

# ISOPHOTOMETRY OF COMET TAGO-SATO-KOSAKA

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## ABSTRACT

Narrow-band filter photographs of comet TSK were taken in the light of  $C_2$ , CN and  $C_3$  by Rahe McCracken and Donn, have been analysed in terms of Haser's model of the coma. The isophotes obtained from these photographs were corrected for sky background. The isophotes were circularly symmetric. Radial intensity profiles were obtained along the sunward, antisun and the two perpendicular directions. In each case, these profiles were the same within the experimental errors in intensity ( $\pm 5\%$ ).

Theoretical curves based on Haser's model were computed for different combinations of the parameters  $\beta_0$  and  $\beta_1$  where  $1/\beta_0$  is the scale length for the decay of the unobserved parent molecule and  $1/\beta_1$  the corresponding quantity for the observed daughter molecule. A comparison of the theoretical and observed intensity profiles, yielded our best estimates for  $\beta_0$  and  $\beta_1$  for the different molecules. These are listed in Table 1. In some cases, we were able to obtain lower limits only to the ratio  $\beta_0/\beta_1$  because the isophotes do not go out far enough, a limitation caused by the sky background. It is to be noted that the same values of the parameters were obtained from observations on different dates indicating no unusual activity in the comet in the intervening period. We believe ours is the first result ever obtained for  $C_3$ .

In Table 2, we summarize all the results for  $C_2$  and CN in different comets. It appears that the scale lengths differ between comets, a result which cannot be attributed to different helio-centric distances alone.

Table 1  
 $C_2$  and CN Scale Lengths - Comet TSK

Observation Date UT	Molecule Wavelength A	$\beta_0$ X $10^5$ KM <sup>-1</sup>	$\beta_0/\beta_1$	Decay Scale Length in Units of $10^4$ KM	
				(Parent)	(Daughter)
2/11.99	CN-3884	5.-6.	2.5-4.	1.67-2.	4.175-8.
2/13.026	CN-3884	5.-6.	2.5-4.	1.67-2.	4.175-8.
2/14.026	CN-3884	5.-6.	2.5-4.	1.67-2.	4.175-8.
2/12.003	$C_2$ -5172	4.0.	4.-6.	2.5.	10.-15.
2/12.015	$C_2$ -5172	4.0.	4.-6.	2.5.	10.-15.
2/13.013	$C_2$ -5172	4.0.	4.-6.	2.5.	10.-15.
2/14.018	$C_2$ -5172	4.0.	4.-6.	2.5.	10.-15.
2/12.026	$C_2$ -4738	4.0.	4.-6.	2.5.	10.-15.
2/12.047	$C_3$ -4063	12.-13.	2.	76-83	1.54-1.67

Table 2  
Comparison of CN and C<sub>2</sub> Scale Lengths

Reference	Molecule Wavelength Å	Comet Heliocentric Distance A.U.	Observation Date UT	Scale Length in Units of 10 <sup>4</sup> KM	
				Parent 1/β <sub>0</sub>	Daughter 1/β <sub>1</sub>
This Analysis	CN-3884	TSK (1.239- 1.275)	2/11.99- 2/14.026 1970	1.67-2	4.175-8
Borra & Wehlau (1973)	CN-3878	TSK (1.095)	2/4.0 1970	2.5	20.0
Delsemme & Moreau (1973)	CN	Bennett (1.0)	3/30- 5/7 1970	5.01	14.1
This Analysis	C <sub>2</sub> -5172 -4738	TSK (1.239 1.275)	2/12.033- 2/14.018 1970	2.5	10-15
Delsemme & Moreau (1973)	C <sub>2</sub>	Bennett (1.0)	3/30- 5/7 1970	2.0	6.31
Dewey & Miller (1966)	C <sub>2</sub> -5165	Seki (.935)	11/11.4 1961	4.57	8.32
O'Dell & Osterbrock (1962)	C <sub>2</sub> -4737	Seki (.922, .935)	11/10.4 & 11/11.4 1961	1.42	8.51
Dewey & Miller (1966)	C <sub>2</sub>	1955e* 1955g* 1959k**		1.167	9.33

\*Observations by Schmidt and van Woerden (1957)

\*\*Observations by Miller (1961)