Supporting Information

A Vacuum Ultraviolet Photoionization Study on High-Temperature Decomposition of JP-10 (*exo*-Tetrahydrodicyclopentadiene)

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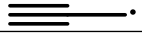
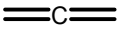
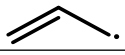
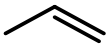
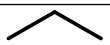
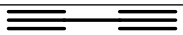
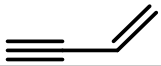
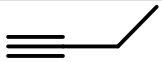
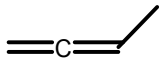
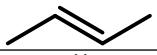
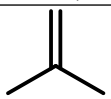
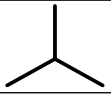
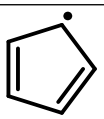
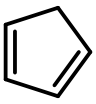
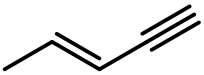
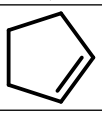
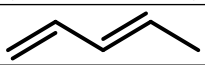
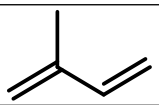
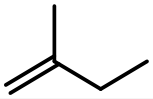
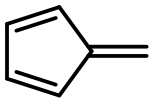
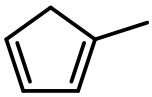
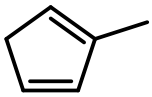
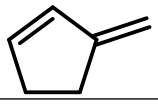
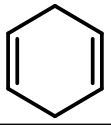
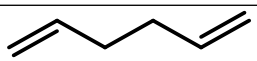
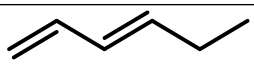
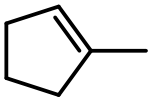
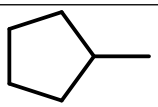
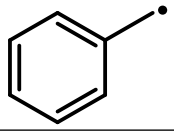
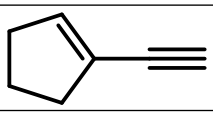
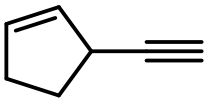
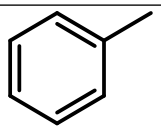
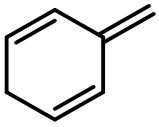
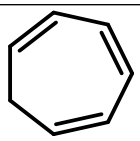
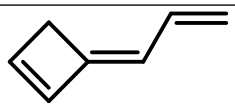
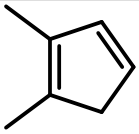
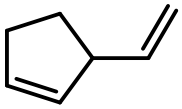
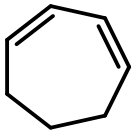
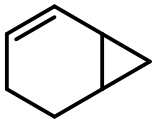
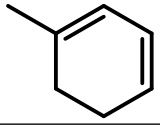
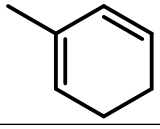
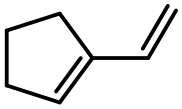
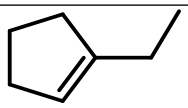
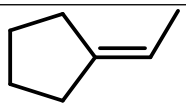
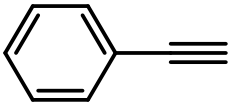
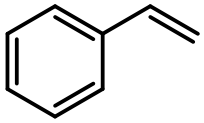
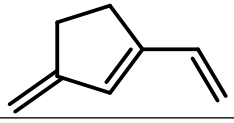
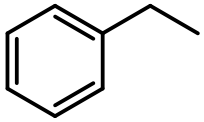
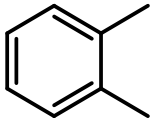
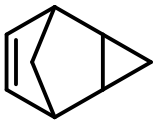
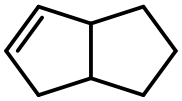
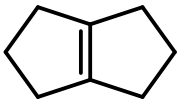
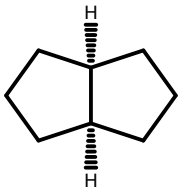
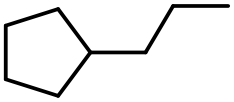
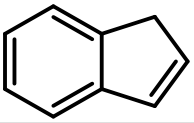
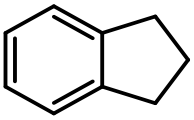
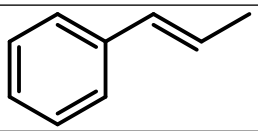
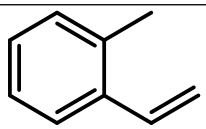
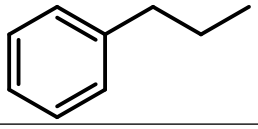
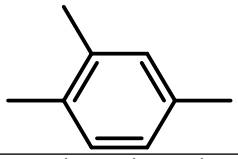
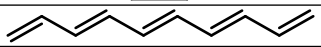
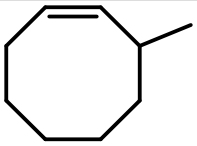
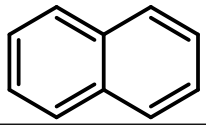
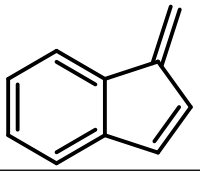
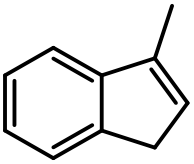
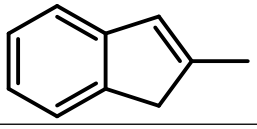
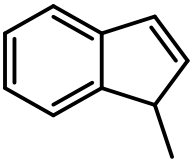
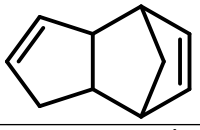
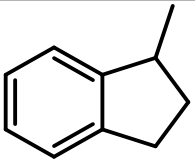
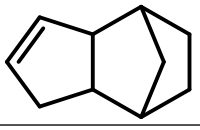
Table S1. Species reported in previous experimental studies on JP-10.

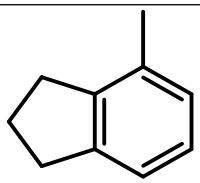
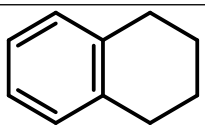
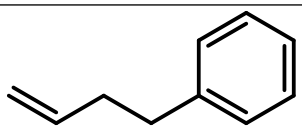
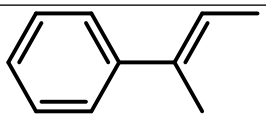
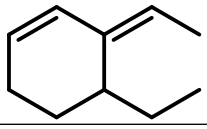
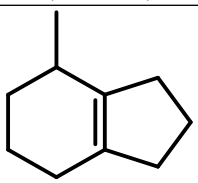
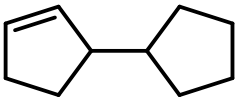
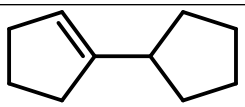
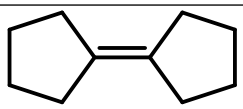
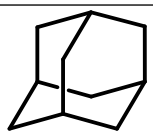
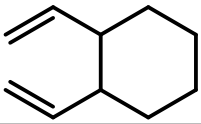
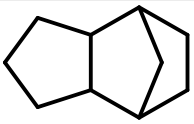
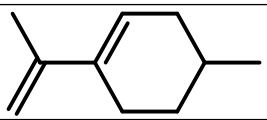
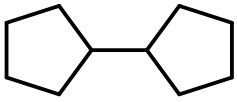
Molecule	Formula	Mass	Structure	Ref.
Hydrogen	H_2	2		1-4
Methyl	CH_3	15		3
Methane	CH_4	16		1-6
Acetylene	C_2H_2	26		1, 3, 7, 8
Ethylene	C_2H_4	28		1-8
Ethyl	C_2H_5	29		3
Ethane	C_2H_6	30		1, 2, 4-6
Propargyl	C_3H_3	39		3
Methylacetylene	C_3H_4	40		1, 7, 8
Allene	C_3H_4	40		1, 7, 8
Allyl	C_3H_5	41		3
Propene	C_3H_6	42		1-6, 8
Propane	C_3H_8	44		1, 4-6, 9
Diacetylene	C_4H_2	50		8
Vinylacetylene	C_4H_4	52		3, 8
1-Butyne	C_4H_6	54		3, 8
1,3-Butadiene	C_4H_6	54		1, 6, 8
1,2-Butadiene	C_4H_6	54		8
1-Butene	C_4H_8	56		1, 6, 8
2-Butene	C_4H_8	56		1, 6, 8
i-Butene	C_4H_8	56		1, 6
n-Butane	C_4H_{10}	56		4, 9
i-Butane	C_4H_{10}	56		1
Cyclopentadienyl	C_5H_5	65		3
Cyclopentadiene	C_5H_6	66		1-3, 5-8, 10
3-Penten-1-yne	C_5H_6	66		8
Cyclopentene	C_5H_8	68		1, 2, 4-6, 8, 10
1,4-Pentadiene	C_5H_8	68		8
1,3-Pentadiene	C_5H_8	68		3

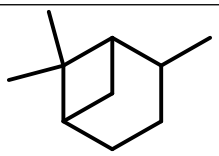
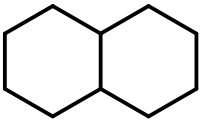
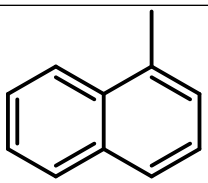
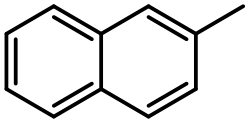
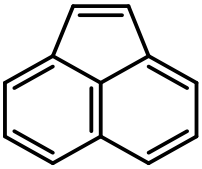
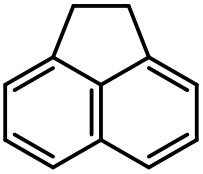
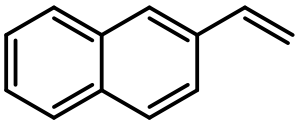
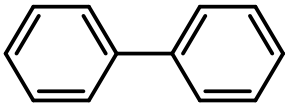
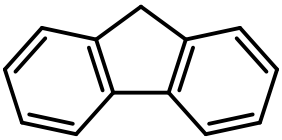
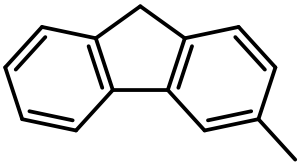
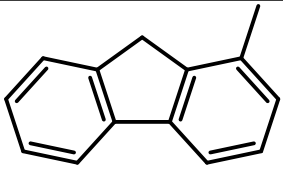
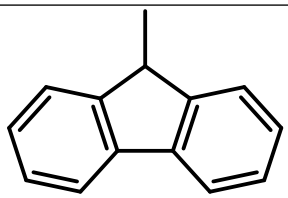
2-Methyl-1,3-butadiene	C_5H_8	68		1
Cyclopentane	C_5H_{10}	70		4, 5
1-Pentene	C_5H_{10}	70		1
2-Methyl-1-butene	C_5H_{10}	70		1
Fulvene	C_6H_6	78		1
Benzene	C_6H_6	78		1, 2, 5-11
1-Methylcyclopentadiene	C_6H_8	80		1, 8
2-Methylcyclopentadiene	C_6H_8	80		1
3-Methylene-cyclopentene	C_6H_8	80		8
1,3-Cyclohexadiene	C_6H_8	80		31
1,4-Cyclohexadiene	C_6H_8	80		1
1,5-Hexadiene	C_6H_{10}	82		2
1,3-Hexadiene	C_6H_{10}	82		1
1-Methylcyclopentene	C_6H_{10}	82		9
Cyclohexene	C_6H_{10}	82		12
Methylcyclopentane	C_6H_{10}	84		9
Benzyl	C_7H_7	91		3
1-Ethynyl-cyclopentene	C_7H_8	92		5, 10

3-Ethynyl-cyclopentene	C_7H_8	92		1, 5
Toluene	C_7H_8	92		1-3, 5, 6, 8-11
3-Methylidenecyclohexa-1,4-diene	C_7H_8	92		1
1,3,5-Cycloheptatriene	C_7H_8	92		8
2-Propenylidene-cyclobutene	C_7H_8	92		8
1,2-Dimethylcyclopentadiene	C_7H_{10}	94		12
1,3-Bis(methylene)cyclopentane	C_7H_{10}	94		10
3-Ethenyl-cyclopentene	C_7H_{10}	94		8
1,3-Cycloheptadiene	C_7H_{10}	94		8
Bicyclo(4.1.0)hept-2-ene	C_7H_{10}	94		8, 10
2-Norbornene	C_7H_{10}	94		1
1-Methylcyclohexa-1,3-diene	C_7H_{10}	94		1
1-Methylcyclohexa-2,4-diene	C_7H_{10}	94		1
Ethenylcyclopentene	C_7H_{10}	94		1
Ethylcyclopentene	C_7H_{12}	96		9

Ethylidenecyclopentane	C_7H_{12}	96		9
Phenylacetylene	C_8H_6	102		3, 8
Styrene	C_8H_8	104		1, 8
1-Ethenyl-3-methylene-cyclopentene	C_8H_{10}	106		8
Ethylbenzene	C_8H_{10}	106		1, 3, 8, 9
p-Xylene	C_8H_{10}	106		1
o-Xylene	C_8H_{10}	106		1, 8, 9
Tricyclo[3.2.1.0(2,4)]oct-6-ene	C_8H_{10}	106		1
1,2,3,3a,4,6a-Hexahydropentalene	C_8H_{12}	108		5, 8-10
Bicyclo[3.3.0]oct-1(5)-ene	C_8H_{12}	108		1
cis-Octahydropentalene	C_8H_{14}	110		9
Propylcyclopentane	C_8H_{16}	112		9
Indene	C_9H_8	116		1, 3, 8
Indane	C_9H_{10}	118		8
Propenyl benzene	C_9H_{10}	118		1, 8

1-Ethenyl-2-methylbenzene	C_9H_{10}	118		1
Propylbenzene	C_9H_{12}	120		1
1,2,4-Trimethylbenzene	C_9H_{12}	120		1
1,3,5,7,9-Decapentayne	$C_{10}H_2$	122		3
3-Methylcyclooctene	C_9H_{16}	124		9
Naphthalene	$C_{10}H_8$	128		1, 8, 10, 11
Benzofulvene	$C_{10}H_8$	128		1
1-Methylindene	$C_{10}H_{10}$	130		1
2-Methylindene	$C_{10}H_{10}$	130		1, 10
3-Methylindene	$C_{10}H_{10}$	130		1
Dicyclopentadiene	$C_{10}H_{10}$	130		10
2,3-Dihydro-1-methyl-1H-indene	$C_{10}H_{12}$	132		4
5,6-Dihydrodicyclopentadiene	$C_{10}H_{12}$	132		1, 10

2,3-Dihydro-4-methyl-1H-Indene	$C_{10}H_{12}$	132		10
1,2,3,4-Tetrahydronaphthalene	$C_{10}H_{12}$	132		1, 10
3-Butenylbenzene	$C_{10}H_{12}$	132		1
(1-Methyl-1-propenyl)-Benzene	$C_{10}H_{12}$	132		10
4-Ethyl-3-ethylidene-cyclohexene	$C_{10}H_{16}$	136		8
4-Methyl-2,3,4,5,6,7-hexahydro-1H-indene	$C_{10}H_{16}$	136		4
3-Cyclopentylcyclopentene	$C_{10}H_{16}$	136		2, 5, 8
1-Cyclopentylcyclopentene	$C_{10}H_{16}$	136		4, 10
Bicyclopentylidene	$C_{10}H_{16}$	136		4
Adamantane	$C_{10}H_{16}$	136		1, 4, 10
1,2-Diethenyl-cyclohexane	$C_{10}H_{16}$	136		8
exo-Tetrahydrodicyclopentadiene	$C_{10}H_{16}$	136		1-12
4-Methyl-1-(1-methyethenyl)cyclohexene	$C_{10}H_{16}$	136		10
Cyclopentylcyclopentane	$C_{10}H_{18}$	138		4

2,6,6-Trimethyl-bicyclo(3.1.1)heptane	$C_{10}H_{18}$	138		8
trans-Decalin	$C_{10}H_{18}$	138		4
1-Methylnaphthalene	$C_{11}H_{10}$	142		1
2-Methylnaphthalene	$C_{11}H_{10}$	142		1
Acenaphthylene	$C_{12}H_8$	152		1
Acenaphthene	$C_{12}H_{10}$	154		1
2-Ethenylnaphthalene	$C_{12}H_{10}$	154		1
Biphenyl	$C_{12}H_{10}$	154		1
Fluorene	$C_{13}H_{10}$	166		1
3-Methyl-1H-fluorene	$C_{14}H_{12}$	180		1
1-Methyl-1H-fluorene	$C_{14}H_{12}$	180		1
9-Methyl-1H-fluorene	$C_{14}H_{12}$	180		1

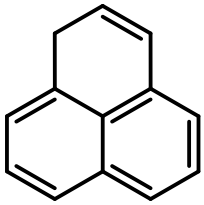
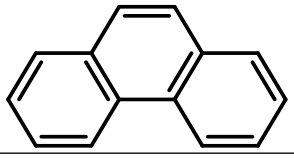
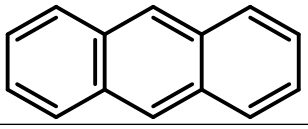
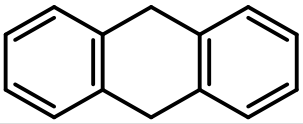
1H-Phenalene	$C_{13}H_{10}$	166		[1]
Phenanthrene	$C_{14}H_{10}$	178		[1]
Anthracene	$C_{14}H_{10}$	178		[1]
9,10-Dihydro-anthracene	$C_{14}H_{12}$	180		[1]

Table S2. Temperature profiles measured in the JP-10 pyrolysis (NSRL). 927 K, 949 K, 972 K, 994 K, 1016 K, 1038 K, 1061 K and 1083 K in the head line define the names of temperature profiles.

Distance (mm)	Temperature (K)							
	927 K	**949 K**	**972 K**	**994 K**	**1016 K**	**1038 K**	**1061 K**	**1083 K**
0	538	549	559	569	580	590	600	611
10	622	636	651	666	680	695	710	724
20	695	713	731	749	767	785	803	821
30	764	785	807	828	849	870	892	913
40	814	837	860	883	906	929	951	974
50	854	878	902	925	949	973	997	1021
60	879	903	928	952	976	1000	1025	1049
70	895	919	943	966	990	1014	1038	1061
80	905	929	953	976	1000	1023	1047	1070
90	913	936	960	983	1006	1030	1053	1077
100	919	942	966	989	1012	1035	1058	1081
105	921	944	967	990	1013	1036	1058	1081
110	923	946	969	991	1014	1037	1060	1082
115	924	947	969	992	1014	1037	1059	1082
120	926	948	971	993	1015	1038	1060	1083
125	926	949	971	993	1016	1038	1060	1083
130	927	949	972	994	1016	1038	1061	1083
135	927	949	972	994	1016	1038	1061	1083
140	927	949	972	994	1016	1038	1060	1082
145	927	949	971	992	1014	1036	1058	1080
150	926	947	969	991	1012	1034	1056	1077
155	925	946	968	989	1010	1032	1053	1075
160	923	944	966	987	1008	1029	1051	1072
165	920	941	963	984	1005	1026	1047	1068
170	918	939	960	981	1002	1023	1043	1064
175	916	937	958	978	999	1020	1041	1061
180	913	933	954	974	994	1015	1035	1056
185	909	930	950	970	991	1011	1031	1052
190	905	925	945	964	984	1004	1024	1044
195	898	918	938	957	977	996	1016	1035
200	888	907	927	946	965	984	1003	1022
205	876	894	912	929	947	965	983	1001
210	860	877	895	912	929	947	964	982
215	833	848	863	877	892	907	922	936
220	797	811	825	838	852	866	880	894
225	747	757	768	778	788	798	808	818

Table S3. Photoionization cross sections (Mb, 1 Mb = 10^{-22} m^2) of the species at selected energies exploited for the calculations of the branching ratios in this work.

Species	Formula	Mass	Ionization energy (eV)	Photon Energy (eV)									Ref.
				8.0	8.4	9.0	9.5	10.0	10.5	11.0	11.5	15.5	
Hydrogen	H_2	2	13.60	-	-	-	-	-	-	-	-	4.73	[13]
Methyl	CH_3	15	9.84	-	-	-	-	4.78	5.81	-	-	-	[14]
Methane	CH_4	16	12.61	-	-	-	-	-	-	-	-	23.87	[15]
Acetylene	C_2H_2	26	11.40	-	-	-	-	-	-	-	18.26	-	[16]
Vinyl	C_2H_3	27	8.25	0.37	1.87	4.94	8.04	11.06	13.32	-	-	-	[17]
Ethylene	C_2H_4	28	10.51	-	-	-	-	-	0.92	7.79	8.02	-	[15]
Ethyl	C_2H_5	29	8.12	-	0.43	2.95	4.36	5.06	5.52	5.64	5.37	-	[18]
Propargyl	C_3H_3	39	8.67	-	-	14.45	26.56	21.09	26.29	-	-	-	[14]
Allene	C_3H_4	40	9.69	-	-	-	-	5.66	15.48	22.26	25.84	-	[19]
Methylacetylene	C_3H_4	40	10.36	-	-	-	-	-	23.06	43.84	42.1	-	[15]
Allyl	C_3H_5	41	8.18	0.82	3.41	5.68	5.64	6.23	6.09	-	-	-	[20]
Propene	C_3H_6	42	9.73	-	-	-	-	7.05	11.09	12.41	13.35	-	[21]
Diacetylene	C_4H_2	50	10.17	-	-	-	-	0.04	23.82	25.79	33.84	-	[16]
1,2,3-Butatriene	C_4H_4	52	9.25	-	-	0.02	3.9	7.54	8.43	10.29	12.15	-	Est.
Vinylacetylene	C_4H_4	52	9.58	-	-	-	0.25	24.49	33.83	37.61	39.92	-	[16]
1,3-Butadiene	C_4H_6	54	9.07	-	-	0.02	8.48	13.96	16.44	19.91	22.45	-	[19]
1-Butene	C_4H_8	56	9.55	-	-	-	-	9.43	9.91	11.1	12.42	-	[22]
2-Butene	C_4H_8	56	9.11	-	-	0.01	5.24	9.06	11.04	14.05	19.17	-	[22]
Ethynylallene	C_5H_4	64	9.25	-	-	0.53	7.85	28.09	35.35	44.81	48.66	-	Est.
Cyclopentadienyl	C_5H_5	65	8.41	-	-	3.78	4.6	8.01	10.03	-	-	-	[23]
Cyclopentadiene	C_5H_6	66	8.57	-	-	8.52	10.05	-	-	-	-	-	[24]
1,3-Pentadiene	C_5H_8	68	8.59	-	-	6.07	12.71	17.24	20.56	21	19.7	-	[19]
Cyclopentene	C_5H_8	68	9.01	-	-	0.21	6.18	11.15	12.57	14.22	16.4	-	[16]
Fulvene	C_6H_6	78	8.36	-	0.56	4.59	7.04	7.87	9.19	-	-	-	Est.
Benzene	C_6H_6	78	9.24	-	-	-	11.05	24.28	31.81	38.6	39.25	-	[16]
1,3-Cyclohexadiene	C_6H_8	80	8.25	-	7.67	20.32	18.39	22.52	27.65	35.76	37.3	-	[22]
1,4-Cyclohexadiene	C_6H_8	80	8.82	-	-	9.39	21.18	19.25	23.07	26.27	33.16	-	Est.
Cyclohexene	C_6H_{10}	82	8.95	-	-	1.5	8.9	11.56	14.81	18.02	19.46	-	[22]

Fulvenallenyl	C_7H_5	89	8.26	0	0.45	3.56	7.41	10.14	11.39	-	-	-	Est.
Fulvenallene	C_7H_6	90	8.29	-	1.88	11.73	18.25	22.11	30	33.31	31.12	-	Est.
5-Methylene-1,3-cyclohexadiene	C_7H_8	92	7.90	0.72	2.99	4.53	7.85	8.94	14.01	-	-	-	Est.
Toluene	C_7H_8	92	8.83	-	-	5.02	18.54	26.02	31.29	39.33	51.27	-	[25]
Phenylacetylene	C_8H_6	102	8.82	-	-	14.82	29.39	52.4	62.42	76.97	101.21	-	[25]
Benzocyclobutene	C_8H_6	102	7.50	10.07	12.93	15.23	19.33	21.29	-	-	-	-	Est.
o-Xylylene	C_8H_8	104	7.75	5.01	12.08	20.73	29.54	41.28	53.93	-	-	-	Est.
Styrene	C_8H_8	104	8.46	-	0.01	10.36	26.33	32.08	43.19	56.81	66.9	-	[25]
1,3,5-Cyclooctatriene	C_8H_{10}	106	7.90	3.24	10.07	13.16	16.48	18.77	-	-	-	-	Est.
o-Xylene	C_8H_{10}	106	8.56	-	-	8.22	17.68	24.17	34.08	45.44	53.04	-	[25]
Indene	C_9H_8	116	8.14	-	3.37	13.6	27.61	40.58	52.19	62.87	86.32	-	[25]
Indane	C_9H_{10}	118	8.54	-	0.01	8.36	18.7	26.7	33.29	42.75	57.6	-	[25]
Naphthalene	$C_{10}H_8$	128	8.14	-	4.49	13.22	21.34	39.81	51.74	61.42	86.99	-	Est.
Acenaphthylene	$C_{12}H_8$	152	8.12	-	3.57	13.92	24.92	38.52	48.86	54.03	-	-	Est.
Biphenyl	$C_{12}H_{10}$	154	8.16	-	2.53	9.14	21.22	34.51	50.63	58.65	-	-	Est.

Note: Molecular hydrogen and methane at 16.64 eV in NSRL were measured in the cold gas measurement (see manuscript). Thus, their photoionization cross sections at 16.64 eV in the database were not used for the branching ratio calculation.

Table S4. The photoionization energies (eV) of the products observed in this work.

Species		Mass	Ionization energy (eV)	ALS					NSRL						
				1200 K	1300 K	1400 K	1500 K	1600 K	949 K	972 K	994 K	1016 K	1038 K	1061 K	1083 K
Methyl	CH_3	15	9.84	-	9.80	9.75	9.75	9.75	-	-	-	-	-	-	-
Acetylene	C_2H_2	26	11.40	-	-	11.35	11.35	11.35	-	-	11.35	11.35	11.40	11.35	11.35
Vinyl	C_2H_3	27	8.25	-	8.25	8.25	8.25	8.25	-	-	-	-	-	-	-
Ethylene	C_2H_4	28	10.51	-	10.45	10.45	11.45	10.45	10.50	10.45	10.45	10.45	10.50	10.45	10.45
Ethyl	C_2H_5	29	8.12	8.15	8.10	8.10	8.10	8.15	-	-	-	-	-	-	-
Propargyl	C_3H_3	39	8.67	-	-	-	8.65	8.65	-	-	-	-	-	-	-
Allene	C_3H_4	40	9.69	-	9.70	9.65	9.70	9.70	-	9.70	9.70	9.70	9.70	9.70	9.70
Methylacetylene	C_3H_4	40	10.36	-	-	10.35	10.35	10.35	-	-	10.40	10.35	10.35	10.35	10.35
Allyl	C_3H_5	41	8.18	8.15	8.10	8.10	8.10	8.10	-	-	-	-	-	-	-
Propene	C_3H_6	42	9.73	-	9.70	9.75	9.70	9.70	-	9.70	9.70	9.70	9.75	9.70	9.75
Diacetylene	C_4H_2	50	10.17	-	-	-	-	10.15	-	-	-	-	-	-	-
1,2,3-Butatriene	C_4H_4	52	9.25	-	-	-	9.25	9.25	-	-	-	-	-	-	-
Vinylacetylene	C_4H_4	52	9.58	-	-	-	9.55	9.55	-	-	-	9.55	9.55	9.55	9.55
1,3-Butadiene	C_4H_6	54	9.07	-	9.00	9.00	9.00	9.00	-	9.00	9.00	9.00	9.05	9.00	9.00
1-Butene	C_4H_8	56	9.55	-	-	-	9.55	9.55	-	9.55	9.50	9.50	9.55	9.55	9.50
2-Butene	C_4H_8	56	9.11	-	-	-	9.10	9.10	-	-	-	-	9.10	9.10	9.10
Ethynylallene	C_5H_4	64	9.25	-	-	-	-	9.20	-	-	-	-	-	-	-
Cyclopentadienyl	C_5H_5	65	8.41	-	-	8.40	8.40	8.40	-	-	-	-	-	-	-
Cyclopentadiene	C_5H_6	66	8.57	-	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.55	8.55	8.50
1,3-Pentadiene	C_5H_8	68	8.59	-	-	-	8.60	8.55	-	-	-	-	8.60	8.60	8.60
Cyclopentene	C_5H_8	68	9.01	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	-
Fulvene	C_6H_6	78	8.36	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35
Benzene	C_6H_6	78	9.24	-	9.25	9.25	9.20	9.20	-	9.25	9.20	9.20	9.25	9.20	9.20
1,3-Cyclohexadiene	C_6H_8	80	8.25	-	-	-	8.25	-	-	-	8.20	8.20	8.20	8.15	8.15
1,4-Cyclohexadiene	C_6H_8	80	8.82	-	-	8.80	8.80	-	-	-	-	-	-	-	-
Cyclohexene	C_6H_{10}	82	8.95	8.95	9.00	9.00	8.95	8.95	-	-	-	-	-	-	-
Fulvenallenyl	C_7H_5	89	8.26	-	-	-	-	8.25	-	-	-	-	-	-	-
Fulvenallene	C_7H_6	90	8.29	-	-	-	8.30	8.25	-	-	-	-	-	-	8.25
5-Methylene-1,3-cyclohexadiene	C_7H_8	92	7.90	-	-	-	-	-	7.90	7.90	7.90	7.90	7.90	7.90	7.90
Toluene	C_7H_8	92	8.83	-	8.80	8.80	8.80	8.85	-	-	8.85	8.80	8.80	8.80	8.80
Phenylacetylene	C_8H_6	102	8.82	-	-	-	-	8.85	-	-	-	-	-	-	8.80
Styrene	C_8H_8	104	8.46	-	-	-	8.45	8.45	-	-	8.50	8.50	8.45	8.45	8.45

o-Xylene	C_8H_{10}	106	8.56	-	8.55	8.60	8.55	8.55	-	-	8.55	8.55	8.60	8.55	8.55
1,3,5-Cyclooctatriene	C_8H_{10}	106	7.90	-	-	-	-	-	7.90	7.90	7.90	7.90	7.90	7.90	7.90
Indene	C_9H_8	116	8.14	-	-	-	-	8.15	-	-	-	8.15	8.15	8.10	8.10
Indane	C_9H_{10}	118	8.54	-	-	-	8.45	8.45	-	-	8.50	8.45	8.45	8.45	8.45
Naphthalene	$C_{10}H_8$	128	8.14	-	-	-	-	-	-	-	-	-	8.15	8.15	8.15
Acenaphthylene	$C_{12}H_8$	152	8.12	-	-	-	-	-	-	-	-	-	-	-	8.10
Biphenyl	$C_{12}H_{10}$	154	8.16	-	-	-	-	-	-	-	-	-	-	-	8.10

Note: Due to the low photoionization energies of benzocyclobutene (7.50 eV) and *o*-xylylene (7.75 eV) which are lower than the experiment energy range, the two products are not listed in the table.

Table S5. Mole fractions of species observed in JP-10 pyrolysis (ALS) at the temperature range from 1200 K to 1600 K. The numbers in each bracket present the lower and upper uncertainties, respectively.

Species		Temperature				
		1200 K	**1300 K**	**1400 K**	**1500 K**	**1600 K**
Hydrogen	H_2	-	5.53E-06 (-1.64E-06, +1.90E-06)	1.18E-05 (-2.83E-06, +3.06E-06)	3.36E-05 (-7.92E-06, +8.52E-06)	1.07E-04 (-2.44E-05, +2.59E-05)
Methyl	CH_3	-	1.34E-06 (-5.59E-07, +7.05E-07)	7.65E-06 (-1.92E-06, +2.12E-06)	3.48E-05 (-7.73E-06, +8.12E-06)	5.92E-05 (-1.33E-05, +1.40E-05)
Acetylene	C_2H_2	-	-	6.91E-07 (-2.22E-07, +2.65E-07)	6.87E-06 (-1.55E-06, +1.64E-06)	3.36E-05 (-7.04E-06, +7.20E-06)
Vinyl	C_2H_3	-	2.44E-06 (-1.34E-06, +2.94E-06)	2.95E-06 (-1.60E-06, +3.46E-06)	4.84E-06 (-2.55E-06, +5.36E-06)	4.27E-06 (-2.30E-06, +4.91E-06)
Ethylene	C_2H_4	-	2.88E-05 (-6.53E-06, +6.92E-06)	9.54E-05 (-2.06E-05, +2.13E-05)	3.14E-04 (-6.65E-05, +6.83E-05)	4.97E-04 (-1.07E-04, +1.11E-04)
Ethyl	C_2H_5	7.74E-06 (-2.13E-06, +2.41E-06)	1.63E-05 (-3.86E-06, +4.16E-06)	2.94E-05 (-6.59E-06, +6.95E-06)	3.02E-05 (-6.70E-06, +7.03E-06)	1.23E-05 (-3.12E-06, +3.44E-06)
Propargyl	C_3H_3	-	-	-	3.31E-06 (-7.92E-07, +8.57E-07)	1.53E-05 (-3.86E-06, +4.25E-06)
Allene	C_3H_4	-	4.69E-07 (-3.01E-07, +4.05E-07)	3.52E-06 (-7.38E-07, +7.55E-07)	3.19E-05 (-7.71E-06, +8.38E-06)	9.48E-05 (-2.29E-05, +2.49E-05)
Methylacetylene	C_3H_4	-	-	7.25E-07 (-2.07E-07, +2.37E-07)	1.09E-05 (-2.56E-06, +2.75E-06)	4.45E-05 (-1.01E-05, +1.07E-05)
Allyl	C_3H_5	4.77E-06 (-1.39E-06, +1.61E-06)	2.37E-05 (-5.92E-06, +6.50E-06)	7.46E-05 (-1.81E-05, +1.96E-05)	1.65E-04 (-3.97E-05, +4.31E-05)	9.08E-05 (-2.26E-05, +2.48E-05)
Propene	C_3H_6	-	9.85E-07 (-3.14E-07, +3.72E-07)	2.80E-06 (-6.66E-07, +7.18E-07)	1.06E-05 (-2.41E-06, +2.55E-06)	1.69E-05 (-3.82E-06, +4.04E-06)

Diacetylene	C_4H_2	-	-	-	-	1.07E-06 (-2.79E-07, +3.11E-07)
1,2,3-Butatriene	C_4H_4	-	-	-	5.98E-07 (-4.73E-07, +1.29E-06)	9.38E-07 (-6.19E-07, +1.54E-06)
Vinylacetylene	C_4H_4	-	-	-	1.09E-06 (-2.66E-07, +2.90E-07)	4.12E-06 (-8.87E-07, +9.18E-07)
1,3-Butadiene	C_4H_6	-	1.81E-06 (-4.51E-07, +4.95E-07)	7.64E-06 (-1.66E-06, +1.72E-06)	3.18E-05 (-6.78E-06, +7.00E-06)	5.55E-05 (-1.20E-05, +1.25E-05)
1-Butene	C_4H_8	-	-	-	1.19E-06 (-3.66E-07, +4.29E-07)	1.82E-06 (-5.95E-07, +7.11E-07)
2-Butene	C_4H_8	-	-	-	3.92E-07 (-1.76E-07, +2.24E-07)	6.17E-07 (-3.13E-07, +4.08E-07)
Ethynylallene	C_5H_4	-	-	-	-	8.87E-07 (-4.66E-07, +9.76E-07)
Cyclopentadienyl	C_5H_5	-	-	6.07E-06 (-3.17E-06, +6.60E-06)	3.95E-05 (-2.03E-05, +4.18E-05)	1.01E-04 (-5.13E-05, +1.05E-04)
Cyclopentadiene	C_5H_6	-	1.91E-05 (-4.88E-06, +5.41E-06)	7.77E-05 (-1.71E-05, +1.79E-05)	2.54E-04 (-5.60E-05, +5.86E-05)	3.37E-04 (-7.43E-05, +7.78E-05)
1,3-Pentadiene	C_5H_8	-	-	-	5.96E-06 (-1.70E-06, +1.95E-06)	1.15E-05 (-2.78E-06, +3.01E-06)
Cyclopentene	C_5H_8	1.67E-06 (-6.77E-07, +8.49E-07)	6.62E-06 (-1.75E-06, +1.97E-06)	1.78E-05 (-3.73E-06, +3.82E-06)	3.74E-05 (-8.44E-06, +8.92E-06)	2.04E-05 (-4.76E-06, +5.09E-06)
Fulvene	C_6H_6	1.41E-06 (-8.59E-07, +2.03E-06)	1.85E-05 (-1.05E-05, +2.36E-05)	6.59E-05 (-3.45E-05, +7.22E-05)	1.69E-04 (-8.79E-05, +1.82E-04)	1.31E-04 (-6.73E-05, +1.38E-04)
Benzene	C_6H_6	-	2.14E-06 (-6.83E-07, +8.11E-07)	1.20E-05 (-2.87E-06, +3.11E-06)	5.69E-05 (-1.24E-05, +1.29E-05)	1.37E-04 (-3.14E-05, +3.34E-

						05)
1,3-Cyclohexadiene	C_6H_8	-	-	-	2.56E-06 (-5.66E-07, +5.94E-07)	-
1,4-Cyclohexadiene	C_6H_8	-	-	9.44E-07 (-4.02E-07, +5.08E-07)	3.95E-06 (-9.66E-07, +1.05E-06)	-
Cyclohexene	C_6H_{10}	8.10E-07 (-4.21E-07, +5.51E-07)	7.84E-07 (-2.63E-07, +3.15E-07)	1.09E-06 (-4.41E-07, +5.53E-07)	1.74E-06 (-5.96E-07, +7.20E-07)	8.68E-07 (-3.32E-07, +4.11E-07)
Fulvenallenyl	C_7H_5	-	-	-	-	7.51E-07 (-4.28E-07, +9.60E-07)
Fulvenallene	C_7H_6	-	-	-	4.99E-07 (-2.61E-07, +5.45E-07)	3.78E-06 (-1.92E-06, +3.91E-06)
5-Methylene-1,3-cyclohexadiene	C_7H_8	2.69E-08 (-1.87E-08, +4.77E-08)	4.61E-07 (-2.62E-07, +5.88E-07)	1.91E-06 (-1.01E-06, +2.14E-06)	9.32E-06 (-4.89E-06, +1.03E-05)	8.77E-06 (-4.77E-06, +1.03E-05)
Toluene	C_7H_8	-	3.02E-07 (-1.68E-07, +3.70E-07)	1.50E-06 (-7.68E-07, +1.57E-06)	5.16E-06 (-2.76E-06, +5.87E-06)	7.81E-06 (-4.04E-06, +8.37E-06)
Phenylacetylene	C_8H_6	-	-	-	-	2.07E-07 (-5.39E-08, +6.01E-08)
Benzocyclobutadiene	C_8H_6	-	-	-	-	2.58E-07 (-1.42E-07, +3.09E-07)
o-Xylylene	C_8H_8	-	-	-	3.47E-07 (-1.92E-07, +4.23E-07)	5.05E-07 (-2.62E-07, +5.44E-07)
Styrene	C_8H_8	-	-	-	1.42E-06 (-3.51E-07, +3.85E-07)	3.70E-06 (-8.17E-07, +8.55E-07)
1,3,5-Cyclooctatriene	C_8H_{10}	9.29E-09 (-9.29E-09, +2.79E-08)	2.37E-07 (-1.56E-07, +3.87E-07)	9.52E-07 (-5.06E-07, +1.07E-06)	2.46E-06 (-1.29E-06, +2.68E-06)	1.17E-06 (-6.33E-07, +1.36E-06)
o-Xylene	C_8H_{10}	-	2.21E-07 (-8.52E-08, +1.06E-07)	1.23E-06 (-3.08E-07, +3.38E-07)	3.49E-06 (-8.28E-07, +8.93E-07)	1.54E-06 (-3.82E-07, +4.19E-07)

Indene	C_9H_8	-	-	-	-	4.03E-07 (-9.63E-08, +1.04E-07)
Indane	C_9H_{10}	-	-	-	7.33E-07 (-1.91E-07, +2.14E-07)	1.02E-06 (-2.43E-07, +2.62E-07)
JP-10	$C_{10}H_{16}$	2.63E-04 (-1.80E-06, +1.80E-06)	2.59E-04 (-2.21E-06, +2.21E-06)	2.32E-04 (-3.11E-06, +3.11E-06)	9.17E-05 (-1.78E-06, +1.78E-06)	1.34E-05 (-7.41E-07, +7.41E-07)

Table S6. Mole fractions of species observed in JP-10 pyrolysis (NSRL) at the temperature range from 949 K to 1083 K. The numbers in each bracket present the lower and upper uncertainties, respectively.

Species		Temperature						
		949 K	**972 K**	**994 K**	**1,016 K**	**1,038 K**	**1,061 K**	**1,083 K**
Hydrogen	H_2	-	-	6.36E-05 (-4.90E-05, +5.85E-05)	1.64E-04 (-4.38E-05, +4.99E-05)	2.62E-04 (-6.02E-05, +6.78E-05)	3.62E-04 (-9.54E-05, +1.09E-04)	3.83E-04 (-6.26E-05, +6.81E-05)
Methane	CH_4	-	-	-	2.58E-06 (-2.58E-06, +3.10E-06)	1.07E-05 (-4.82E-06, +5.66E-06)	2.74E-05 (-7.25E-06, +8.25E-06)	3.52E-05 (-5.73E-06, +6.22E-06)
Acetylene	C_2H_2	-	-	6.89E-07 (-2.06E-07, +2.41E-07)	4.47E-06 (-1.26E-06, +1.45E-06)	8.69E-06 (-2.63E-06, +3.08E-06)	1.85E-05 (-5.58E-06, +6.51E-06)	3.32E-05 (-8.08E-06, +8.81E-06)
Ethylene	C_2H_4	3.72E-06 (-1.21E-06, +1.44E-06)	1.70E-05 (-5.28E-06, +6.22E-06)	4.49E-05 (-1.01E-05, +1.06E-05)	1.03E-04 (-2.65E-05, +2.95E-05)	1.59E-04 (-3.71E-05, +3.98E-05)	2.14E-04 (-4.73E-05, +4.95E-05)	2.89E-04 (-6.58E-05, +6.98E-05)
Allene	C_3H_4	-	1.65E-06 (-6.00E-07, +7.35E-07)	6.48E-06 (-3.17E-06, +4.11E-06)	1.32E-05 (-7.16E-06, +9.43E-06)	1.86E-05 (-5.06E-06, +5.74E-06)	2.85E-05 (-1.02E-05, +1.25E-05)	1.77E-05 (-6.21E-06, +7.55E-06)
Methylacetylene	C_3H_4	-	-	2.11E-06 (-9.05E-07, +1.15E-06)	6.01E-06 (-2.30E-06, +2.84E-06)	1.14E-05 (-2.94E-06, +3.27E-06)	1.91E-05 (-5.18E-06, +5.86E-06)	4.21E-05 (-9.70E-06, +1.03E-05)
Propene	C_3H_6	-	3.73E-06 (-9.24E-07, +1.01E-06)	1.12E-05 (-2.86E-06, +3.17E-06)	2.62E-05 (-6.42E-06, +7.01E-06)	3.72E-05 (-8.62E-06, +9.21E-06)	4.40E-05 (-1.00E-05, +1.06E-05)	4.85E-05 (-1.13E-05, +1.21E-05)
Vinylacetylene	C_4H_4	-	-	-	7.04E-07 (-2.00E-07, +2.29E-07)	1.23E-06 (-3.37E-07, +3.83E-07)	2.82E-06 (-6.93E-07, +7.57E-07)	4.61E-06 (-1.18E-06, +1.31E-06)
1,3-Butadiene	C_4H_6	-	1.22E-06 (-3.47E-07, +3.98E-07)	3.74E-06 (-9.28E-07, +1.02E-06)	9.83E-06 (-2.55E-06, +2.83E-06)	1.40E-05 (-3.42E-06, +3.74E-06)	2.08E-05 (-4.80E-06, +5.12E-06)	2.77E-05 (-6.15E-06, +6.45E-06)
1-Butene	C_4H_8	-	1.92E-06 (-5.48E-07, +6.31E-07)	6.93E-06 (-1.96E-06, +2.25E-06)	1.24E-05 (-2.84E-06, +3.01E-06)	1.46E-05 (-3.32E-06, +3.53E-06)	8.92E-06 (-2.45E-06, +2.78E-06)	3.56E-06 (-1.06E-06, +1.23E-06)
2-Butene	C_4H_8	-	-	-	-	4.37E-08 (-4.37E-08, +6.12E-08)	1.11E-06 (-5.46E-07, +7.07E-07)	8.39E-07 (-6.25E-07, +8.53E-07)

cyclopentadiene	C_5H_6	5.29E-06 (-2.28E-06, +2.89E-06)	1.46E-05 (-3.77E-06, +4.20E-06)	3.61E-05 (-8.69E-06, +9.42E-06)	7.72E-05 (-1.87E-05, +2.03E-05)	1.18E-04 (-2.55E-05, +2.65E-05)	1.80E-04 (-4.36E-05, +4.74E-05)	2.05E-04 (-4.82E-05, +5.18E-05)
Cyclopentene	C_5H_8	7.05E-07 (-3.40E-07, +4.39E-07)	4.52E-06 (-1.29E-06, +1.48E-06)	8.94E-06 (-2.97E-06, +3.57E-06)	1.37E-05 (-3.73E-06, +4.23E-06)	8.43E-06 (-2.30E-06, +2.61E-06)	6.74E-06 (-2.25E-06, +2.70E-06)	-
1,3-Pentadiene	C_5H_8	-	-	-	-	2.63E-06 (-9.15E-07, +1.11E-06)	1.89E-06 (-6.75E-07, +8.23E-07)	3.89E-06 (-1.56E-06, +1.96E-06)
Fulvene	C_6H_6	4.88E-07 (-4.36E-07, +1.26E-06)	2.34E-06 (-1.68E-06, +4.37E-06)	1.19E-05 (-6.78E-06, +1.53E-05)	1.52E-05 (-8.66E-06, +1.94E-05)	1.37E-05 (-7.18E-06, +1.50E-05)	1.53E-05 (-8.71E-06, +1.95E-05)	9.29E-06 (-5.56E-06, +1.29E-05)
Benzene	C_6H_6	-	3.17E-06 (-9.41E-07, +1.09E-06)	7.76E-06 (-2.37E-06, +2.77E-06)	2.27E-05 (-6.05E-06, +6.81E-06)	4.28E-05 (-1.16E-05, +1.31E-05)	7.11E-05 (-1.67E-05, +1.80E-05)	9.39E-05 (-2.04E-05, +2.12E-05)
1,3-Cyclohexadiene	C_6H_8	-	-	1.25E-06 (-4.53E-07, +5.55E-07)	3.92E-06 (-1.30E-06, +1.55E-06)	7.25E-06 (-2.10E-06, +2.42E-06)	1.01E-05 (-2.56E-06, +2.83E-06)	8.37E-06 (-2.17E-06, +2.41E-06)
Fulvenallene	C_7H_6	-	-	-	-	-	-	2.53E-07 (-1.53E-07, +3.60E-07)
5-Methylene-1,3-cyclohexadiene	C_7H_8	1.69E-07 (-1.69E-07, +5.08E-07)	1.39E-06 (-7.74E-07, +1.71E-06)	4.88E-06 (-2.61E-06, +5.56E-06)	1.11E-05 (-7.09E-06, +1.72E-05)	9.87E-06 (-5.53E-06, +1.22E-05)	8.82E-06 (-4.82E-06, +1.05E-05)	5.47E-06 (-3.49E-06, +8.47E-06)
Toluene	C_7H_8	-	1.03E-06 (-3.81E-07, +4.69E-07)	3.45E-06 (-9.00E-07, +1.01E-06)	6.93E-06 (-2.07E-06, +2.41E-06)	1.08E-05 (-2.99E-06, +3.41E-06)	1.41E-05 (-3.77E-06, +4.25E-06)	1.68E-05 (-4.05E-06, +4.40E-06)
Benzocyclobutadiene	C_8H_6	-	-	-	-	-	-	1.67E-07 (-1.14E-07, +2.87E-07)
Phenylacetylene	C_8H_6	-	-	-	-	-	-	4.69E-07 (-1.29E-07, +1.46E-07)
o-Xylylene	C_8H_8	-	-	-	4.32E-07 (-3.25E-07, +8.68E-07)	3.09E-07 (-2.13E-07, +5.41E-07)	1.89E-07 (-1.60E-07, +4.50E-07)	9.11E-07 (-5.66E-07, +1.35E-06)
Styrene	C_8H_8	-	-	6.00E-07 (-2.24E-07,	6.55E-07 (-2.23E-07,	2.23E-06 (-5.57E-07,	4.41E-06 (-1.11E-06,	5.17E-06 (-1.29E-06,

				+2.77E-07)	+2.69E-07)	+6.12E-07)	+1.22E-06)	+1.42E-06)
1,3,5-Cyclooctatriene	C_8H_{10}	8.90E-08 (-5.23E-08, +1.20E-07)	1.88E-07 (-1.25E-07, +3.12E-07)	7.44E-07 (-4.17E-07, +9.24E-07)	1.07E-06 (-5.77E-07, +1.23E-06)	1.24E-06 (-7.15E-07, +1.62E-06)	7.52E-07 (-4.81E-07, +1.17E-06)	1.94E-07 (-1.24E-07, +3.04E-07)
o-Xylene	C_8H_{10}	-	-	1.95E-06 (-5.49E-07, +6.29E-07)	3.81E-06 (-1.28E-06, +1.53E-06)	5.31E-06 (-1.36E-06, +1.51E-06)	5.68E-06 (-1.46E-06, +1.63E-06)	4.30E-06 (-1.10E-06, +1.23E-06)
Indene	C_9H_8	-	-	-	3.96E-07 (-9.68E-08, +1.06E-07)	7.90E-07 (-1.95E-07, +2.14E-07)	1.24E-06 (-2.98E-07, +3.23E-07)	1.73E-06 (-3.98E-07, +4.24E-07)
Indane	C_9H_{10}	-	-	4.93E-07 (-1.30E-07, +1.46E-07)	1.12E-06 (-3.34E-07, +3.89E-07)	1.32E-06 (-3.56E-07, +4.02E-07)	1.69E-06 (-4.31E-07, +4.77E-07)	1.43E-06 (-3.86E-07, +4.36E-07)
Naphthalene	$C_{10}H_8$	-	-	-	-	4.53E-07 (-1.36E-07, +1.58E-07)	8.13E-07 (-2.29E-07, +2.62E-07)	1.67E-06 (-4.28E-07, +4.75E-07)
Acenaphthylene	$C_{12}H_8$	-	-	-	-	-	-	2.34E-07 (-1.38E-07, +3.19E-07)
Biphenyl	$C_{12}H_{10}$	-	-	-	-	-	-	3.82E-07 (-2.21E-07, +5.04E-07)
JP-10	$C_{10}H_{16}$	2.65E-04 (-7.79E-06, +7.79E-06)	2.35E-04 (-6.96E-06, +6.96E-06)	1.99E-04 (-7.52E-06, +7.52E-06)	1.50E-04 (-8.27E-06, +8.27E-06)	8.06E-05 (-2.79E-06, +2.79E-06)	3.79E-05 (-1.27E-06, +1.27E-06)	1.39E-05 (-6.28E-07, +6.28E-07)

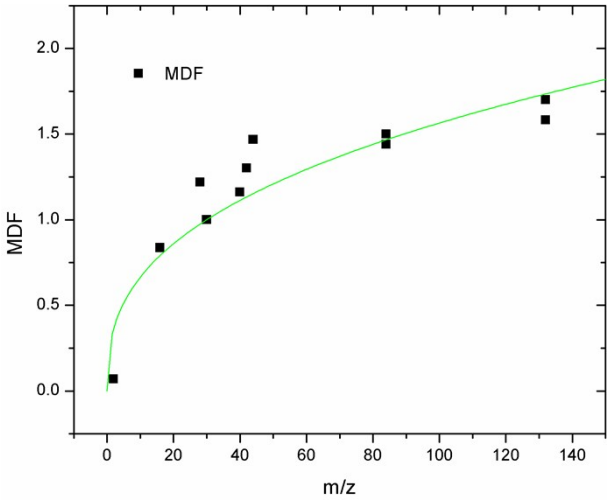


Figure S1. Mass discrimination measurement in NSRL. The factors are determined to be $\left(\frac{x}{30}\right)^{0.36267}$.

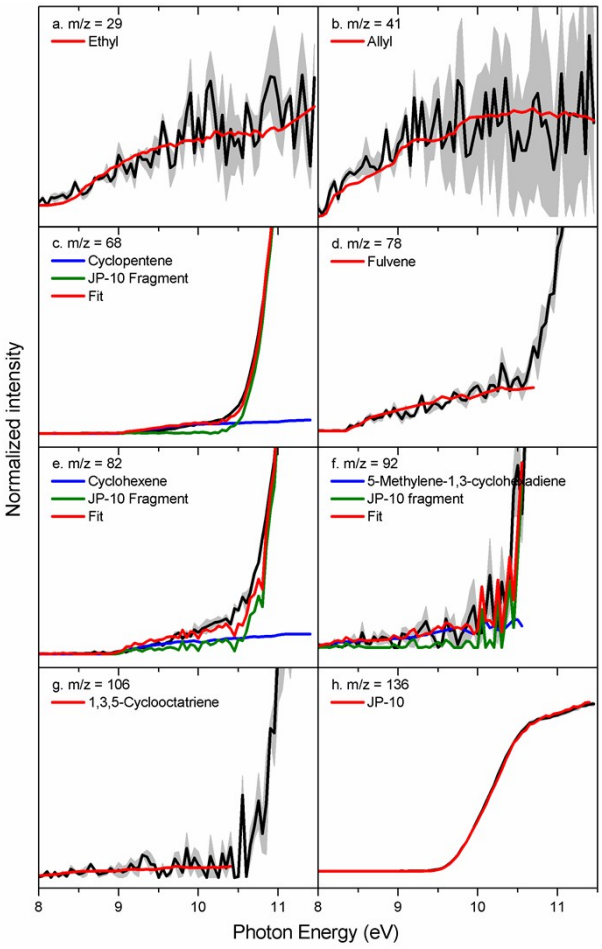


Figure S2-1. Experimental photoionization efficiency curves (PIE, black lines) recorded from the decomposition of JP-10 (ALS) at 1200 K along with the experimental errors (gray area) and the reference PIE curves (red, green and blue lines). In case of multiple contributions to one PIE curve, the red line resembles the overall fit. JP-10 fragment means the photolysis fragment of JP-10. For *m/z* = 68, 78, 82, 92 and 106, the PIE curves present sharp increase above10.5 eV due to photolysis fragment of JP-10.

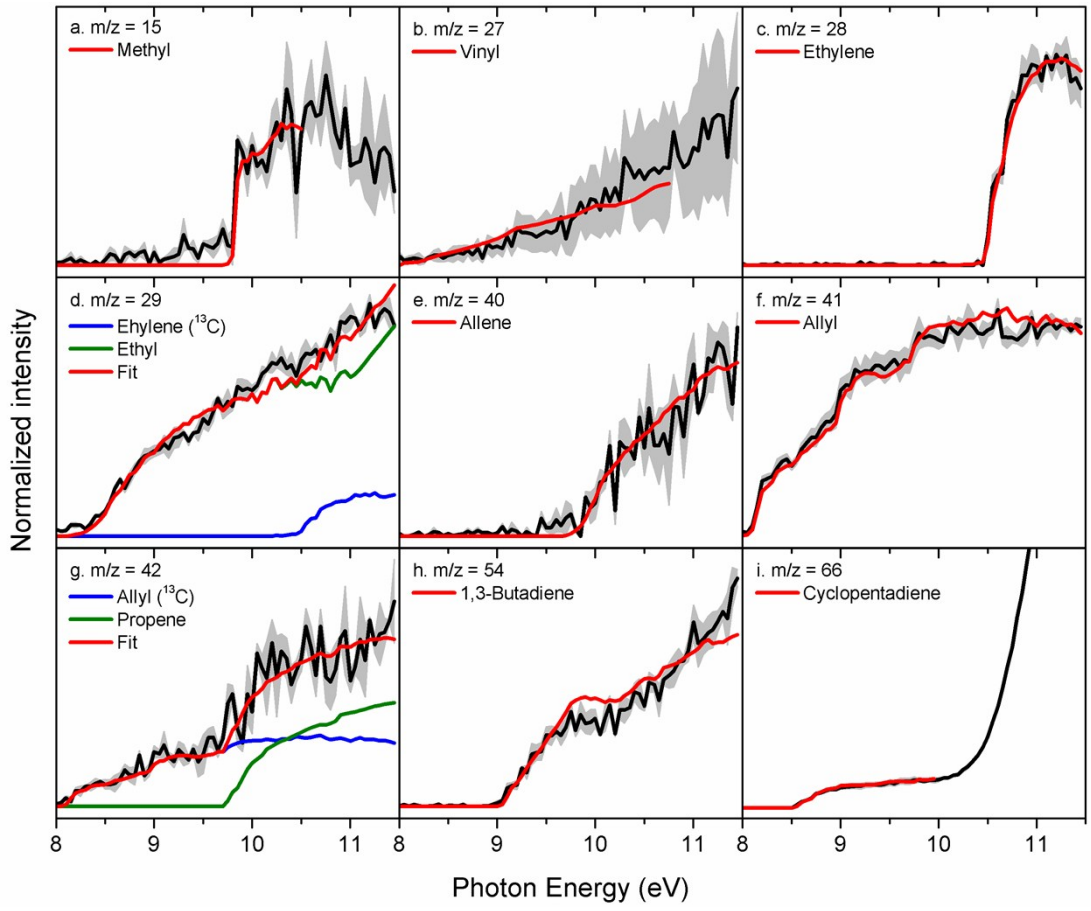


Figure S2-2-1. Experimental photoionization efficiency curves (PIE, black lines) recorded from the decomposition of JP-10 (ALS) at 1300 K along with the experimental errors (gray area) and the reference PIE curves (red, green and blue lines). In case of multiple contributions to one PIE curve, the red line resembles the overall fit. For *m/z* = 66, the PIE curve presents sharp increase above10.5 eV due to photolysis fragment of JP-10.

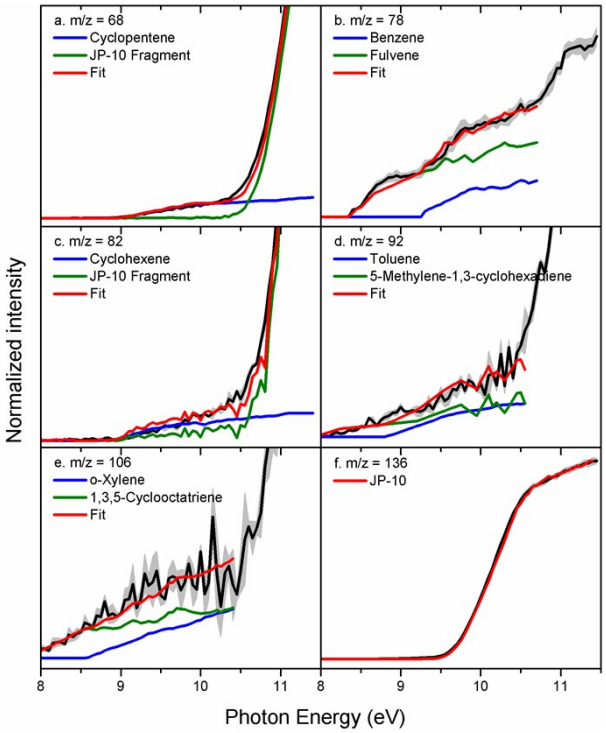


Figure S2-2-2. Experimental photoionization efficiency curves (PIE, black lines) recorded from the decomposition of JP-10 (ALS) at 1300 K along with the experimental errors (gray area) and the reference PIE curves (red, green and blue lines). In case of multiple contributions to one PIE curve, the red line resembles the overall fit. JP-10 fragment means the photolysis fragment of JP-10. For *m/z* = 68, 78, 82, 92 and 106, the PIE curves present sharp increase above10.5 eV due to photolysis fragment of JP-10.

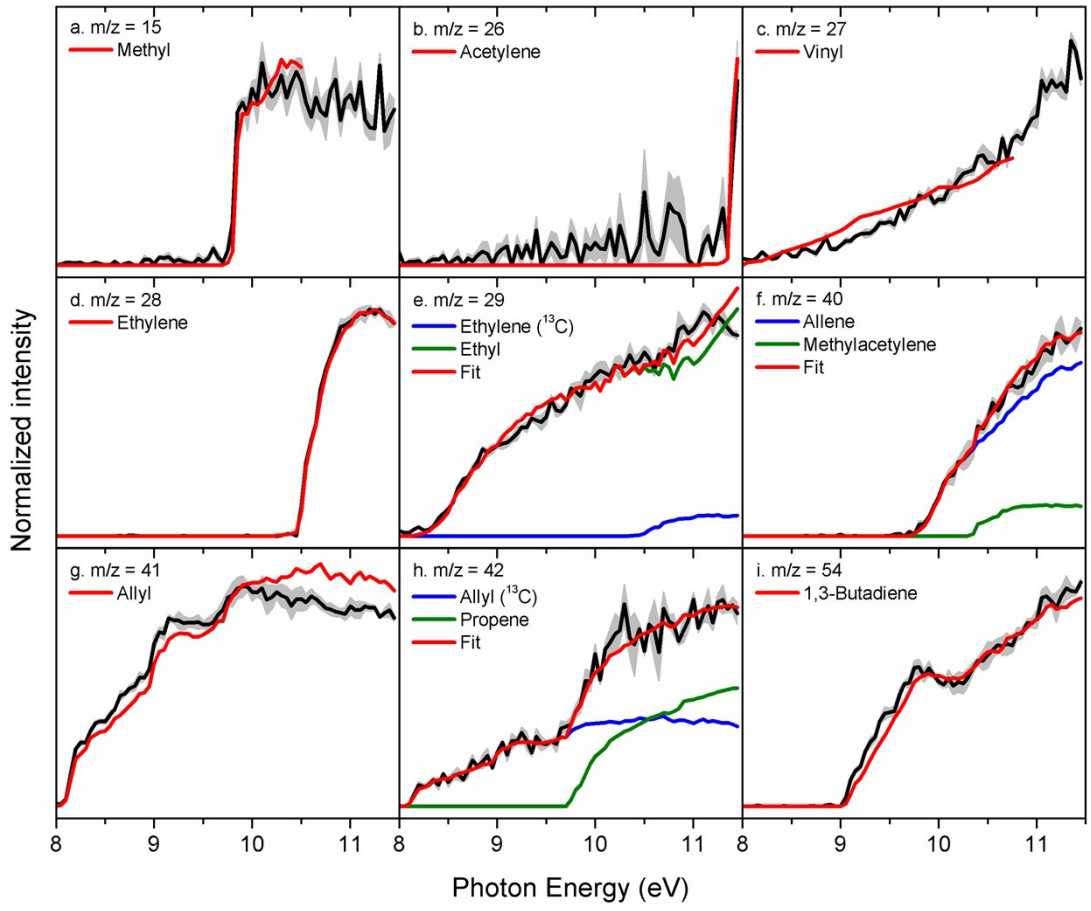


Figure S2-3-1. Experimental photoionization efficiency curves (PIE, black lines) recorded from the decomposition of JP-10 (ALS) at 1400 K along with the experimental errors (gray area) and the reference PIE curves (red, green and blue lines). In case of multiple contributions to one PIE curve, the red line resembles the overall fit.

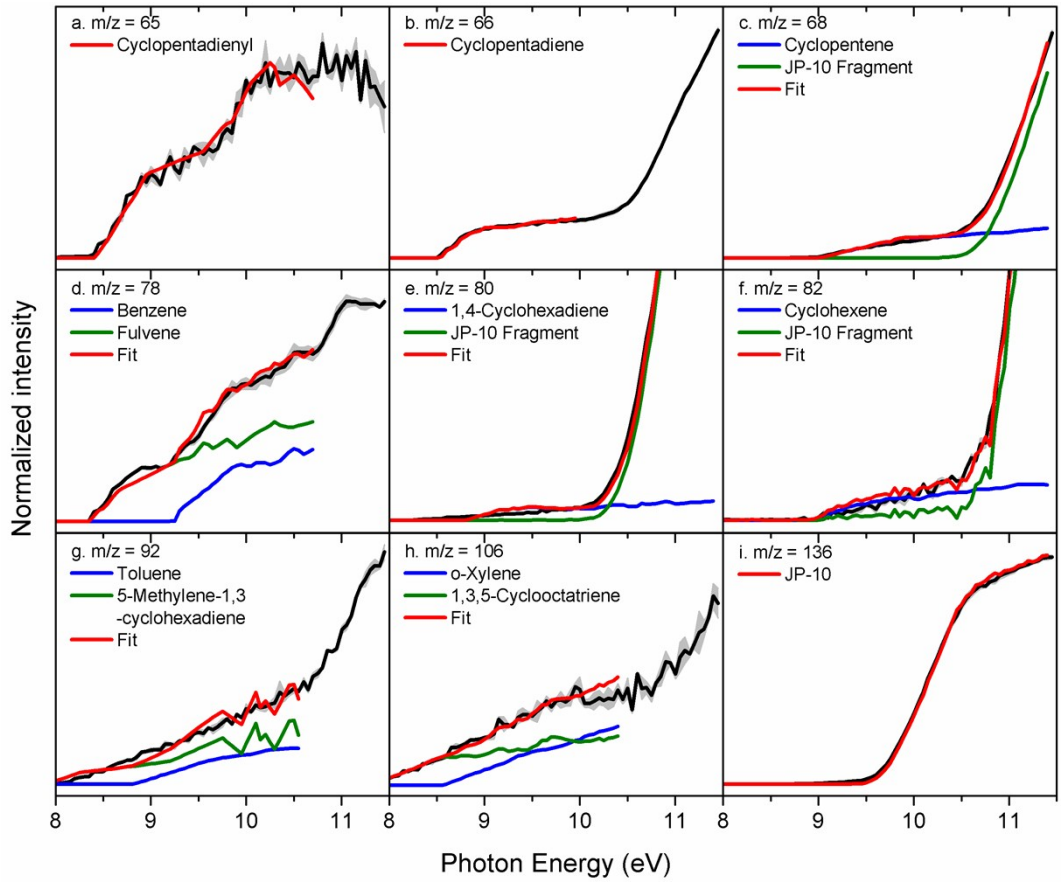


Figure S2-3-2. Experimental photoionization efficiency curves (PIE, black lines) recorded from the decomposition of JP-10 (ALS) at 1400 K along with the experimental errors (gray area) and the reference PIE curves (red, green and blue lines). In case of multiple contributions to one PIE curve, the red line resembles the overall fit. JP-10 fragment means the photolysis fragment of JP-10. For *m/z* = 66, 68, 80, 82, 92 and 106, the PIE curves present sharp increase above10.5 eV due to photolysis fragment of JP-10.

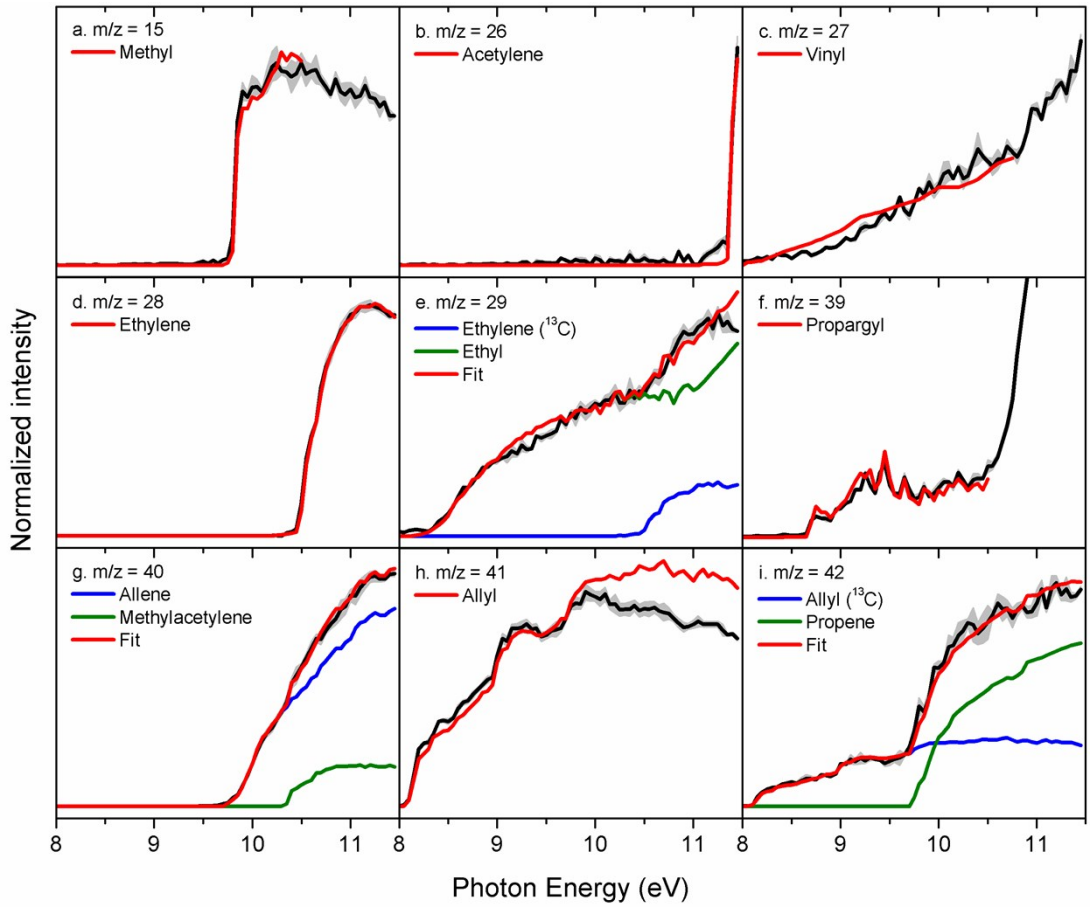


Figure S2-5-1. Experimental photoionization efficiency curves (PIE, black lines) recorded from the decomposition of JP-10 (ALS) at 1500 K along with the experimental errors (gray area) and the reference PIE curves (red, green and blue lines). In case of multiple contributions to one PIE curve, the red line resembles the overall fit.

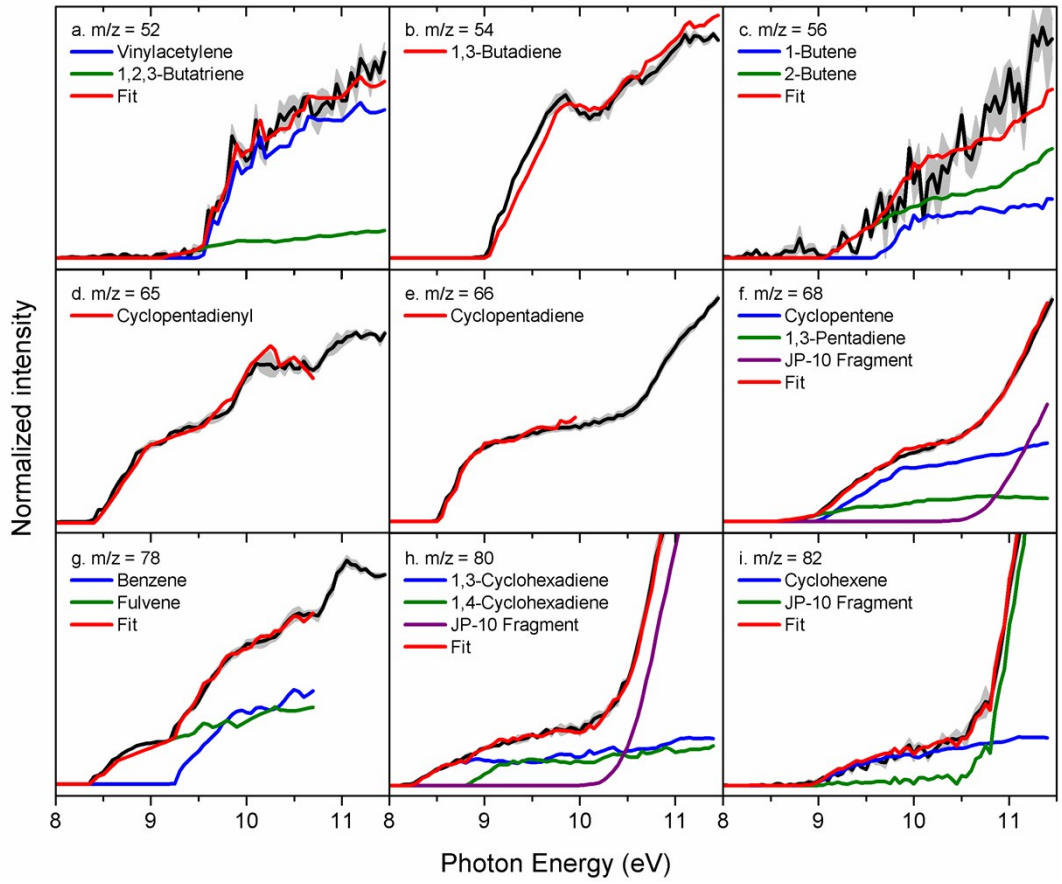


Figure S2-5-2. Experimental photoionization efficiency curves (PIE, black lines) recorded from the decomposition of JP-10 (ALS) at 1500 K along with the experimental errors (gray area) and the reference PIE curves (red, green and blue lines). In case of multiple contributions to one PIE curve, the red line resembles the overall fit. JP-10 fragment means the photolysis fragment of JP-10. For *m/z* = 66, 68, 80 and 92, the PIE curves present sharp increase above10.5 eV due to photolysis fragment of JP-10.

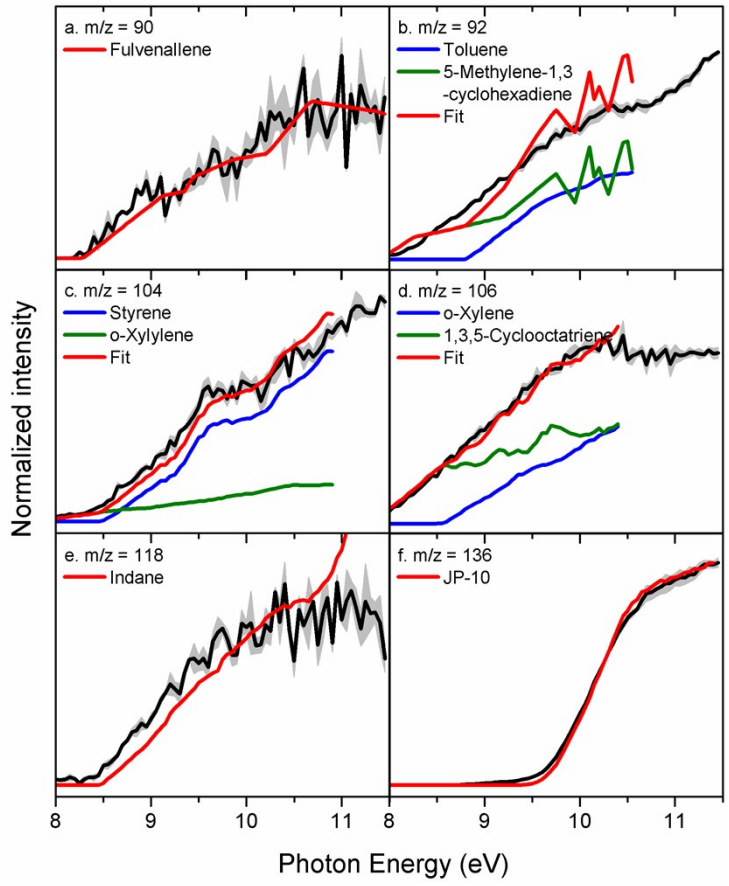


Figure S2-5-3. Experimental photoionization efficiency curves (PIE, black lines) recorded from the decomposition of JP-10 (ALS) at 1500 K along with the experimental errors (gray area) and the reference PIE curves (red, green and blue lines). In case of multiple contributions to one PIE curve, the red line resembles the overall fit.

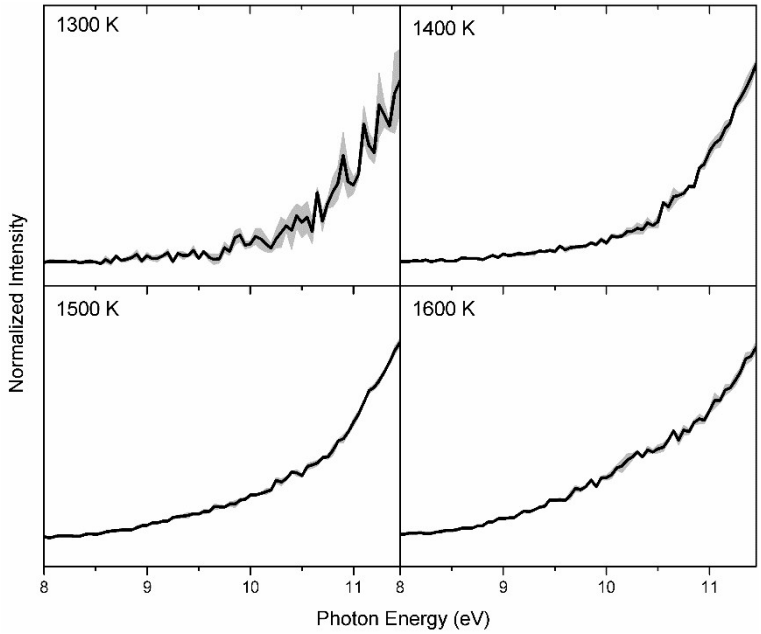


Figure S3. PIE measurement of *m/z* = 91 in the temperature from 1300 K to 1600 K in ALS.

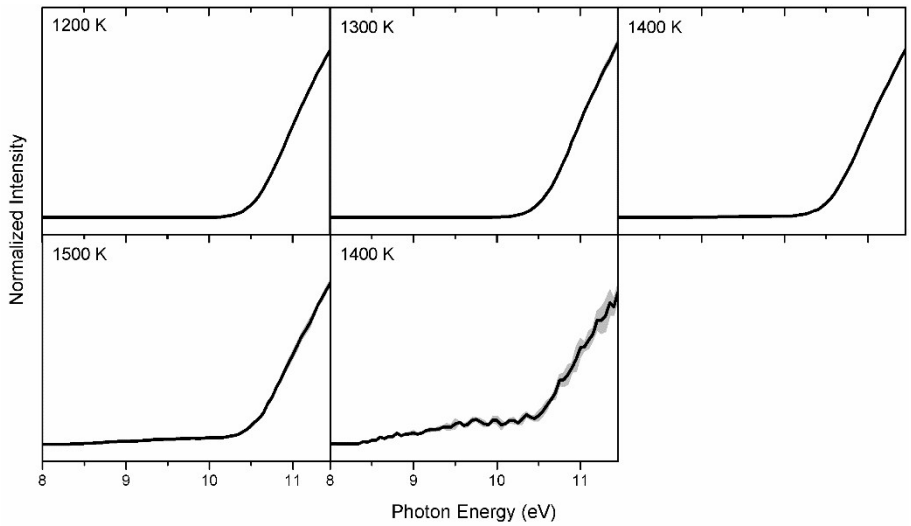


Figure S4. PIE measurement of *m/z* = 94 in the temperature from 1200 K to 1600 K in ALS. The PIE curves present sharp increase above10.5 eV due to photolysis fragment of JP-10.

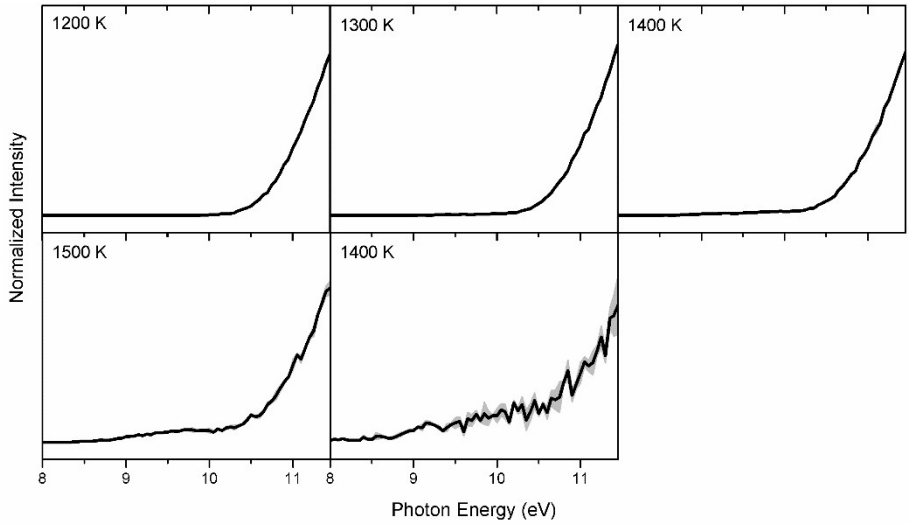


Figure S5. PIE measurement of *m/z* = 108 in the temperature from 1200 K to 1600 K in ALS. The PIE curves present sharp increase above10.5 eV due to photolysis fragment of JP-10.

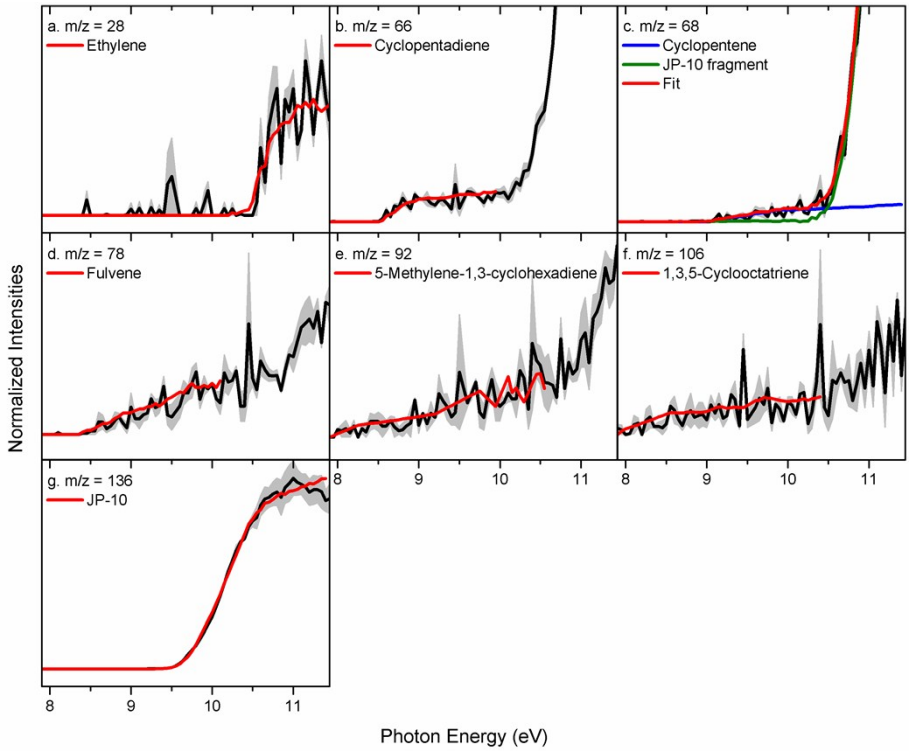


Figure S6-1. Experimental photoionization efficiency curves (PIE, black lines) recorded from the decomposition of JP-10 (NSRL) at 949 K along with the experimental errors (gray area) and the reference PIE curves (blue, green and red lines). In case of multiple contributions to one PIE curve, the red line resembles the overall fit. JP-10 fragment means the photolysis fragment of JP-10.

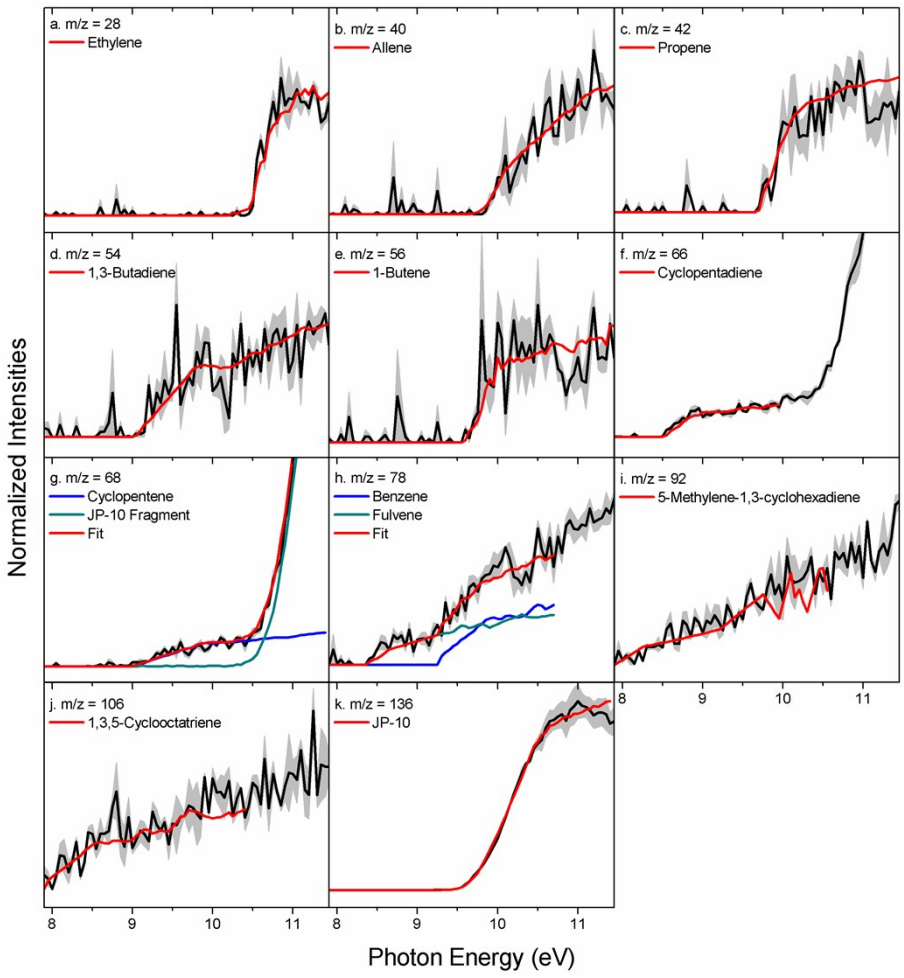


Figure S6-2. Experimental photoionization efficiency curves (PIE, black lines) recorded from the decomposition of JP-10 (NSRL) at 972 K along with the experimental errors (gray area) and the reference PIE curves (blue, green and red lines). In case of multiple contributions to one PIE curve, the red line resembles the overall fit. JP-10 fragment means the photolysis fragment of JP-10. For *m/z* = 66 and 68, the PIE curves present sharp increase above10.5 eV due to photolysis fragment of JP-10.

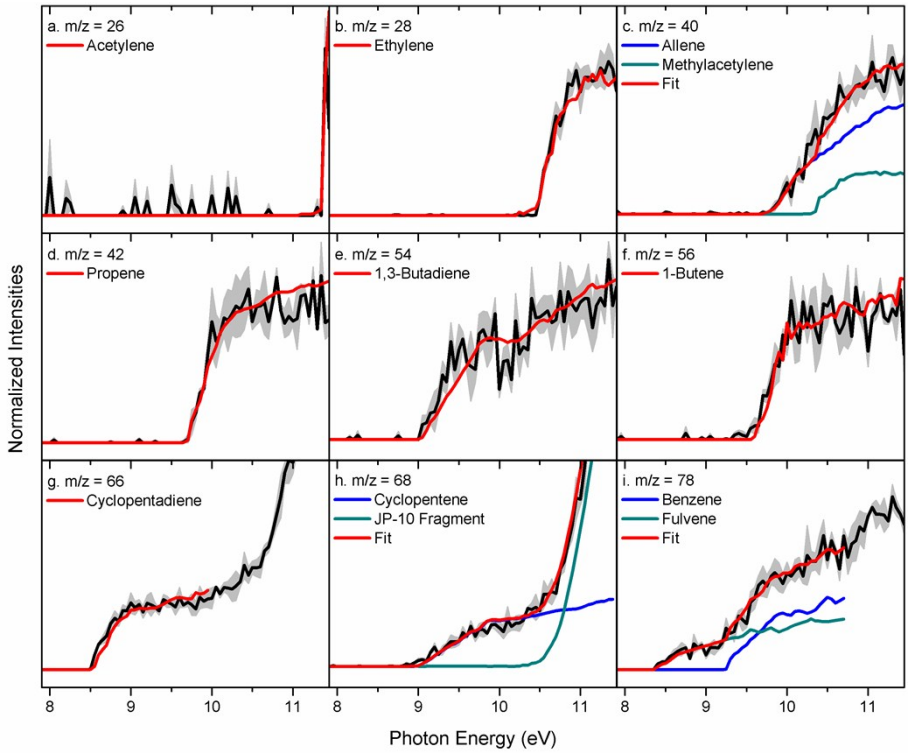


Figure S6-3-1. Experimental photoionization efficiency curves (PIE, black lines) recorded from the decomposition of JP-10 (NSRL) at 994 K along with the experimental errors (gray area) and the reference PIE curves (blue, green and red lines). In case of multiple contributions to one PIE curve, the red line resembles the overall fit. JP-10 fragment means the photolysis fragment of JP-10.

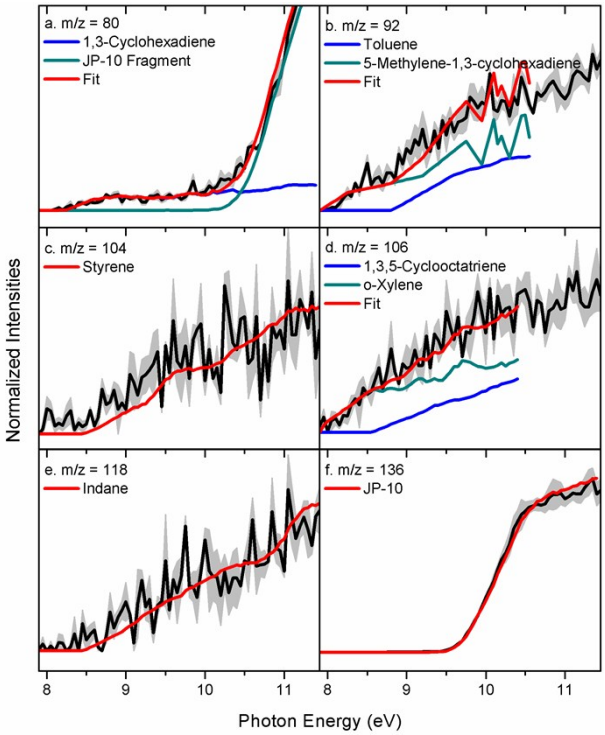


Figure S6-3-2. Experimental photoionization efficiency curves (PIE, black lines) recorded from the decomposition of JP-10 (NSRL) at 994 K along with the experimental errors (gray area) and the reference PIE curves (blue, green and red lines). In case of multiple contributions to one PIE curve, the red line resembles the overall fit. JP-10 fragment means the photolysis fragment of JP-10. For *m/z* = 80, the PIE curve presents sharp increase above10.5 eV due to photolysis fragment of JP-10.

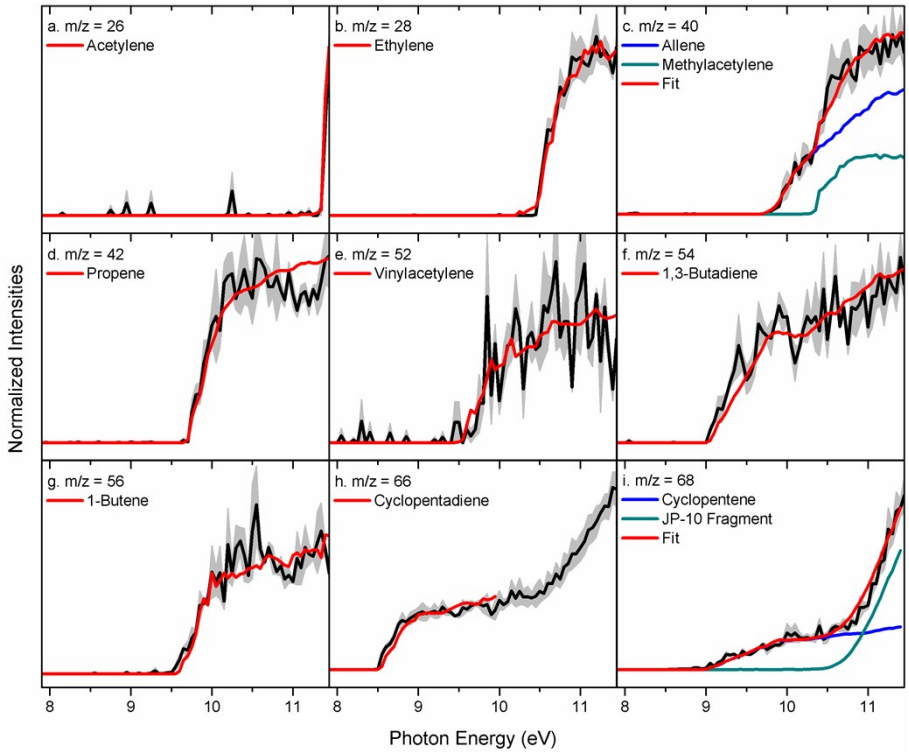


Figure S6-4-1. Experimental photoionization efficiency curves (PIE, black lines) recorded from the decomposition of JP-10 (NSRL) at 1016 K along with the experimental errors (gray area) and the reference PIE curves (blue, green and red lines). In case of multiple contributions to one PIE curve, the red line resembles the overall fit. JP-10 fragment means the photolysis fragment of JP-10. For *m/z* = 66 and 68, the PIE curves present sharp increase above10.5 eV due to photolysis fragment of JP-10.

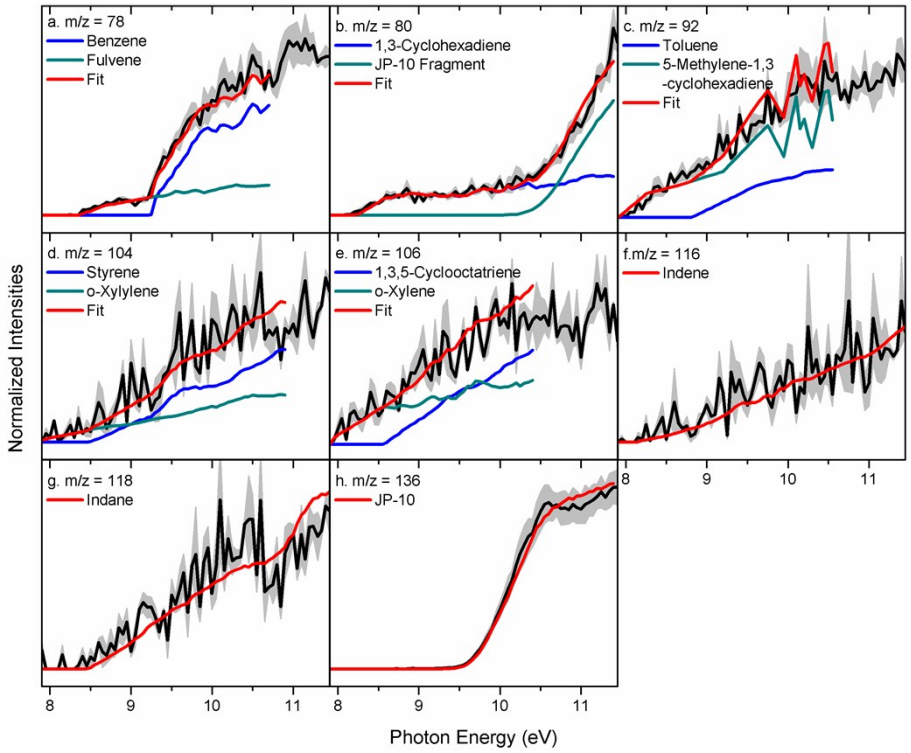


Figure S6-4-2. Experimental photoionization efficiency curves (PIE, black lines) recorded from the decomposition of JP-10 (NSRL) at 1016 K along with the experimental errors (gray area) and the reference PIE curves (blue, green and red lines). In case of multiple contributions to one PIE curve, the red line resembles the overall fit. JP-10 fragment means the photolysis fragment of JP-10.

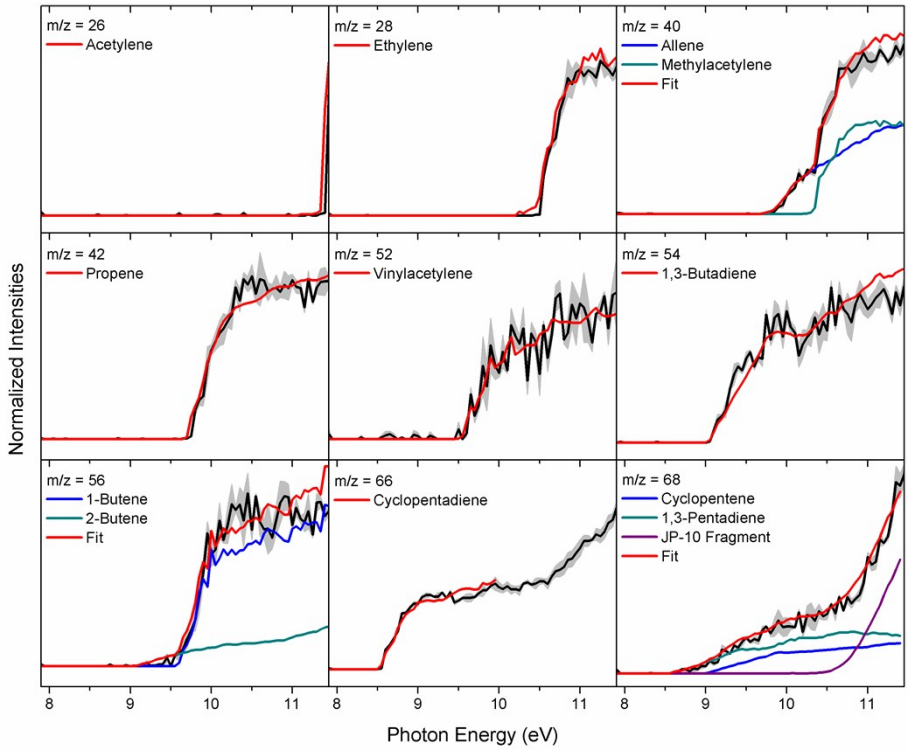


Figure S6-5-1. Experimental photoionization efficiency curves (PIE, black lines) recorded from the decomposition of JP-10 (NSRL) at 1038 K along with the experimental errors (gray area) and the reference PIE curves (blue, green and red lines). In case of multiple contributions to one PIE curve, the red line resembles the overall fit. JP-10 fragment means the photolysis fragment of JP-10.

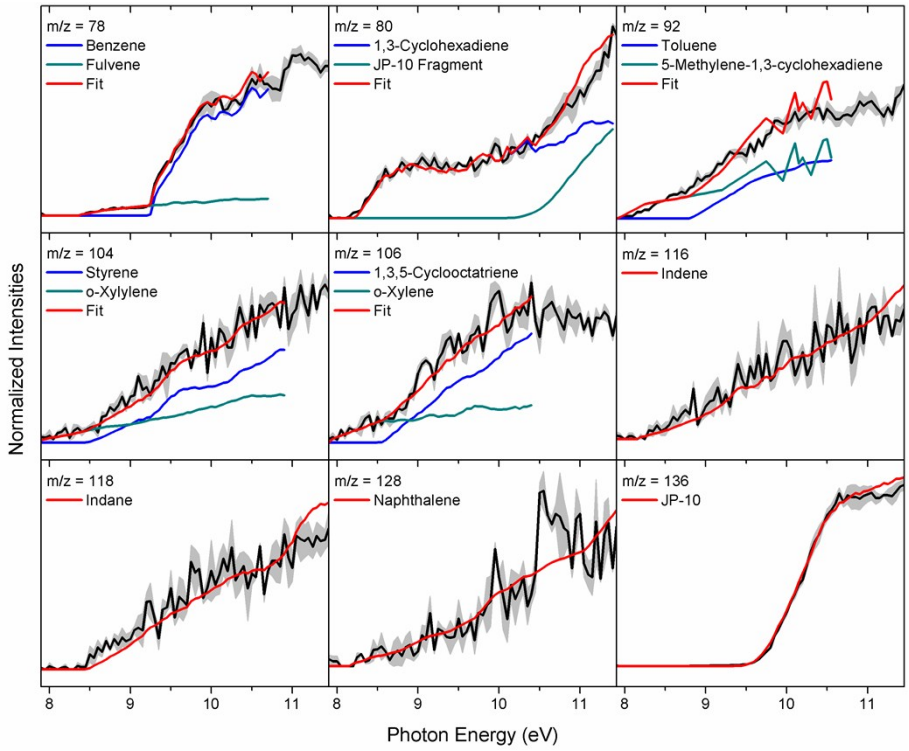


Figure S6-5-2. Experimental photoionization efficiency curves (PIE, black lines) recorded from the decomposition of JP-10 (NSRL) at 1038 K along with the experimental errors (gray area) and the reference PIE curves (blue, green and red lines). In case of multiple contributions to one PIE curve, the red line resembles the overall fit. JP-10 fragment means the photolysis fragment of JP-10.

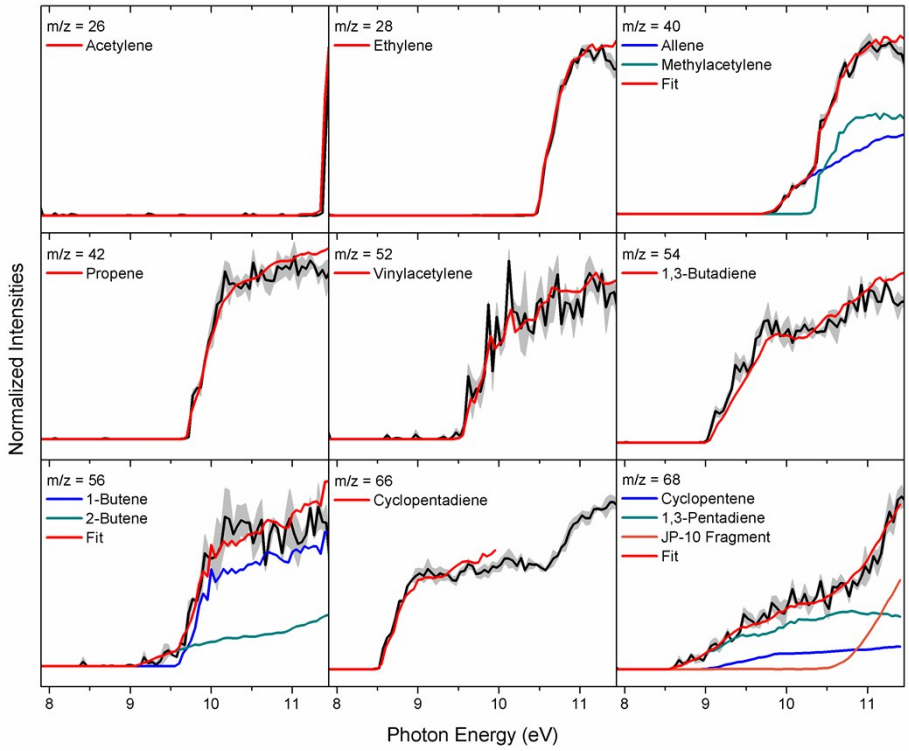


Figure S6-6-1. Experimental photoionization efficiency curves (PIE, black lines) recorded from the decomposition of JP-10 (NSRL) at 1061 K along with the experimental errors (gray area) and the reference PIE curves (blue, green and red lines). In case of multiple contributions to one PIE curve, the red line resembles the overall fit. JP-10 fragment means the photolysis fragment of JP-10. For *m/z* = 66 and 68, the PIE curves present sharp increase above10.5 eV due to photolysis fragment of JP-10.

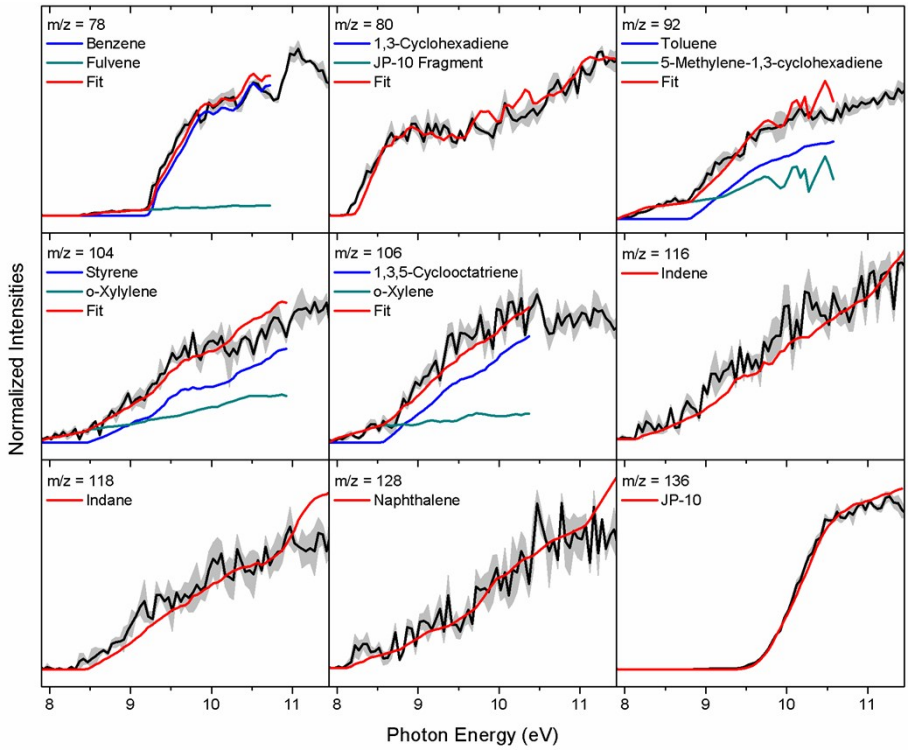


Figure S6-6-2. Experimental photoionization efficiency curves (PIE, black lines) recorded from the decomposition of JP-10 (NSRL) at 1061 K along with the experimental errors (gray area) and the reference PIE curves (blue, green and red lines). In case of multiple contributions to one PIE curve, the red line resembles the overall fit. JP-10 fragment means the photolysis fragment of JP-10.

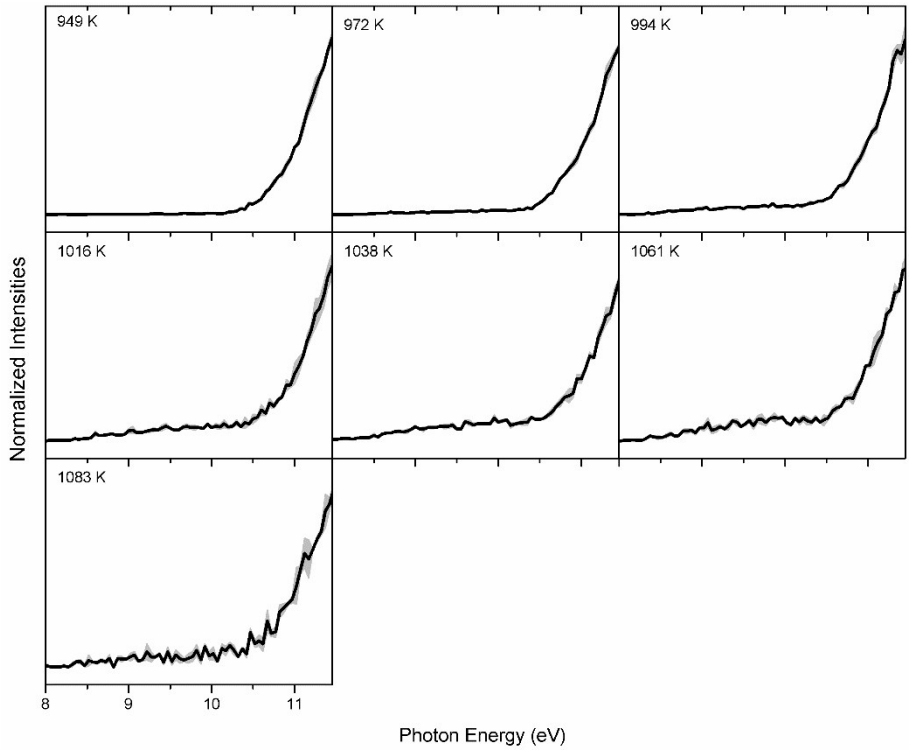


Figure S7. PIE measurement of *m/z* = 94 in the temperature from 949 K to 1083 K in NSRL. The PIE curves present sharp increase above10.5 eV due to photolysis fragment of JP-10.

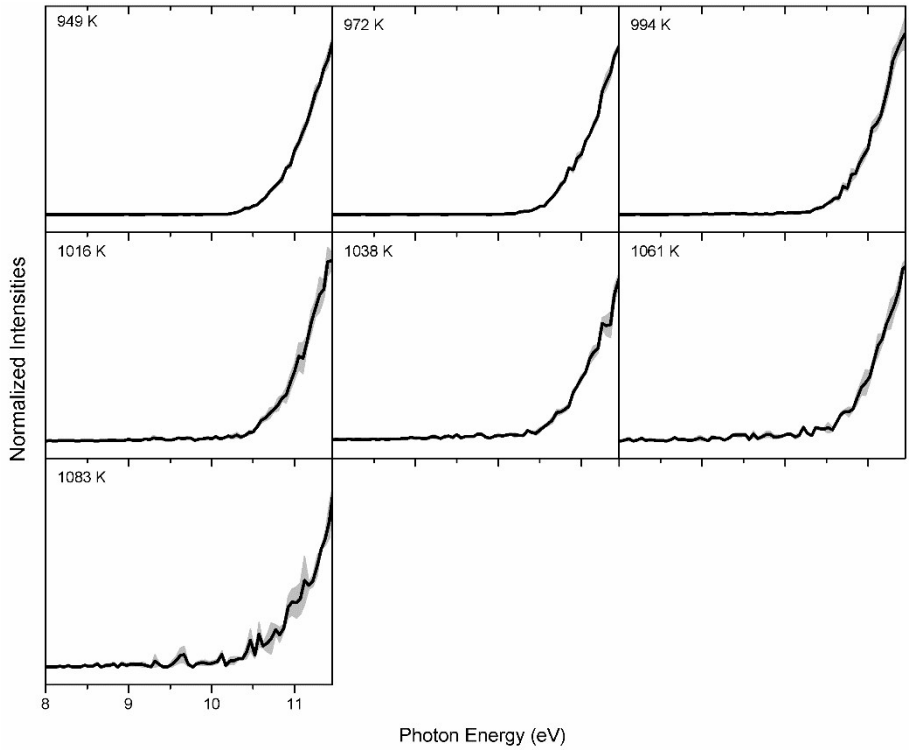


Figure S8. PIE measurement of *m/z* = 108 in the temperature from 949 K to 1083 K in NSRL. The PIE curves present sharp increase above10.5 eV due to photolysis fragment of JP-10.

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