Authors: Marin Chabot & Karine Béroff (Orsay)

$C_{10} + h\nu \rightarrow C_9 + C$ (1)

$\rightarrow C_8 + C_2$ (2)

$\rightarrow C_7 + C_3$ (3)

$\rightarrow C_6 + C_4$ (4)

$\rightarrow C_5 + C_5$ (5)

$\rightarrow C_4 + C_3 + C_3$ (6)

$\rightarrow C_{10}^+ + e^-$ (7)

Thermodynamic Data

Dissociation Energy (1) = 724 kJ mol^{-1} = 7.50 eV

Dissociation Energy (2) = 753 kJ mol^{-1}= 7.80 eV

Dissociation Energy (3) = 579 kJ mol^{-1} = 6.00 eV

Dissociation Energy (4) = 743 kJ mol^{-1} = 7.70 eV

Dissociation Energy (5) = 579 kJ mol^{-1} = 6.00 eV

Dissociation Energy (6) = 1079 kJ mol^{-1} = 11.20 eV

Ionisation Potential = 887 kJ mol^{-1} = 9.20 eV

DE from Raghavachari (1987) (estimated error bars of the order of 0.5 eV, relative values better known); IP (vertical) from Belau et al (2007) (estimated error bars 0.1).

Rate Coefficient Data

k / molecule^{-1} s^{-1}	T / K	Reference	Comments
Rate Coefficient Measurement: none			
Reviews and Evaluations			
$9.37 \times 10^{-10} \times \exp(-2.6 \times A_V)$	10-41000	UMIST06 database	(a) channel (1)
$1.96 \times 10^{-10} \times \exp(-3.0 \times A_V)$	10-41000	UMIST06 database	(a) channel (2)
$9.47 \times 10^{-12} \times \exp(-3.9 \times A_V)$	10-41000	UMIST06 database	(a) channel (4)
$3.46 \times 10^{-12} \times \exp(-5.1 \times A_V)$	10-41000	UMIST06 database	(a) C_7+C_2+C
$1.16 \times 10^{-12} \times \exp(-5.2 \times A_V)$	10-41000	UMIST06 database	(a) C_6+C_3+C
$5.49 \times 10^{-10} \times \exp(-3.1 \times A_V)$	10-41000	UMIST06 database	(a) photoionisation
Branching Fraction Measurement			
(1) = 0.01 (±0.005)		Chabot 2006, 2010	(b)
(2) = 0.01 (±0.005)			
(3) = 0.70 (±0.03)			
(4) = 0.03 (±0.01)			
(5) = 0.25 (±0.02)			
~~*Branching fraction Reviews and Evaluations*~~			

Comments

(a) No details on how photoionisation and photodissociation rates were estimated were found anywhere in the literature. Each channel has its own attenuation coefficient. These rate evaluations are not consistent with rate and branching fraction evaluations for smaller C_n species. We recommend using rates of van Dishoeck (1988) for large C_n ($10 \geq n \geq 6$).

(b) Measurements have been performed with High Velocity Collision experiment on hot (3000°K) C_{10} clusters produced by a sputtering source. Results have been interpreted satisfactorily within a statistical fragmentation behaviour (Martinet, 2004). Derivation of these experimental results in astrochemical context assumes that statistical fragmentation occurs under photodissociation process (Tuna 2007, Chabot 2010).

Preferred Values

Rate constants:
Photo dissociation:
$k = 1.0 \times 10^{-9} \times \exp(-1.7 \times A_V)$
Photo ionisation:
$k = 2.0 \times 10^{-10} \times \exp(-2.5 \times A_V)$

Reliability of rate constants:
F0=2; g=0

Recommended Branching Fractions:
Photo dissociation:
(1) = (2) = (4) = (6) = 0.00
(3) = 0.75
(5) = 0.25
Photo ionisation:
(7) =1.0

Reliability of Branching Fractions:
±0.1 (uniform)

References

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