
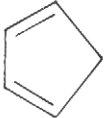
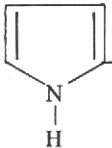
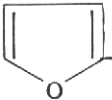
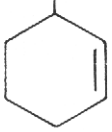
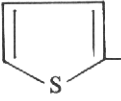

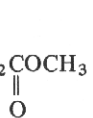
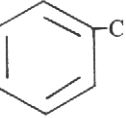
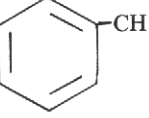
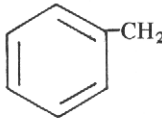
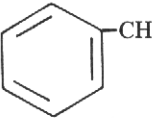
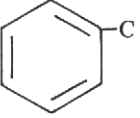
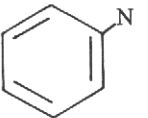
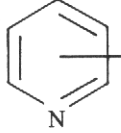
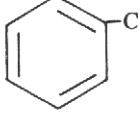
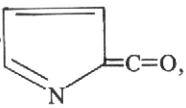
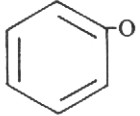


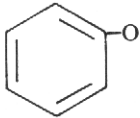
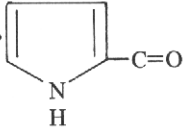
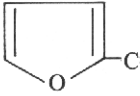
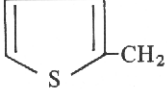
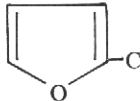
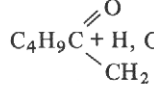
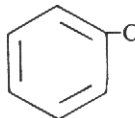
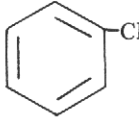
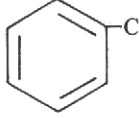
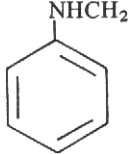
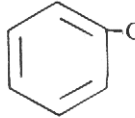
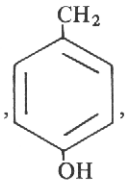
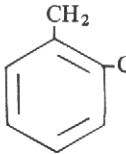
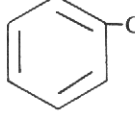
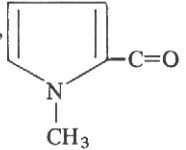
COMMON FRAGMENT IONS

Not all members of homologous and isomeric series are given. The list is meant to be suggestive rather than exhaustive. Appendix II of Hamming and Foster,⁷ Table A-7 of McLafferty's Interpretative book,⁹ and the high-resolution ion data of McLafferty are recommended as supplements.

<i>m/e</i>	Ions*	<i>m/e</i>	Ions
14	CH ₂		
15	CH ₃		
16	O		
17	OH		
18	H ₂ O, NH ₄		
19	F, H ₃ O		
26	C≡N		
27	C ₂ H ₃		
28	C ₂ H ₄ , CO, N ₂ (air), CH=NH		
29	C ₂ H ₅ , CHO		
30	CH ₂ NH ₂ , NO		
31	CH ₂ OH, OCH ₃		
32	O ₂ (Air)		
33	SH, CH ₂ F		
34	H ₂ S		
35	Cl		
36	HCl		
39	C ₃ H ₃		
40	CH ₂ C=N, Ar(Air)		
41	C ₃ H ₅ , CH ₂ C=N + H, C ₂ H ₂ NH		
42	C ₃ H ₆		
43	C ₃ H ₇ , CH ₃ C=O, C ₂ H ₅ N		
44	CH ₂ C=O + H, CH ₃ CHNH ₂ , CO ₂ , NH ₂ C=O, (CH ₃) ₂ N		
45	CHOH, CH ₂ CH ₂ OH, CH ₂ OCH ₃ , C-OH, CH ₃ CH-O + H		
46	NO ₂		
47	CH ₂ SH, CH ₃ S		
48	CH ₃ S + H		
49	CH ₂ Cl		
51	CHF ₂		
53	C ₄ H ₅		
54	CH ₂ CH ₂ C≡N		
55	C ₄ H ₇ , CH ₂ =CHC=O		
56	C ₄ H ₈		
57	C ₄ H ₉ , C ₂ H ₅ C=O		
58	CH ₃ -C(=O)+ H, C ₂ H ₅ CHNH ₂ , (CH ₃) ₂ NCH ₂ , C ₂ H ₅ NHCH ₂ , C ₂ H ₂ S		
59	(CH ₃) ₂ COH, CH ₂ OC ₂ H ₅ , C(=O)-OCH ₃ , NH ₂ C(=O) + H, CH ₃ OCHCH ₃ , CH ₃ CHCH ₂ OH		
60	CH ₂ C(=O)+ H, CH ₂ ONO		
61	CH ₃ C(=O)-O + 2H, CH ₂ CH ₂ SH, CH ₂ SCH ₃		
65	 ≡ C ₅ H ₅		
66	 ≡ C ₅ H ₆		
67	C ₅ H ₇		
68	CH ₂ CH ₂ CH ₂ C≡N		
69	C ₅ H ₉ , CF ₃ , CH ₃ CH=CHC=O, CH ₂ =C(CH ₃)C=O		
70	C ₅ H ₁₀		
71	C ₅ H ₁₁ , C ₃ H ₇ C=O		
72	C ₂ H ₅ C(=O)+ H, C ₃ H ₇ CHNH ₂ , (CH ₃) ₂ N=C=O, C ₂ H ₅ NHCHCH ₃ , and isomers		
73	Homologs of 59		
74	CH ₂ -C(=O)-OCH ₃ + H		
75	C-OC ₂ H ₅ + 2H, CH ₂ SC ₂ H ₅ , (CH ₃) ₂ CSH, (CH ₃ O) ₂ CH		
77	C ₆ H ₅		
78	C ₆ H ₅ + H		
79	C ₆ H ₅ + 2H, Br		

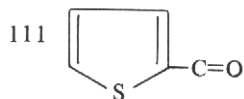
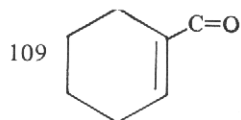
*Ions indicated as a fragment + nH (n = 1, 2, 3, ...) are ions that arise via rearrangement involving hydrogen transfer.

- 80  CH_2 , $\text{CH}_3\text{SS} + \text{H}$
- 81  CH_2 , C_6H_9 , 
- 82 $\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{C}\equiv\text{N}$, CCl_2 , C_6H_{10}
- 83 C_6H_{11} , CHCl_2 , 
- 85 C_6H_{13} , $\text{C}_4\text{H}_9\text{C}=\text{O}$, CClF_2
- 86 $\text{C}_3\text{H}_7\text{C}=\text{O} + \text{H}$, $\text{C}_4\text{H}_9\text{CHNH}_2$, and isomers.

- 87 $\text{C}_3\text{H}_7\text{CO}$, homologs of 73, $\text{CH}_2\text{CH}_2\text{COCH}_3$

- 88 $\text{CH}_2-\text{C}(=\text{O})-\text{OC}_2\text{H}_5 + \text{H}$
- 89 $\text{C}(=\text{O})-\text{OC}_3\text{H}_7 + 2\text{H}$, 
- 90 $\text{CH}_3\text{CHONO}_2$, 
- 91  CH_2 ,  CH + H ,  C + 2H ,
 $(\text{CH}_2)_4\text{Cl}$, 
- 92  CH_2 ,  CH_2 + H ,
- 93 CH_2Br , C_7H_9 ,  $\text{C}=\text{O}$,
 O , C_7H_9 (terpenes)

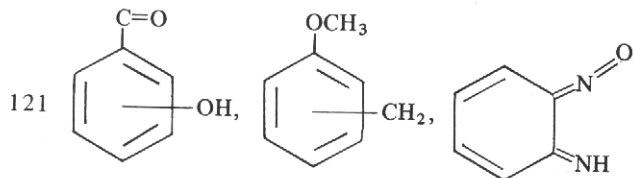
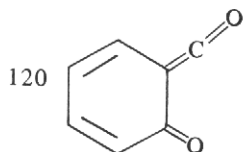
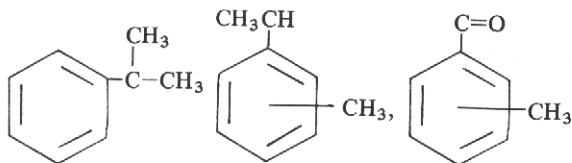
- 94  + H ,  $\text{C}=\text{O}$
- 95  $\text{C}=\text{O}$
- 96 $\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{C}\equiv\text{N}$
- 97 C_7H_{13} , 
- 98  $\text{CH}_2\text{O} + \text{H}$
- 99 C_7H_{15} , $\text{C}_6\text{H}_{11}\text{O}$
- 100 $\text{C}_4\text{H}_9\text{C}(=\text{O}) + \text{H}$, $\text{C}_5\text{H}_{11}\text{CHNH}_2$

- 101 $\text{C}(=\text{O})-\text{OC}_4\text{H}_9$
- 102 $\text{CH}_2\text{C}(=\text{O})-\text{OC}_3\text{H}_7 + \text{H}$
- 103 $\text{C}(=\text{O})-\text{OC}_4\text{H}_9 + 2\text{H}$, $\text{C}_5\text{H}_{11}\text{S}$, $\text{CH}(\text{OCH}_2\text{CH}_3)_2$
- 104 $\text{C}_2\text{H}_5\text{CHONO}_2$
- 105  $\text{C}=\text{O}$,  CH_2CH_2 ,

- 106  NHCH_2
- 107  CH_2O ,  CH_2 , OH ,  CH_2 , OH
- 108  CH_2O + H ,  $\text{C}=\text{O}$, CH_3

m/e

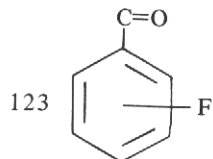
Ions



119 CF_3CF_2 ,

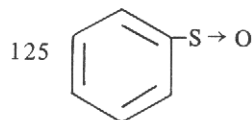


C_9H_{13} (terpenes)

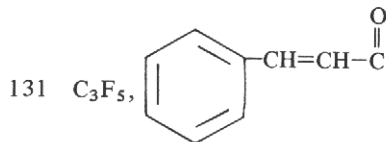


m/e

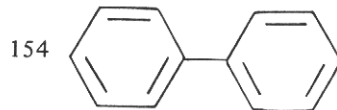
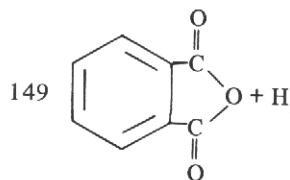
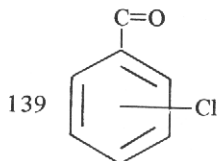
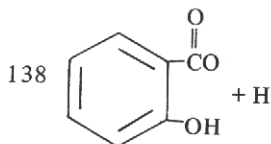
Ions



127 I







135 $(\text{CH}_2)_4\text{Br}$



COMMON FRAGMENTS LOST

This list is suggestive rather than comprehensive. It should be used in conjunction with Appendix B, Table 5-19 of Hamming and Foster⁷ and Table A-5 of McLafferty⁹ are recommended as supplements. All of these are lost as neutral species.

Molecular Ion Minus	Fragment Lost	Molecular Ion Minus	Fragment Lost
1	H·	53	C ₄ H ₅
15	CH ₃ ·	54	CH ₂ =CH-CH=CH ₂
17	HO·	55	CH ₂ =CHCHCH ₃
18	H ₂ O	56	CH ₂ =CHCH ₂ CH ₃ , CH ₃ CH=CHCH ₃ , 2CO
19	F·	57	C ₄ H ₉ ·
20	HF	58	·NCS, (NO + CO), CH ₃ COCH ₃
26	CH≡CH, ·C≡N		
27	CH ₂ =CH·, HC≡N		
28	CH ₂ =CH ₂ , CO, (HCN + H)	59	CH ₃ OC·, CH ₃ CN ₂ ·, 
29	CH ₃ CH ₂ ·, ·CHO	60	C ₃ H ₇ OH
30	NH ₂ CH ₂ ·, CH ₂ O, NO		
31	·OCH ₃ , ·CH ₂ OH, CH ₃ NH ₂		
32	CH ₃ OH, S	61	CH ₃ CH ₂ S·, 
33	HS·, (·CH ₃ and H ₂ O)	62	[H ₂ S and CH ₂ =CH ₂]
34	H ₂ S	63	·CH ₂ CH ₂ Cl
35	Cl·	64	C ₅ H ₄ , S ₂ , SO ₂
36	HCl, 2H ₂ O		
37	H ₂ Cl (or HCl + H)	68	 CH ₂ =C-CH=CH ₂
38	C ₃ H ₂ ·, C ₂ N, F ₂	69	CF ₃ ·, C ₅ H ₉ ·
39	C ₃ H ₃ , HC ₂ N	71	C ₅ H ₁₁ ·
40	CH ₃ C≡CH		
41	CH ₂ =CHCH ₂ ·		
42	CH ₂ =CHCH ₃ , CH ₂ =C=O,  , NCO, NCNH ₂	73	CH ₃ CH ₂ OC·
43	C ₃ H ₇ ·, CH ₃ C·, CH ₂ =CH-O·, [CH ₃ · and CH ₂ =CH ₂], HCNO	74	C ₄ H ₉ OH
44	CH ₂ =CHOH, CO ₂ , N ₂ O, CONH ₂ , NHCH ₂ CH ₃	75	C ₆ H ₃
45	CH ₃ CHOH, CH ₃ CH ₂ O·, CO ₂ H, CH ₃ CH ₂ NH ₂	76	C ₆ H ₄ , CS ₂
46	[H ₂ O and CH ₂ =CH ₂], CH ₃ CH ₂ OH, ·NO ₂	77	C ₆ H ₅ , CS ₂ H
47	CH ₃ S·	78	C ₆ H ₆ , CS ₂ H ₂ , C ₅ H ₄ N
48	CH ₃ SH, SO, O ₃	79	Br·, C ₅ H ₅ N
49	·CH ₂ Cl	80	HBr
51	·CHF ₂	85	·CClF ₂
52	C ₄ H ₄ , C ₂ N ₂	100	CF ₂ =CF ₂
		119	CF ₃ -CF ₂ ·
		122	C ₆ H ₅ COOH
		127	I·
		128	HI