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C(^{3}P) + OCN($^2\Pi$) → CN($^2\Sigma^+$) + CO($^1\Sigma^+$) (1) $\Delta Hr^{298} = -519$ kJ mol^{-1} *(Baulch* et al.*, 2005)*

Rate Coefficient Data *k*

k / cm^3 molecule^{-1} s^{-1}	*T* / K	Reference	Comments
Rate Coefficient Measurements			
None that can be found.			
Reviews and Evaluations			
1.0×10^{-10}	10 - 300	UMIST database	
1.0×10^{-10}	*T*-independent	OSU website	

Comments

This is a very exothermic radical-radical reaction. The reactants correlate with 36 states ($3^2A' + 3^2A'' + 3^4A' + 3^2A''$), the products in their ground states with only one doublet surface. However the $A^2\mathbf{\Pi}$ state of CN is energetically accessible and probably provides other adiabatic routes. Nevertheless, it seems that an electronic degeneracy factor of about 1/6 will decrease the rate coefficient from the simple collision value.

There have been no experiments on this reaction (or none listed in the NIST data base), and no calculations that I can find reference to.

Preferred Values

Rate coefficients (10 – 300 K)

$k(300\text{ K}) = 1 \times 10^{-10}$ cm^3 molecule^{-1} s^{-1}
$k(10\text{ K}) = 1 \times 10^{-10}$ cm^3 molecule^{-1} s^{-1}
$\mathbf{k(T) = 1 \times 10^{-10}}$ **cm^3 molecule^{-1} s^{-1}**

Reliability

$\Delta \log k$ (300 K) = ± 0.7
$\Delta \log k$ (10 K) = ± 0.7
$\mathbf{F_0 = 5\ ;\ g = 0}$

Comments on Preferred Values

In the absence of any data, the estimates given in the OSU and UMIST data bases appear reasonable for this radical-radical reaction. 'Reliability is low'.
Note that in the interstellar medium, electronically excited CN will relax before reacting, for this reason, in most astrophysical environments, we do not make any distinctions between ground and excited states.

References

D. L. Baulch *et al*., J. Phys. Chem. Ref. Data **34**, 575 (2005).