Supplementary information:

Flow tube studies of the C(^{3}P) reactions with ethylene and propylene

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Table S1 Preponderant reactions expected to occur upon irradiation of a $C_3O_2 + C_2H_4$ mixture

	Reactions	k (300K) / cm^3s^{-1}	Reference
1	$C + C_2H_4 \rightarrow C_3H_3 + H$	2.1×10^{-10}	[1]
2	$C + C_3O_2 \rightarrow C_2 + 2CO$	2×10^{-10}	[2]
3	$C + C_2O \rightarrow$ C2 + CO	4×10^{-11}	By comparison with $C + O_2$ (triplet + triplet reaction)
4	$C + C_3H_3 \rightarrow C_4H_2 + H$	1×10^{-10}	OSU database[3]
5	$C + C_2H_3 \rightarrow C_3H_2 + H$	1×10^{-10}	OSU database[3]
6	$C_2O + H \rightarrow CH + CO$	3×10^{-11}	[4-6]
7	$C_2O + C_3O_2 \rightarrow C_2 + 3CO$	1×10^{-10}	By comparison with $^1C_2O + NH_3$[7]
8	$C_2O + C_2H_3 \rightarrow C_3H_3 + CO$	4×10^{-11}	Considering no barrier (radical + radical reaction)
9	$C_2O + C_3H_3 \rightarrow C_4H_3 + CO$	4×10^{-11}	Considering no barrier (radical + radical reaction)
10	$C_2O + C_2H_4 \rightarrow C_3H_4 + CO$	1×10^{-10}	By comparison with $^1C_2O + NH_3$[7]
11	$C_2O + C_3H_4 \rightarrow C_4H_4 + CO$	1×10^{-10}	By comparison with $^1C_2O + NH_3$
12	$CH + C_3O_2 \rightarrow C_2H + 2CO$	1×10^{-10}	Sato et al.[8] propose 1.0e-11 inferred from a complex mechanism
13	$CH + C_2H_4 \rightarrow C_3H_4 + H$	2.84×10^{-10}	[9]
14	$CH + C_3H_4 \rightarrow C_4H_4 + H$	4.6×10^{-10}	[10]
15	$C_2H + C_2H_4 \rightarrow C_4H_4 + H$	9.9×10^{-11}	[11]
16	$C_2H + C_3O_2 \rightarrow HC_4O + CO$	1.0×10^{-10}	By comparison with $C_2O + NH_3$[7]
17	$C_2H + C_2O \rightarrow C_3H + CO$	4.0×10^{-10}	Estimated by comparison with C_2H + NO

Table S2 Preponderant reactions expected to occur upon irradiation of a C_3O_2 + C_3H_6 mixture

	Reaction	k (300K) / cm^3s^{-1}	Reference
1	$C + C_3H_6 \rightarrow C_4H_5 + H$ $\rightarrow C_3H_3 + CH_3$	1.3×10^{-10} 1.3×10^{-10}	[12]
2	$C + C_3O_2 \rightarrow C_2 + 2CO$	2×10^{-10}	[2]
3	$C + C_2O \rightarrow C_2 + CO$	4×10^{-11}	By comparison with C + O_2 (triplet + triplet reaction)
4	$C + C_3H_3 \rightarrow C_4H_2 + H$	1×10^{-10}	OSU database[3]
5	$C + C_4H_5 \rightarrow C_5H_4 + H$	1×10^{-10}	Estimated based on C + C_3H_3
6	$C + C_2H_3 \rightarrow C_3H_2 + H$	1×10^{-10}	OSU database[3]
7	$C + C_3H_5 \rightarrow C_4H_4 + H$	1×10^{-10}	Estimated based on C + C_3H_3
8	$C + CH_3 \rightarrow C_2H_2 + H$	1×10^{-10}	OSU database[3]
9	$C_2O + H \rightarrow CH + CO$	3×10^{-11}	[5,6,13]
10	$C_2O + C_3O_2 \rightarrow C_2 + 3CO$	1×10^{-10}	By comparison with $^1C_2O + NH_3$
11	$C_2O + C_3H_5 \rightarrow C_4H_5 + CO$	4×10^{-11}	Considering no barrier (radical + radical reaction)
12	$C_2O + CH_3 \rightarrow C_2H_3 + CO$	4×10^{-11}	Considering no barrier (radical + radical reaction)
13	$C_2O + C_2H_3 \rightarrow C_3H_3 + CO$	4×10^{-11}	Considering no barrier (radical + radical reaction)
14	$C_2O + C_3H_3 \rightarrow C_4H_3 + CO$	4×10^{-11}	Considering no barrier (radical + radical reaction)
15	$C_2O + C_3H_6 \rightarrow C_4H_6 + CO$	1×10^{-10}	By comparison with $^1C_2O + NH_3$
16	$C_2O + C_4H_6 \rightarrow C_5H_6 + CO$	1×10^{-10}	By comparison with $^1C_2O + NH_3$
17	$CH + C_3O_2 \rightarrow C_2H + 2CO$	1×10^{-10}	Sato et al.[8] propose 1.0e-11 deduced from a complex mechanism
18	$CH + C_3H_6 \rightarrow C_4H_6 + H$	3×10^{-10}	Extrapolation to 300 K[14]
19	$CH + C_4H_6 \rightarrow C_5H_6 + H$	3×10^{-10}	By comparison with CH + C_3H_6
20	$C_2H + C_3H_6 \rightarrow C_4H_4 + CH_3$ $\rightarrow C_5H_6 + H$	5×10^{-10} 9×10^{-11}	[15]
21	$C_2H + C_3O_2 \rightarrow HC_4O + CO$	1.0×10^{-10}	By comparison with $C_2O + NH_3$
22	$C_2H + C_2O \rightarrow C_3H + CO$	4.0×10^{-10}	Estimated by comparison with C_2H + NO

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