

**TABLE V. ORGANIC DERIVATIVES OF HALIDES**
**A) Alkyl and cycloalkyl halides 1. Chlorides**
**a) Liquids (Listed in order of increasing atmospheric b.p.)\***

No	Name	Boiling point, °C	$n_D^{20}$	$D_4^{20}$	S-Alkyl thiuronium picrate	1 Naphthyl amide	Anilide	Alkyl mercuric halide	Picrate of 2-naphthyl ether	2,4-Dinitrophenyl thioether	2,4-Dinitrophenyl sulfone	Miscellaneous
1	Methyl chloride	-24			224	160	114	167		128	185, 189	Methyl-2-naphthyl ether, 70
2	Vinyl chloride	-14			104							Polymerizes to solid on irradiation
3	Ethyl chloride	13		0.917 <sub>8</sub>	188	126	104	192	104	115	156, 160	
4	Isopropyl chloride	36.5	1.378	0.859	196, 148		103		95			
5	1-Chloropropene	37					114					
6	Allyl chloride	44.5	1.416	0.940	155		114		99			3-Nitrophthalimide deriv., 100-1
7	<i>n</i> -Propyl chloride	46.5	1.388	0.889	181, 176	121	92	147	81	84	126	
8	<i>tert</i> -Butyl chloride	51	1.386	0.846	160-1	147	128	122-3				Heating with maleic anhydride and boiling the adduct in water → 4-chloro-1,2,3,6-tetrahydrophthalic acid, 173-5
9	Chloroprene	59	1.458	0.9583								
10	<i>sec</i> -Butyl chloride	68	1.397	0.874	190, 166	129	108	30.5	86	66	120	
11	Isobutyl chloride	69	1.398	0.881	174	125	109		85	76	105	
12	Methallyl chloride (3-Chloro-2-methyl-1-propene)	72	1.4340	0.9475								Phthalimide deriv., 89-90
13	<i>n</i> -Butyl chloride	78	1.402	0.886	180, 177	112	63	128	67	66	92	
14	Neopentyl chloride	85		0.879			130-1	117-8				
15	<i>tert</i> -Amyl chloride	86	1.405	0.865		138	92					
16	3-Chloro-1-pentene	93-4	1.4254	0.8978								Phthalimide deriv., 78-9
17	DL-3-Chloro-2-methyl-1-butene	94	1.4304	0.9088								Br <sub>2</sub> → dibromo deriv., 197-8
18	Trimethylvinyl chloride (3-Chloro-2-methyl-2-butene)	94	1.4320	0.925 (0.905)								Br <sub>2</sub> in ether → dibromo deriv., 197
19	DL-2-Chloropentane	97	1.4079	0.8695		102.3	94.6					
20	3-Pentyl chloride (3-Chloropentane)	97	1.4082	0.8723		117-8	127, 122					
21	Isoamyl chloride	100	1.409	0.872	179, 173	111	108	86	94	80	124	
22	<i>n</i> -Amyl chloride ( <i>n</i> -Pentyl chloride)	106	1.412	0.882	154	112	96	110	67	80	83	
23	1-Chloro-2-pentene	109-10	1.435 <sup>21</sup>	0.908 <sup>21.5</sup>								Phthalimide deriv., 69-70
24	2-Chloro-2-methylpentane	110.3	1.4126	0.863		116-8	71-4					
25	3-Chloro-2,2-dimethylbutane (Pinacolyl chloride)	112	1.4181	0.8767				89-90				
26	Cyclopentyl chloride	114-5	1.4510	1.005				108				
27	4-Chloro-2,2-dimethylbutane	115	1.4160	0.8670			138-9	133				
28	3-Chloro-3-methylpentane	115-7	1.421	0.89			87-8					
29	2-Chloro-2,3-dimethylbutane	117-9		0.8769 <sup>22</sup>								Carbonation of Grignard and conversion of acid to amide, 125-7. Br <sub>2</sub> → 2,3-dibromo deriv., 166-8 (173-4)
30	3-Hexyl chloride (3-Chlorohexane)	123	1.4163	0.870 <sub>20</sub>								Grignard reagent + O <sub>2</sub> → 3-hexanol → 3-hexanone, 2,4-Dinitrophenylhydrazone, 147.8 Semicarbazone, 110.11

\*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES

A) Alkyl and cycloalkyl halides 1. Chlorides

a) Liquids (Listed in order of increasing atmospheric b.p.)\* (Continued)

No	Name	Boiling point, °C	$n_D^{20}$	$D_4^{20}$	S Alkyl thuronium picrate	1 Naphthyl amide	Anilide	Alkyl mercuric halide	Picrate of 2 naphthyl ether	2,4-Di-nitro-phenyl thio ether	2,4-Di-nitro-phenyl sulfone	Miscellaneous
31	2-Hexyl chloride (2-Chlorohexane)	123.4	1.4142 <sup>21</sup>	0.8694 <sup>21</sup>			91-2					
32	1-Chloro-2-ethylbutane	125-7	1.4230	0.8914			81.2 83-4					
33	3-Chloro-2,2,3-trimethylbutane	133										Carbonation of Grignard → acid, 80
34	n-Hexyl chloride	133	1.420	0.878	157	106	69	125		74	97	
35	Cyclohexyl chloride	143	1.462	0.989		188	146					6-Nitro-2-mercaptobenzothiazole deriv 100-1.2 sulfone, 189
36	5-Chloro-2,3-dimethylpentane	152	1.4299	0.8825			80.1					
37	n-Heptyl chloride	159	1.426	0.877	142	95	57	120		82	101	
38	Benzyl chloride	179	1.539	1.100	188	166	117	104	123	130	178, 182	Quaternary salt with dimethyl aniline, 110
39	n-Octyl chloride	180, 184	1.431	0.875	134	91	57	115		78	98	
40	β-Phenylethyl chloride	190					97		84			
41	4-Methylbenzyl chloride	192	1.5380	1.0512								Phthalimide, 120. 117 Carbonation of Grignard → 4-tolylacetic acid, 92
42	α-Phenylethyl chloride	195					133					
43	3-Methylbenzyl chloride	195-6	1.5327 <sup>25</sup>	1.064 <sup>20</sup>								Phthalimide deriv., 117-8, Carbonation of Grignard → 3-tolylacetic acid, 61
44	2-Methylbenzyl chloride	197.9										Phthalimide deriv., 148-9, Heating with pyridine → alkyl pyridinium chloride 183
45	β-Chlorostyrene	197-9	1.571 <sup>25</sup>	1.109								Br <sub>2</sub> in chl → dibromo deriv., 32, Oxid → benzoic acid, 122
46	n-Nonyl chloride	202	1.434	0.870	131					86	92	
47	2-Chlorobenzyl chloride	213-4										5-Nitro deriv. 66 Carbonation of Grignard → 2-chlorophenylacetic acid, 94-5
48	4-Chlorobenzyl chloride	214, 222					166					Oxid → 4-chlorobenzoic acid, 242
49	3-Chlorobenzyl chloride	216		1.2695 <sup>15</sup>								Oxid → 3-chlorobenzoic acid, 158, 155, Heating with 2,4-dichlorophenol in toluene → 2-(3-chlorobenzyl)-4,6-dichlorophenol, 59-60
50	n-Decyl chloride	223	1.437	0.868	137							
51	4-Isopropylbenzyl chloride	226-9										Carbonation of Grignard → acid, 52
52	n-Undecyl chloride (n-Hendecyl chloride)	241	1.440	0.868	139							
53	n-Dodecyl chloride (Lauryl chloride)	243-4	1.4425	0.8673				114				Refluxed with pyridine → alkyl pyridinium chloride, 92
54	Cetyl chloride (Hexadecyl chloride)	286 d			155			102				3-Nitrophthalimide deriv., 101, Alkyl saccharin deriv., 98

\*Derivative data given in order m.p., crystal color, solvent from which crystallized

**TABLE V. ORGANIC DERIVATIVES OF HALIDES**

**A) Alkyl and cycloalkyl halides 2. Bromides**

**a) Liquids (Listed in order of increasing atmospheric b.p.)\***

No	Name	Boiling point, °C	$n_D^{20}$	$D_4^{20}$	S-Alkyl thiuronium picrate	1-Naphthyl amide	Amide	Alkyl mercuric halide	Picrate of 2-naphthyl ether	2,4-Dinitrophenyl thioether	2,4-Dinitrophenyl sulfone	Miscellaneous
1	Methyl bromide	3.5			224	160	114	172, 160		128	185, 189	
2	Vinyl bromide	16					104					
3	Ethyl bromide	38	1.425	1.460	188	126	104	193, 198	104	115	156, 160	
4	1-Bromopropene	60	1.452	1.4133			114					
5	Isopropyl bromide	60	1.425	1.314	196, 148		103	93	92	95	140	
6	Allyl bromide	71	1.46545	1.398	155		114		99	71		
7	<i>n</i> -Propyl bromide	71	1.4341	1.353	181, 177	121	92	138	75	84	126	
8	<i>tert</i> -Butyl bromide	72.3		1.211		147	128					
9	Isobutyl bromide	91	1.435	1.253	174, 167	125	109	55	84	76	105	
10	<i>sec</i> -Butyl bromide	91	1.437	1.256	190, 166	129	108	39	85	66	120	
11	<i>n</i> -Butyl bromide	101	1.440	1.274	180, 177	112	63	136, 129	67	66	92	
12	<i>tert</i> -Amyl bromide	108	1.442	1.198 <sup>18</sup>		138	92					
13	Neopentyl bromide	109		1.225			126					
14	DL-2-Pentyl bromide	117, 113	1.442	1.212		102.3	93					
15	3-Pentyl bromide	118	1.443	1.211			124					
16	Isoamyl bromide	120-1	1.442	1.213	179, 173	111	108	80	94	80	124	
17	<i>n</i> -Amyl bromide ( <i>n</i> -Pentyl bromide)	129	1.445	1.219	154	112	96	127, 122	67	80	83	
18	Cyclopentyl bromide	137	1.489	1.387								
19	2-Hexyl bromide (2-Bromohexane)	146	1.4832 <sup>25</sup>	1.1658			91-2					
20	<i>n</i> -Hexyl bromide	155, 157	1.448	1.175	157	106	69	127, 119		74	97	
21	Cyclohexyl bromide	165	1.495	1.336		188	146	153				
22	<i>n</i> -Heptyl bromide	180, 174	1.451	1.140	142	95	57	118		82	101	
23	Benzyl bromide	198		1.438	188	166	117	119	123	130	178, 182	
24	<i>n</i> -Octyl bromide	201, 204	1.453	1.112	134	91	57	109		78	98	
25	$\alpha$ -Phenylethyl bromide	205					133					
26	$\beta$ -Phenylethyl bromide	218	1.556	1.359			97	169	84			
27	<i>n</i> -Nonyl bromide	220	1.454	1.090	131			109		86	92	
28	$\beta$ -Bromostyrene	221				217	115	91				
29	<i>n</i> -Dodecyl bromide (Lauryl bromide)	130 <sup>6</sup>	1.458	1.038				108				
30	<i>n</i> -Tetradecyl bromide	179 <sup>20</sup>	1.460	1.017						94	104	m p 5

\*Derivative data given in order m p, crystal color, solvent from which crystallized

**TABLE V. ORGANIC DERIVATIVES OF HALIDES**

**A) Alkyl and cycloalkyl halides 3. Iodides**

**a) Liquids (Listed in order of increasing atmospheric b.p.)\***

No	Name	Boiling point, °C	$n_D^{20}$	$D_4^{20}$	S-Alkyl thuronium picrate	1-Naphthyl amide	Anilide	Alkyl mercuric halide	Picrate of 2-naphthyl ether	2,4-Dinitrophenyl thioether	2,4-Dinitrophenyl sulfone	Miscellaneous
1	Methyl iodide	43	1.532	2.282	224	160	114	152, 145	117	128	185, 189	
2	Vinyl iodide	56					104					
3	Ethyl iodide	72	1.514	1.940	188	126	104	186, 182	104	115	156, 160	
4	Isopropyl iodide	90	1.499	1.703	196, 148		103		92	95	140	
5	<i>n</i> -Propyl iodide	102-3	1.505	1.743	181, 176	121	92	113	75	84	126	
6	Allyl iodide	103	1.578	1.777	155	121	114	112	99			
7	<i>tert</i> -Butyl iodide	103, 98			188	147	128					
8	<i>sec</i> -Butyl iodide	120	1.499	1.592	190, 166	129	108		85	66	120	
9	Isobutyl iodide	120	1.496	1.602	174, 167	125	109	72	84	76	105	
10	<i>tert</i> -Amyl iodide	128		1.479		138	92					
11	<i>n</i> -Butyl iodide	130	1.499	1.616	180, 177	112, 110	63	117	67	66	92	
12	2-Pentyl iodide	142	1.496	1.510			93					
13	3-Pentyl iodide	142	1.497	1.511			124					
14	Isoamyl iodide	148	1.493	1.503	179, 173	111	108	122	94	80	124	
15	<i>n</i> -Amyl iodide ( <i>n</i> -Pentyl iodide)	155	1.496	1.512	154	112	96	110	67	80	83	
16	Cyclopentyl iodide	166-7	1.5447	1.7096								
17	Cyclohexyl iodide	179, sl d		1.626 $\frac{1}{3}$		188	146					
18	<i>n</i> -Hexyl iodide	179	1.493	1.437	157	106	69	110		74	97	
19	<i>n</i> -Heptyl iodide	204	1.490	1.373	142	95	57	103		82	101	
20	<i>n</i> -Nonyl iodide	220			131					86	92	
21	<i>n</i> -Octyl iodide	225-6	1.489	1.330	134					78	98	

\*Derivative data given in order m p, crystal color, solvent from which crystallized

**TABLE V. ORGANIC DERIVATIVES OF HALIDES**

**B) Dihalides and polyhalides (non-aromatic)**

**1. Fluorides (Listed in order of increasing atmospheric b.p.)\***

No	Name	Boiling point °C	$n_D^{20}$	$D_4^{20}$	Miscellaneous
1	Perfluorocyclopentane	22		1.648 <sub>4</sub> <sup>25</sup>	m p 10
2	1,3-Difluoropropane	41.2	1.3190 <sup>26</sup>	1.0057 <sub>4</sub> <sup>25</sup>	
3	Perfluorocyclohexane	50			m p 49
4	Perfluoro- <i>n</i> -hexane	57	1.2515 <sup>22</sup>	1.6995 <sub>4</sub> <sup>25</sup>	
5	Perfluoro-2-methylpentane	58	1.2564 <sup>22</sup>	1.7326	
6	Perfluoro- <i>n</i> -heptane	84	1.2770	1.801 <sub>4</sub> <sup>25</sup>	
7	Perfluoro- <i>n</i> -nonane	127	1.2865 <sup>25</sup>	1.860 <sub>4</sub> <sup>25</sup>	
8	Perfluoro- <i>n</i> -decane	150	1.2890 <sup>25</sup>	1.873 <sub>4</sub> <sup>25</sup>	m p 36
9	Perfluoro- <i>n</i> -undecane (Perfluoro- <i>n</i> -hendecane)	161	1.2960 <sup>25</sup>	1.919 <sub>4</sub> <sup>25</sup>	m p 57

\*Derivative data given in order m p , crystal color, solvent from which crystallized

**TABLE V. ORGANIC DERIVATIVES OF HALIDES**

**B) Dihalides and polyhalides (non-aromatic)**

**2. Chlorides a) Liquids (Listed in order of increasing atmospheric b.p.)\***

No	Name	Boiling point, °C	$n_D^{20}$	$D_4^{20}$	Miscellaneous
1	Dichloromethane (Methylene chloride)	41	1.4237	1.336	6-Nitro-2-mercaptobenzothiazole deriv., 232-3. Di-(2-naphthyl) ether, 133 S-Alkyl bis-(thiuronium picrate), 267
2	<i>trans</i> -1,2-Dichloroethylene	48	1.452	1.2569	Br <sub>2</sub> → dibromo deriv., 190-5
3	1,1-Dichloroethane	57	1.4164	1.175	1,1-Di-(1-naphthyl) ether, 117
4	<i>cis</i> -1,2-Dichloroethylene	60	1.4428 <sup>45</sup>	1.282	Br <sub>2</sub> → dibromo deriv., 190-5
5	Chloroform	61	1.446	1.489	Gives carbylamine test with primary amines
6	2,2-Dichloropropane	70	1.4117	1.093	
7	1,1,1-Trichloroethane	74	1.4380	1.349	
8	Carbon tetrachloride	77	1.4630	1.595	
9	Ethylene dichloride (1,2-Dichloroethane)	84	1.4443	1.256	1,2-Di-(2-naphthyl) ether, 217
10	1,1,2-Trichloroethylene	87	1.4773	1.464	HgO + NaOEt + KCN in al shaken 1 hr at 40-60 → mercury bis-(trichloroethylene), Hg(-CCl=CCl <sub>2</sub> ) <sub>2</sub> , 83, eth
11	1,2-Dichloropropane	96	1.4388	1.155	1,2-Di-(2-naphthyl) ether, 152. 1,2-Diphenyl ether, 32
12	1-Bromo-2-chloroethane	106-7			6-Nitro-2-mercaptobenzothiazole deriv., 202-3. Di-(2-naphthyl) ether, 217
13	1,1,2-Trichloroethane	114	1.4707	1.443	
14	1,1,2,2-Tetrachloroethylene (Perchloroethylene)	121	1.5055	1.623	With paraformaldehyde + conc H <sub>2</sub> SO <sub>4</sub> → α,α-dichloro-β-hydroxypropionic acid, 88-9
15	1,2-Dichlorobutane	123-4	1.440		6-Nitro-2-mercaptobenzothiazole deriv., 164-5
16	1,3-Dichloropropane	125	1.449	1.189 <sup>18</sup> 1.177 <sup>27</sup>	1,3-Di-(1-naphthyl) ether, 103-4. 1,3-Di-(2-naphthyl) ether, 148-9. 1,3-Diphenyl ether, 60
17	1,3-Dichloro-2-methylpropane	135-6	1.4627 <sup>19</sup>	1.131 <sup>20</sup>	
18	1-Bromo-3-chloropropane	143-4	1.4861	1.594	1,3-Di-(1-naphthyl) ether, 103-4. 1,3-Di-(2-naphthyl) ether, 148-9. 1,3-Diphenyl ether, 60
19	1,1,2,2-Tetrachloroethane	146	1.4942	1.600	
20	1,2,3-Trichloropropane	158	1.4585	1.417	
21	Pentachloroethane	161	1.504	1.681	
22	Benzalchloride	207, 214	1.5515	1.295 <sup>16</sup>	Oxid → benzoic acid, 122. Hydrolysis → benzaldehyde, 2,4-Dinitrophenylhydrazone, 237. Semicarbazone, 222
23	Benzotrichloride	221		1.374 <sup>17</sup> 1.399 <sup>15</sup>	Hydrolysis → benzoic acid, 122
24	2-Chlorobenzalchloride (2-Chlorobenzylidene chloride)	228-9	1.5670 <sup>16</sup>	1.399 <sup>15</sup>	Oxid → 2-chlorobenzoic acid, 141. Hydrolysis → 2-chlorobenzaldehyde, 2,4-dinitrophenylhydrazone, 213-209
25	3-Chlorobenzalchloride (3-Chlorobenzylidene chloride)	237-40			Oxid → 3-chlorobenzoic acid, 158. Hydrolysis → 3-chlorobenzaldehyde, 2,4-dinitrophenylhydrazone, 256-248
26	4-Chlorobenzalchloride (4-Chlorobenzylidene chloride)	237			Oxid → 4-chlorobenzoic acid, 240. Hydrolysis → 4-chlorobenzaldehyde, 47. 2,4-dinitrophenylhydrazone, 265

\*Derivative data given in order m p, crystal color, solvent from which crystallized

**TABLE V. ORGANIC DERIVATIVES OF HALIDES**  
**B) Dihalides and polyhalides (non-aromatic)**  
**3. Bromides a) Liquids (Listed in order of increasing atmospheric b.p.)\***

No	Name	Boiling point, °C	$n_D^{20}$	$D_4^{20}$	Miscellaneous
1	Dibromomethane (Methylene bromide)	98-9	1 538	2 496	6-Nitro-2-mercaptobenzothiazole deriv , 232 3, S-Alkyl bis-(thiuronium picrate), 267
2	1,1-Dibromoethane	112	1 5128	2 055	6-Nitro-2-mercaptobenzothiazole deriv , 145 6 1,1-Di-(1 naphthyl) ether, 117
3	1,2-Dibromoethane	132	1 5379	2 179	m p 10, 6-Nitro-2-mercaptobenzothiazole deriv 201 2 1,2-Di-(2-naphthyl) ether 217
4	DL-1,2-Dibromopropane	141-2	1 5203	1 933	6-Nitro-2-mercaptobenzothiazole, 194 5, 1 2-Di-(2-naphthyl) ether, 152, 1,2-Diphenyl ether, 32
5	1,2-Dibromo-2-methylpropane	149	1 512	1 783	
6	1,2-Dibromo-1-butene	150		1 887	
7	Bromoform	150-1	1 598	2 890 <sup>o</sup>	m p 8
8	1,3-Dibromopropene	156	1 538 <sup>25</sup>	2 097 <sup>o</sup>	
9	1,1-Dibromo-2-methylpropene	156 7	1 530	1 866 <sup>25</sup>	
10	2,3-Dibromobutane	157	1 515	1 792	
11	1,2-Dibromobutane	166		1 820	6-Nitro-2-mercaptobenzothiazole deriv , 164 5
12	1,3-Dibromopropane	167 8	1 523	1 982	1,3-Di-(1-naphthyl) ether, 103-4 1 3 Di-(2-naphthyl) ether 148 9 1,3-Diphenyl ether, 60
13	1,3-Dibromo-2-butene	168-9	1 548	1 877	
14	1,3-Dibromobutane	174	1 507	1 820 <sup>o</sup>	
15	1,1,2-Tribromoethane	189	1 5933	2 6211	
16	1,4-Dibromobutane	197-8		1 847 <sup>o</sup>	<i>p</i> -toluidine (3 moles) $\xrightarrow{\text{heat}}$ N-4 tolylpyrrolidine, 42 dil al
17	1,2,3-Tribromopropane	220	1 582	2 402	
18	1,5-Dibromopentane	221	1 514 <sup>15</sup>	1 694 <sup>25</sup>	6-Nitro-2-mercaptobenzothiazole deriv , 132 3 S-Alkyl bis-(thiuronium picrate) 247
19	1,1,2,2-Tetrabromoethane	243-4	1 638	2 967	
20	1,8-Dibromooctane	270-2	1 501 <sup>15</sup>	1 468 <sup>15</sup>	m p 15-6, S-Alkyl bis-(thiuronium picrate), 214
21	1,9-Dibromononane	285-8		1 415 <sup>15</sup>	m p -2 5, S-Alkyl bis-(thiuronium picrate), 193

\*Derivative data given in order m p , crystal color, solvent from which crystallized

**TABLE V. ORGANIC DERIVATIVES OF HALIDES**

**B) Dihalides and polyhalides (non-aromatic)**

**4. Iodides a) Liquids (Listed in order of increasing atmospheric b.p.)\***

No	Name	Boiling point, °C	$n_D^{20}$	$D_4^{20}$	Miscellaneous
1	<b>Di-iodomethane</b> (Methylene iodide)	181	1.7425	3.325	6-Nitro-2-mercaptobenzothiazole deriv., 232-3, Di-(2-naphthyl) ether, 133, S-Alkyl bis-(thiuronium picrate), 267
2	<b>1,3-Di-iodopropane</b>	224	1.6423	2.5755	1,3-Di-(1-naphthyl) ether, 103-4, 1,3-Di-(2-naphthyl) ether, 148-9, 1,3-Diphenyl ether, 60

\*Derivative data given in order m.p., crystal color, solvent from which crystallized