Table 46.2 Acids

COMPOUND	MP, °C	BP, °C	Derivative, Mp, °C		
			AMIDE	ANILIDE	*p*-TOLUIDIDE
Acetic		118	82	114	147
Acetylanthranilic	185		171	167	
o-Anisic (methoxybenzoic)	100		128	131	
p-Anisic	184		162	169	186
Benzoic	122		128	163	158
o-Bromobenzoic	150		155	141	
Butanoic		163	115	95	72
Chloroacetic	63		118	134	120
o-Chlorobenzoic	140		139	118	131
m-Chlorobenzoic	158		134	122	
p-Chlorobenzoic	242		179	194	
4-Chloro-3-nitrobenzoic	182		156	131	
Cinnamic	133		147	153	168
Dichloroacetic		189	98	118	153
2,4-Dichlorobenzoic	158				
3,4-Dichlorobenzoic	208		133		
Diglycolic (oxydiacetic)	148		135 (mono)	118 (mono)	
3,4-Dimethoxybenzoic	182		164	154	
2,2-Dimethylsuccinic	140				
Diphenylacetic	146		167	180	
p-Ethoxybenzoic	198		202	169	
Glutaric	97		174	224	
Hippuric (benzoylglycine)	187		183	208	
p-Hydroxybenzoic	215		162	202	204
Itaconic	165 (*d*)		192 (di)		
p-Methoxyphenylacetic	85		189		
Methylpropanoic (isobutyric)		155	129	105	109
Methylsuccinic	115		165 (mono)		
Naphthalene-1-acetic	133		181	155	
1-Naphthoic	162		205	161	
m-Nitrobenzoic	140		142	155	162
p-Nitrobenzoic	241		201	217	
Phenylacetic	76		154	117	
2-Phenylbutanoic	42		86		
3-Phenylpropanoic	48		82	92	
5-Phenylpentanoic	60		109	90	
Phthalic	208 (*d*)		149		
Propionic		140	81	106	126
Salicylic (*o*-hydroxybenzoic)	158		139	136	156
Succinic	188		242 (mono)		
o-Toluic	105		142	125	144
m-Toluic	111		97	126	118
p-Toluic	177		158	140	160
3,4,5-Trimethoxybenzoic	170		176		

Table 46.3 Alcohols

COMPOUND	BP, °C	MP, °C	Derivative, Mp, °C	
			3,5-DINITROBENZOATE	PHENYLURETHANE
Benzyl alcohol	206		113	78
1-Butanol	117		64	57
2-Butanol	99		75	65
2-Buten-1-ol	122			
Cinnamyl alcohol	257	33	121	90
2-Chloroethanol	130			51
1-Chloro-2-propanol	127		83	
Cholesterol		148		168
Cyclohexanol	161		112	82
Cyclopentanol	141		115	132
Diphenylmethanol		69	141	140
Ethanol	78		93	52
2-Ethyl-1-butanol	149		52	
1-Heptanol	177		47	68
2-Heptanol	160		49	
1-Hexanol	156		58	42
Methanol	65		108	47
4-Methoxybenzyl alcohol	260	25		92
1-Methoxy-2-propanol	119		85	
4-Methylbenzyl alcohol		60	118	79
2-Methyl-1-butanol	129		70	31
3-Methyl-1-butanol	132		61	57
3-Methyl-2-butanol	113		76	68
2-Methyl-3-buten-2-ol	98			
2-Methyl-1-pentanol	148		51	
3-Methyl-2-pentanol	134		43	
4-Methyl-2-pentanol	132		65	143
2-Methyl-1-propanol	108		87	86
1-Octanol	192		61	74
2-Octanol	179		32	114
1-Pentanol	138		46	46
2-Pentanol	119		61	
3-Pentanol	116		101	48
2-Phenoxyethanol	237			
1-Phenylethanol	203		95	94
2-Phenylethanol	219		108	80
1-Phenyl-1-propanol	219			
2-Phenyl-2-propanol	202	34		
1-Propanol	97		74	51
2-Propanol	82		123	88
2-Propen-1-ol	97		48	70
2-Propyn-1-ol	115			

Table 46.4 Aldehydes

COMPOUND	BP, °C	MP, °C	Derivative, Mp, °C	
			SEMICARBAZONE	2,4-DINITRO-PHENYLHYDRAZONE
o-Anisaldehyde (*o*-methoxybenzaldehyde)	246	38	215	254
p-Anisaldehyde	247		210	254
Benzaldehyde	179		222	237
Butanal	75		106	123
2-Butenal	103		199	190
o-Chlorobenzaldehyde	208		225	207
p-Chlorobenzaldehyde	214	47	230	270 (*d*)
Cinnamaldehyde	252		215	255
Citral	228		164	116
Citronellal	206		82	77
2,5-Dimethoxybenzaldehyde		52	—	—
3,4-Dimethoxybenzaldehyde		44	177	263
p-Dimethylaminobenzaldehyde		74	222	325
o-Ethoxybenzaldehyde	248		219	
2-Ethylbutanal	116		99	134
Furfural	161		202	230
Heptanal	156		109	108
Hexanal	131		106	104
o-Hydroxybenzaldehyde (salicylaldehyde)	197		231	248
p-Hydroxybenzaldehyde		115	224	280 (*d*)
2-Methylbutanal	93		103	120
3-Methylbutanal	92		107	123
a-Methylcinnamaldehyde	270		208	
5-Methylfurfural	187		211	212
1-Naphthaldehyde	292	34	221	
p-Nitrobenzaldehyde		106	221	
o-Nitrobenzaldehyde		44	256	250
Phenylacetaldehyde	194		156	121
Piperonal (3,4-methylenedioxybenzaldehyde)	264	36	230	266
o-Tolualdehyde	200		212	195
p-Tolualdehyde	204		215	234

Table 46.5 Amides

COMPOUND	MP, °C
Acetamide	82
Acetanilide	114
Acetoacetanilide	85
o-Acetoacetanisidide	84
p-Acetoacetanisidide	115
o-Acetoacetotoluide	104
o-Acetotoluide	112
m-Acetotoluide	66
p-Acetotoluide	153
Benzamide	130
p-Bromoacetanilide	167
p-Bromobenzamide	155
o-Bromobenzanilide	141
m-Bromobenzanilide	136
p-Chloroacetanilide	179
p-Chloroacetoacetanilide	134
m-Chlorobenzamide	134
p-Chlorobenzanilide	194
Cinnamanilide	153
o-Ethoxybenzamide	133
m-Ethoxybenzamide	139
o-Methoxybenzamide	129
N-Methylacetanilide	102
o-Toluamide	142
m-Toluamide	97
p-Toluamide	158

Table 46.6 Amines

COMPOUND	BP, °C	MP, °C	Derivative, Mp, °C		
			ACETAMIDE	BENZAMIDE	PHENYLTHIOUREA
Aniline	183		114	160	154
Benzylamine	184		60	105	156
N-Benzylaniline		37			
o-Bromoaniline	229		99	116	146
p-Bromoaniline		66	167	204	148
n-Butylamine	77			42	65
iso-Butylamine	69			57	82
sec-Butylamine	63			76	101
tert-Butylamine	46			134	120
o-Chloroaniline	207		87	99	156
m-Chloroaniline	230		72	120	124
p-Chloroaniline		70	179	192	152
Cyclohexylamine	134		104	149	148
Di-*n*-butylamine	160				86
2,4-Dichloroaniline		63	145	117	
2,5-Dichloroaniline		50	132	120	
Diethylamine	55			42	34
Di-*n*-propylamine	110				69
Di-*iso*-propylamine	86				
p-Ethoxyaniline	250		137	173	136
Ethyl *p*-aminobenzoate		89	110	148	
N-Ethylaniline	205		54	60	
o-Ethylaniline	216		111	147	
n-Hexylamine	128			40	77
o-Methoxyaniline	225		87	84	
p-Methoxyaniline		58	128	155	154
2-Methoxy-5-methylaniline		50	110		
4-Methoxy-2-methylaniline		30	134		
N-Methylaniline	196		102	63	87
o-Nitroaniline		71	92	94	142
m-Nitroaniline		114	155	155	160
p-Nitroaniline		147	210	199	
α-Phenylethylamine	185		57	120	
β-Phenylethylamine	198		114	116	135
Piperidine	105			48	101
o-Toluidine	199		112	143	136
m-Toluidine	203		65	125	94
p-Toluidine		45	153	158	141

Table 46.7 Aromatic Halides and Hydrocarbons

			Derivative		
			Nitration Product		Carboxylic Acid
COMPOUND	BP, °C	MP, °C	Positions	MP, °C	MP, °C
Anthracene		216			
Biphenyl		70	4,4′	233	
Bromobenzene	157		2,4	75	
4-Bromobiphenyl		89			
p-Bromochlorobenzene		67	2	72	
o-Bromotoluene	181				147
p-Bromotoluene	185	28	2	47	251
Chlorobenzene	132				
o-Chlorotoluene	159				140
m-Chlorotoluene	162		4,6	91	158
p-Chlorotoluene	162		2	38	242
p-Cymene (isopropyltoluene)	175		2,6	54	
o-Dibromobenzene	224		4,5	114	
p-Dibromobenzene		89	2	84	
2,5-Dibromotoluene					157
o-Dichlorobenzene	179		4,5	110	
p-Dichlorobenzene		53	2	54	
2,4-Dichlorotoluene	195				160
2,6-Dichlorotoluene	199				130
Diphenylmethane		26			
Ethylbenzene	135				122
Fluorene		115			
Mesitylene	164		2,4	86	
1-Methylnaphthalene	240				162
2-Methylnaphthalene		32	1	81	
α-Methylstyrene	169				122
2-Phenylethyl chloride	190				122
Styrene	146				122
Toluene	111		2,4	70	122
o-Xylene	142		4,5	71	
m-Xylene	139		2,4	83	
p-Xylene	137		2,3,5	137	

Table 46.8 Esters

COMPOUND	BP, °C	MP, °C
Diethyl ethylmalonate	75 (5 mm)	
Diethyl glutarate	237	
Diethyl maleate	225	
Diethyl malonate	198	
Diethyl oxalate	185	
Diethyl phthalate	296	
Diethyl phenylmalonate	170 (14 mm)	16
Diethyl succinate	216	
Diethyl suberate	268	
Ethyl acetate	77	
Ethyl acetoacetate	181	
Ethyl *p*-anisate	270	
Ethyl benzoate	213	
Ethyl benzoylacetate	270	
Ethyl cinnamate	271	
Ethyl cyanoacetate	208	
Ethyl-*p*-hydroxybenzoate		116
Ethyl 2-methylacetoacetate	187	
Ethyl *p*-nitrobenzoate		57
Ethyl phenylacetate	229	
Ethyl propionate	98	
Ethyl salicylate	234	
Ethyl *p*-toluate	241	
Isopropenyl acetate	96	
Isopropyl acetate	91	
Isopropyl formate	68	
Isopropyl benzoate	218	
Isopropyl salicylate	255	
Methyl acetate	57	
Methyl acetoacetate	169	
Methyl *p*-anisate		49
Methyl benzoate	198	
Methyl *n*-butyrate	102	
Methyl *iso*-butyrate	92	
Methyl *o*-chlorobenzoate	230	
Methyl *m*-chlorobenzoate	231	
Methyl cinnamate		35
Methyl heptanoate	173	
Methyl hexanoate	150	
Methyl *p*-hydroxybenzoate		130
Methyl mandelate		57
Methyl *p*-nitrobenzoate		95
Methyl pentanoate	130	
Methyl phenylacetate	218	

(Table continued on next page.)

Table 46.8 Esters (*Continued*)

COMPOUND	BP, °C	MP, °C
Methyl propionate	79	
Methyl *o*-toluate	213	
Methyl *p*-toluate		30
Phenyl acetate	197	
Phenyl benzoate		69
Phenyl salicylate		42

Table 46.9 Ethers (Aryl)

			Derivative, Mp, °C
COMPOUND	BP, °C	MP, °C	NITRO
Anisole	154		87 (di)
o-Bromoanisole	218		106
p-Bromoanisole	223		88
o-Chloroanisole	195		95
p-Chloroanisole	200		98
o-Dimethoxybenzene	206		92 (dibromo)
m-Dimethoxybenzene	214		140 (dibromo)
p-Dimethoxybenzene		55	142 (dibromo)
o-Methylanisole	171		63 (bromo)
m-Methylanisole	177		91 (tri)
p-Methylanisole	176		
Phenetole (ethoxybenzene)	172		58

Table 46.10 Ketones

COMPOUND	BP, °C	MP, °C	Derivative, Mp, °C	
			SEMICARBAZONE	2,4-DINITRO-PHENYLHYDRAZONE
Acetone	56		187	126
2-Acetonaphthone		54	234	262
Acetophenone	200		198	250
Benzophenone		48	167	239
p-Bromoacetophenone		51	208	235
Butanone	80		146	117
Butyrophenone	230		187	190
Chloroacetone	119		164	125
p-Chloroacetophenone	232		201	231
p-Chloropropiophenone		36	176	
Cyclohexanone	156		167	162
Cyclopentanone	131		203	146
3,3-Dimethyl-2-butanone	106		158	125
2,4-Dimethyl-3-pentanone	125		160	95
Fluorenone		83		283
2-Heptanone	151		127	89
3-Heptanone	148		103	
4-Heptanone	145		133	75
Hexane-2,5-dione	188		220 (di)	255 (di)
2-Hexanone	129		122	110
5-Hexen-3-one	129		102	108
4-Hexen-3-one	139		157	
p-Hydroxypropiophenone		148		229
Isobutyrophenone	222		181	163
p-Methoxyacetophenone		38	197	220
p-Methoxypropiophenone		28		
p-Methylacetophenone	226	28	205	258
3-Methyl-2-butanone	94		113	120
2-Methylcyclohexanone	163		195	137
4-Methylcyclohexanone	169		199	130
5-Methyl-3-heptanone	160		102	
6-Methyl-3-heptanone	160		132	
5-Methyl-2-hexanone	145		147	95
Methylcyclohexyl ketone	180		177	140
4-Methyl-2-pentanone	119		135	95
4-Methyl-3-penten-2-one	130		164	203
m-Nitroacetophenone		81	257	228
p-Nitroacetophenone		80		
2-Octanone	173		123	58
2,4-Pentandione	139		122 (mono)	209
2-Pentanone	102		112	144
3-Pentanone	102		139	156

(Table continued on next page.)

Table 46.10 Ketones (*Continued*)

COMPOUND	BP, °C	MP, °C	Derivative, Mp, °C	
			SEMICARBAZONE	2,4-DINITRO-PHENYLHYDRAZONE
Phenylacetone	216		198	156
4-Phenyl-2-butanone	235		142	
4-Phenyl-3-buten-2-one		41	187	
Propiophenone	218		174	191

Table 46.11 Nitriles

COMPOUND	BP, °C	MP, °C
Acetonitrile	81	
Acrylonitrile	78	
Adiponitrile	295	
Benzonitrile	191	
p-Bromobenzonitrile		112
Butyronitrile	118	
Chloroacetonitrile	127	
o-Chlorobenzonitrile	232	47
m-Chlorobenzonitrile		41
p-Chlorobenzonitrile		92
o-Chlorophenylacetonitrile	242	24
p-Chlorophenylacetonitrile	265	30
Glutaronitrile	286	
Isobutyronitrile	108	
Malononitrile	219	
p-Methoxybenzonitrile		62
1-Naphthaleneacetonitrile		35
1-Naphthonitrile	299	35
2-Naphthonitrile	306	66
o-Nitrobenzonitrile		110
m-Nitrobenzonitrile		118
p-Nitrobenzonitrile		147
p-Nitrophenylacetonitrile		116
Phenylacetonitrile	234	
o-Tolunitrile	205	
m-Tolunitrile	212	
p-Tolunitrile	217	27

Table 46.12 Nitro Compounds

COMPOUND	BP, °C	MP, °C
o-Bromonitrobenzene	261	43
m-Bromonitrobenzene	256	54
p-Bromonitrobenzene		126
4-Bromo-3-nitrotoluene		33
o-Chloronitrobenzene	246	32
m-Chloronitrobenzene	235	44
p-Chloronitrobenzene		83
2,5-Dibromonitrobenzene		85
2,4-Dichloronitrobenzene		52
2,4-Dimethylnitrobenzene	238	
2,5-Dimethylnitrobenzene	234	
2,6-Dimethylnitrobenzene	226	15
2,4-Dinitroanisole		89
1,3-Dinitrobenzene		90
1,4-Dinitrobenzene		172
2,4-Dinitrobromobenzene		72
2,4-Dinitrochlorobenzene		52
2,4-Dinitrotoluene		70
2,6-Dinitrotoluene		66
o-Nitroanisole	265	
p-Nitroanisole		54
Nitrobenzene	210	
4-Nitrobiphenyl		114
o-Nitrotoluene	224	
m-Nitrotoluene	231	16

Table 46.13 Phenols

COMPOUND	MP, °C	BP, °C	Derivative, Mp, °C		
			BENZOATE	3,5-DINITRO-BENZOATE	PHENYL-URETHANE
4-*t*-Butylphenol	100		81		
4-Chloro-3,5-dimethylphenol	115		[acetate, 48]		
o-Chlorophenol		176			121
p-Chlorophenol	43		88	186	148
o-Cresol (methylphenol)		190		138	142
m-Cresol		202	55	165	128
p-Cresol	36		70	189	146
2,4-Dichlorophenol	45		97	142	
3,5-Dichlorophenol	68		55		
2,4-Dimethylphenol	27	212	38	165	103
2,5-Dimethylphenol	75		61	137	161
2,6-Dimethylphenol	49			159	133
3,4-Dimethylphenol	62		59	182	120
3,5-Dimethylphenol	68			195	151
4-Ethylphenol	47		60	132	120
o-Hydroxyphenol (catechol)	104		84 (di)	152 (di)	169 (di)
m-Hydroxyphenol (resorcinol)	110		117 (di)	201 (di)	164 (di)
p-Hydroxyphenol (hydroquinone)	169		199 (di)	317 (di)	
2-Isopropyl-5-methylphenol (thymol)	51		33	103	107
2-Isopropylphenol		212	[aryloxyacetic acid, 133]		
4-Isopropylphenol	61		71		
2-Methoxyphenol	30	205	58	141	148
4-Methoxyphenol	56		87		137
4-Methyl-2-nitrophenol	34				
5-Methyl-2-nitrophenol	53				
1-Naphthol	94		56	217	177
2-Naphthol	122		107	210	155
o-Nitrophenol	45			155	
p-Nitrophenol	114		143	186	
Phenol	42	180	68	146	126