloropurine[2,3] or 6-methylmercaptopurine[4] as possible cytokinetic agents.

Recently Kuraishi and Okumura[5] found that kinetin is the leaf-growth factor for Raphanus sativus L.

In Tokushima we have synthesized various kinetin-analogs such as 6-substituted purines and 6-substituted 3-methylpyridazines by condensing 6-methylmercaptopurine[6] and 6-chloro-3-methylpyridazine[7] respectively with various amines. The results are shown in Tables I and II.

The biological test on 6-(2-thenyl)-amino-, 6-benzylamino- and 6-*n*-hexylamino-purines prove to have the same effect on the growth of Raphanus leaf as kinetin. It is very interesting that 6-benzylaminopurine shows leaf-growth activity but 6-phenylethylaminopurine does not.

The authors are indebted to the research institute of Tanabe Parm. Co. in Tokyo for the microanalyses.

Department of Applied Chemistry
Faculty of Engineering Tokushima
University, Tokushima

2) J. W. Daly and B. E. Christensen, *J. Org. Chem.*, **21**, 177 (1956).
3) M. W. Bullock, J. J. Hand and E. L. R. Stokstad, *J. Am. Chem. Soc.*, **78**, 3693 (1956).
4) C. G. Skinner and W. Shive, ibid., **77**, 6692 (1955).
5) S. Kuraishi and F. S. Okumura, *Bot. Mag.* (Tokyo), **69**, 300 (1956).
6) G. B. Elion, E. Burgi and G. H. Hitchings, *J. Am. Chem. Soc.*, **74**, 411 (1952).
7) W. G. Overend and L. F. Wiggins, *J. Chem. Soc.*, **1947**, 239.