

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
a) Liquids 1) Listed in order of increasing atmospheric b.p.*

No	Name	Boiling point, °C	Melting point °C	n _D ²⁰	Semi-carbonyl	2,4-Dinitrophenylhydrazone	p-Nitrophenylhydrazone	Phenylhydrazone	Oxime	Dimethylone deriv (Dimedone deriv)	Dimethylone anhydride	Miscellaneous	o-Dianisidine spot test		
													Cold	Hot	Limit γ
1	Formaldehyde (Methanal)	-21	-91		169	167, yel al	181 2, yel, bz	145	oil	189, al, 191 4			pa yel	or br	50
2	Trifluoroacetaldehyde	-20				151									
3	Acetaldehyde (Ethanal)	20 2	-123 5	1 3392 ¹⁸ , 1 3316	162 3	stable 168, al unstable 157, mixture 148	128 5	57, 99	47	139, al	175-6, al	Thiosemicarbazone, 146	or	dk br	30
4	Propionaldehyde (Propanal)	48 9	-81	1 364	89, bz-lgr, 154, w	148, or, 150, red, 155	125, yel, 50% al	oil	40	154 6, al	143	Picrate, 156-7	dk ol gn	red	20
5	Glyoxal	50	15		270	328	311	180	178	mono 186, di 228	mono 224	Phenylsazone, 169-70			
6	Acrolein (Acraldehyde)	52 4	-87 7	1 4025	171, w	165	150-1	50 1, hot lgr, pyrazoline		192, 50% al	163, al		red br	vlt br	0 1
7	Propynal (Propargyl aldehyde)	55										Cu deriv, 160			
8	2,2,2-Trifluoropropionaldehyde	56 ⁷⁴⁵				151									
9	Isobutyraldehyde	64	-65 9	1 3730	125 6	187, or-yel, al, 182	130 1, or-yel, al	oil	oil	154	144				
10	2-Methyl-2-propenal (Methacrolein)	73 5		1 4191	198	206		74, pyrazoline							
11	n-Butyraldehyde (Butanal)	74 7	-97 1	1 38433	95 5, lgr, 106	123, al	87, yel, al, 93 5, red	93 5	b p 152 ⁷¹⁵	134, 142	141				
12	Trimethylacetaldehyde (Pivaldehyde)	75	3, 6	1 3791	190	210, yel			41						
13	Chloroacetaldehyde	85-6				134-5d, 148, al			oil						
14	2-Chloropropionaldehyde	86		1 431 ¹⁷								Hydrate, b p 80 5-81			
15	Dichloroacetaldehyde	89 5-90 5				155-6, using only 1 equivalent of reagent			b p 67-9 ¹⁷ , using only 1 equivalent of reagent						

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

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES

a) Liquids 1) Listed in order of increasing atmospheric b.p.* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	Semi-carbazone	2,4-Di-nitro-phenyl-hydrazone	p-Nitro-phenyl-hydrazone	Phenyl-hydrazone	Oxime	Dimeth-one deriv (Dime done deriv)	Dimeth one anhy dride	Miscel-laneous	o-Dianisidine spot test				
													Cold	Hot	Limit, γ		
16	Methoxyacetaldehyde	92		1.3950		124.5	115										
17	3-Methylbutanal (Isovaleraldehyde)	92.5	-51	1.39225	107	123, yel - or, al	110.1, al	oil	48.5	154-5, al	173 (cor)	Thio-semicarbazone, 52.3					
18	2-Methyl-1-butanal (α-Methylbutyraldehyde)	92-3	20, tri-	1.3942	103.5, bz - pet eth	120											
19	Trichloroethanal (Chloral, Trichloroacetaldehyde)	98	-57.5	1.45572	90d	131	131, yel		56			Hydrate, 51.7					
20	Pentanal (Valeraldehyde)	103.4	-91.5	1.3947		98, yel, al, 107			52, pet eth	104.5	113	Thio-semicarbazone, 65					
21	tert-Butylacetaldehyde	103		1.4150		147											
22	2-Butenal (Crotonaldehyde)	104	-69	1.4362 ^{20.5}	199	190, crim, bz - lt pet	184.5	56	119	183	163, sint, 167	Phenyl-semicarbazone, 126-7	dk red	dk br - red		2	
23	Dimethylethylacetaldehyde	104															
24	Ethoxyacetaldehyde	106		1.3956		116.7, me al	113.4, al										
25	2-Isopropylacrolein	107.9		1.4223		165											
26	2-Butynal	105		1.446 ¹⁹		136											
27	Methylisopropylacetaldehyde	114		1.3998 ²⁵		124											
28	2-Bromoisobutyraldehyde	115		1.4518 ²⁵								Decomposes in w					
29	Diethylacetaldehyde (2-Ethylbutyraldehyde)	116-117		1.4025	99, bz - lt pet	95, pa - or, lt pet, 129, 30, al				102, me al							
30	Methyl-n-propylacetaldehyde	116 ⁷³⁷			102	103											
31	2-Methyl-2-butenal	116.9			216												
32	n-Propoxyacetaldehyde	119 ⁷⁴⁸				86											
33	Isobutylacetaldehyde (Isocaproaldehyde)	121 ⁷⁴³			127	99			b p 103 ³⁵								
34	Paraldehyde (Acetaldehyde trimer)	124.4 ⁷⁵²	12.6	1.4049								Dilute acid → Acetaldehyde, b p 20.2	dk ol grn	dk red br		4	
35	2-Pentenal	125			180		123										
36	3-Methoxyisobutyraldehyde	129		1.4030 ²⁷		102											

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

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
a) Liquids 1) Listed in order of increasing atmospheric b.p.* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	Semi carba zone	2,4-Di nitro phenyl hydra zone	p Nitro phenyl hydra zone	Phenyl hydra zone	Oxime	Dimeth one deriv (Dime done deriv)	Dimeth one anhy dride	Miscel laneous	o-Dianisidine spot test		
													Cold	Hot	Limit γ
37	3-Chloropropion-aldehyde	130-1		1 475 ¹⁵								Trimer 35.5, dil HCl-abs al b p 170 5 ¹²⁻⁵			
38	Hexanal (Capro-aldehyde)	131		1 4068	106, bz - pet eth	104, or - yel			51, pet eth me al	108.5, dil al		Phenyl-semicarbazone, 135-6			
39	Ethylisopropylacet-aldehyde	133.5		1 4086 ²⁵		121									
40	3,3-Dimethyl-pentanal	134		1 4292		102									
41	3-Methyl-2-butenal (3-Methylcroton-aldehyde)	135		1 4526	223	182									
42	Cyclopentanecarboxaldehyde	136			124										
43	2-Methylpenten-2-al-1 (3-Ethyl-2-methylacrolein)	136.8		1 4488	207	159, red al		58-60	48-48.8						
44	Tetrahydrofurfural	142-3 ⁷⁹		1 4473 1 43658	166	134						Conc HCl → brt red col α Benzyl-α phenyl hydra zone 67 me al			
45	5-Methylhexanal	144 ⁷⁵⁰		1 4114	117	117									
46	3-Furaldehyde	144 ⁷³²		1 4945	211			149.5							
47	1-Cyclopentenyl-formaldehyde	146		1 4828 ²¹	208			188							
49	2-Chloro-2-butenal (2-Chlorocroton-aldehyde)	147-50		1 478 ²³								Cyano-hydrin b p 137.8 ²⁶ , n _D ²⁰ 1 4762			
50	2-Hexenal	150		1 4470 ¹³	176			139							
51	3-Hexenal	150			147										
52	Heptanal (Enanth-aldehyde)	155	-45	1 4125	109, al	108, yel, al	73		57	135	112		red-br	red	9
53	Ethylisobutylacet-aldehyde	155			98										
54	Di-n-propylacetaldehyde	161		1 4142 ¹⁵	101				b p 126 ⁴⁷						

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

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
a) Liquids 1) Listed in order of increasing atmospheric b.p.* (Continued)

No	Name	Boiling point, °C	Melting point °C	n _D ²⁰	Semi-carbazon	2,4-Dinitrophenylhydrazone	p Nitrophenylhydrazone	Phenylhydrazone	Oxime	Dimeth one deriv (Dime done deriv)	Dimeth one anhydride	Miscellaneous	o-Dianisidine spot test		
													Cold	Hot	Limit, γ
55	2-Furancarboxaldehyde (Furfural)	161.7	-36.5	1.52608	202	212.4, yel, 230 (cor), red, mixture 185	54	97	α 75-6, pet eth, β 91.2, al	160d	162.5	Phenylsemicarbazone, 180.1	dk red-vlt	dk bl-vlt	0.02
56	Hexahydrobenzaldehyde	162		1.4495 ¹⁹	173, 176, w	172			90-1, pet eth			Oxime-HCl, 107-8d			
57	2-Ethylhexanal-1 (n-Butylethylacetaldehyde)	163		1.4150	254d	114.5, dil al, 120.1, yel, al									
58	2,2,3-Trichloro-n-butylaldehyde (n-Butylchloral, Crotonchloral)	164.5 5.5		1.47554					65			NH ₃ → Butylchloral ammonia, 62			
59	Butanedial (Succinaldehyde)	169-70d		1.4254		280			di 172			Polymer, 65			
60	Octanal (n-Octaldehyde Caprylaldehyde)	171		1.42167	98, dil me al 101	106, yel, al, 96	80, brt yel		60, me al	90, dil al	101	Thiosemicarbazone, 94-94.5			
61	2-Ethyl-3-n-propylacrolein	173		1.4518 ²²	150.1, 153	124.5, 122									
62	3-Fluorobenzaldehyde	173					202	114	63						
63	2,2,2-Tribromoethanal (Bromal)	174, yel							115			Monohydrate, 53.5	no reac	dk grn	40
64	4-Fluorobenzaldehyde	174.5 ⁵²					212	147	syn 116.7, anti 86						
65	2-Fluorobenzaldehyde	175	-44.5				205	90	63						
66	Benzaldehyde	179	-26, fp -55.6	1.5446	222, 233-5, r htng	237, or, al	190, red, al 234, 6, 262	158, 154.5	α 35 (stable) β 130, eth 64, pet eth	193	200	Phenylsemicarbazone, 180.1	or	red-or	3
67	Nonanal (Pelargonaldehyde)	185		1.4273	100.84, me al	100 (cor), yel, al						Phenylsemicarbazone, 131.2			
68	5-Methylfurfural	187		1.5147 ²⁵	211*	212 (cor)	130, red	147-8	syn 112, anti 51-2						
69	Glutaraldehyde	187-9d		1.4330 ²⁵			169		di 175, 178, w						
70	Phenylethanal (Phenylacetaldehyde)	194	33	1.53191	153, dil al, 156	121, grn-yel, al, 110		58, lgr, 62-3	97-8, eth, 100	165	126		dk br-red	dk br	polym

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

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES

a) Liquids 1) Listed in order of increasing atmospheric b.p.* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	Semi carb zone	2,4-Di nitro phenyl hydra zone	p Nitro phenyl hydra zone	Phenyl hydra zone	Oxime	Dimeth one deriv (Dime done deriv)	Dimeth one anhy dride	Miscel laneous	o-Diamidine spot test		
													Cold	Hot	Limit, γ
71	2-Hydroxybenzaldehyde (Salicylaldehyde)	197 (cor)	-7, f p 16	1.574	231	248, red, abs al 252d, lt red, ac a 242	227, red-br, al	142	57.63		208, 70% al	p-Nitrobenzoate, 128	or	or	5
72	2-Thiophenecarboxaldehyde	198		1.5950 ¹⁶				119 139							
73	3-Methylbenzaldehyde (3-Tolu-aldehyde)	199		1.5413 ²¹	204 223 4	212, 194	157	91, lgr, 84	60, lgr	172	206		dk or-red	ch red	5
74	2-Methylbenzaldehyde (2-Tolu-aldehyde)	200		1.5481	209 al, 212, 218	193 4, red, ac a	222, red, al	101, 105 6, 111	49	167	215		dk or-red	ch red	5
75	4-Methylbenzaldehyde (4-Tolu-aldehyde)	204 5		1.5454	234, al, 215	232 5 4 5 (cor) or-yel al PhNO ₂	200 5 (cor), dk red, ac a	112-3, al, 121	79-80, 110				dk or-red	ch red	5
76	d-Citronellal (d-Rhodinal)	207		1.4485	83-4, chl, ppt by lgr 91 2	78, yel, al			oil	77 9, dil al	173		dk grn	brt red	10
77	Decanal (Capraldehyde)	207-9		1.4287	102	104, yel			69, dil me al	91 7, dil al		Thio-semicarbazone, 99-100	pa ol	dk br	200
78	2-Chlorobenzaldehyde	213-4	11	1.56708	146, yel, 225, pyr, 229-30, me al	213 6 (cor), 209, or red, xyl	237 8, red, al, 241, br-red, 249, or	86	α 75-6, al, β 101 3	205d, al	224 6 (cor), al				
79	Phenoxyethanal (Phenoxyacetaldehyde, Glycolaldehyde phenyl ether)	215d		1.5380 ²¹	145			86, pa yel, al	95, pet eth						
80	3,5-Dimethylbenzaldehyde	220-2	9	1.5385	201 2							Oxid → acid, 170, al			
81	3-Phenylpropionaldehyde (Hydrocinnamaldehyde)	224			127, al	149, yel, al	122 3, yel, dil al		93-4 5, dil al 97 (cor)						
82	Citral a. (Geranial)	228d		1.48752	164, me al	108-10, red-or al, 116			143 5				dk red	red blk	0 1
83	Citral b. (Neral)	228d		1.4900	HCl 171, mixture 132, NaOAc	96, red-or, al							dk red	red blk	0 1

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

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
a) Liquids 1) Listed in order of increasing atmospheric b.p.* (Continued)

No	Name	Boiling point, °C	Melting point °C	n _D ²⁰	Semi carbazone	2,4-Di-nitro-phenyl-hydrazone	p-Nitro-phenyl-hydrazone	Phenyl-hydrazone	Oxime	Dimeth-one deriv (Dime-done deriv)	Dimeth-one anhy dride	Miscel-laneous	o-Dianisidine spot test			
													Cold	Hot	Limit γ	
84	2,6-Dimethylbenzaldehyde	228 ⁷⁴²	11		158											
85	3-Methoxybenzaldehyde (3-Anisaldehyde)	230	3-4	1.5538	233d		171	76	39-40 pet eth. 112			Phenylthio-semicarbazone, 153	dk or	red br	0.4	
86	3-Bromobenzaldehyde	234-6			205		220	141	72							
87	4-Isopropylbenzaldehyde (Cumaldehyde)	236		1.5301	211, me al	241, red bz., 243, red, ac a., 244.5, al-chl	190, al	129, al	α 52, al β 111	170-1, al	172-3		dk red	ol yel	3	
88	3-Ethoxybenzaldehyde	245-5		1.5408												
89	4-Methoxybenzaldehyde (4-Anisaldehyde)	248	2-5	1.5731	210, 203	253-4d, red, ac a., 250, red, xyl	160, red-vlt	120-1, wh, dil al	α' 64-5, bz α 4-5 (from α' on fusion) β 133, bz	144-5 (cor), al	243 (cor), al		dk or	red-br	0.4	
90	3-Phenylpropenal (Cinnamaldehyde)	252d	-7-5	1.61949	215-6 w	255d, red, ac a	195, red, al	168, yel, dil al	α 64-5, lgr, β 138-5, bz	213 (cor), al	175, al		dk ch red	ch red	0.05	
91	4-Ethoxybenzaldehyde	255, 249	13-4		202d, al, 208				syn 157 anti 118							
92	3,4-Diethoxybenzaldehyde (Protocatechualdehyde diethyl ether)	277-80							98			Oxid → acid, 165				
93	Diphenylacetaldehyde	315-6d			162				α 120, β 106			Oxid → Benzophenone 48				

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

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
a) Liquids 2) Reduced pressure b.p. only (listed in order of increasing semicarbazone m.p.)*

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	Semi carba zone	2,4-Di nitro phenyl hydra zone	p Nitro phenyl hydra zone	Phenyl hydra zone	Oxime	Di meth one deriv (Dime done deriv)	Di meth one anhy dride	Miscellaneous	o-Dianisidine spot test				
													Cold	Hot	Limit γ		
1	7-Methyloctanal	94 ¹²⁰			80	100											
2	3-(2-Furyl)propionaldehyde	70 ¹⁴		1.4470	80												
3	2-Methyloctanal	83 ²⁰			80												
4	2,3-Dichloro-n-butyr-aldehyde	58 60 ²⁰		1.4618 ²¹	96.7				oil								
5	Octanal (n-Octaldehyde)	81 ³²		1.4217	98.101	106 yel	80		59.60	89.8							
6	Undecanal (n-Decanal)	120 ²⁰	-4	1.4324 ²³	103 me al	104 yel			72 wh me al			Timer 47.8					
7	Tridecanal (n-Tridecylaldehyde)	136 ⁸	15		106 al	108			80.5 dil al			Trimer 61.5 eth					
8	2-Hydroxypropionaldehyde	114 ⁹			114 w		127										
9	2-n-Amylcinnamaldehyde (2-n-Pentylcinnamaldehyde Jasminaldehyde)	161 3 ¹⁷		1.5381	118	164 red al			74 al w								
10	2-Methyl-3-phenylpropionaldehyde	90 ⁹			123												
11	2-Hydroxy-2-methylhexanal (n-Butylmethylglycolaldehyde)	87.8 ⁵			143												
12	Phenoxyacetaldehyde	83		1.5360	146	138			95								
13	2-Ethyl-2-hexenal	73 ²⁰			152	125											
14	2-Ethyl-3-hexenal	84 ³²			156												
15	Cyclohexylacetaldehyde	58 ¹⁰		1.4509 ²⁵	159	125											
16	2-Nonenal	126 ²¹		1.4426	165	126	113										
17	2-Heptenal	85 ¹⁴		1.4314	169		116										
18	2,3,6-Trimethylbenzaldehyde	114 ¹⁰			169				126								
19	3,5-Dimethylhexahydrobenzaldehyde	71 ¹¹			171												
20	2-Hydroxy-2-phenylpropionaldehyde (Methylphenylglycolaldehyde)	101 ⁴			182.3												
21	2,4,6-Trimethylbenzaldehyde	98 ⁶ 128 ¹⁵		1.5524	188												
22	2-Hydroxy-2-phenylbutyraldehyde (Ethylphenylglycolaldehyde)	110 11			188												
23	2-Hydroxybutyraldehyde (Aldol)	83 ⁷			194		109.11 red yel dil al		syn 112 anti 51.2	146.8 30 ⁹ me al	126	4-Bromo phenylhydrazone 127.8					
24	1,2,3,4-Tetrahydro-2-naphthaldehyde	92 ¹			197												
25	2-(1-Naphthyl)propionaldehyde	132 ²			204												

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

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES

a) Liquids 2) Reduced pressure b.p. only (listed in order of increasing semicarbazone m.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	Semi carba zone	2,4 Di nitro phenyl hydra zone	p Nitro phenyl hydrazone	Phenyl hydra zone	Oxime	Di meth one deriv (Dime done deriv)	Di meth one anhy dride	Miscellaneous	o Dianisidine spot test			
													Cold	Hot	Limit γ	
26	1,6-Hexanedial (Adipic dialdehyde)	94 ¹² , 70 ^d		1.4350	di 206				di 185.6 w							
27	2-Methylcinnamaldehyde	124 ¹⁴		1.6057 ¹⁷	208, al - w											
28	Phenylglyoxal	108 ¹⁵			mono 208 9d yel al bis 229d		309					91 (mono hyd) w 2 Thio semicarba zone, 170 yel al				
30	Cyclohexenecarboxaldehyde	70 ¹¹		1.4921 ¹	213				99							
31	2-Phenoxybenzaldehyde	153 ¹			215											

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TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
a) Liquids 3) Miscellaneous; reduced pressure b.p. only (listed alphabetically)*

No	Name	Boiling point °C	Melting point, °C	n _D ²⁰	Semi carba zone	2,4 Di nitro phenyl-hydra-zone	p-Nitro-phenyl hydra-zone	Phenyl-hydra-zone	Oxime	Di meth one deriv (Dime done deriv)	Di meth-one anhy-dride	Miscellaneous	o Diamisidine spot test		
													Cold	Hot	Limit γ
1	2-Chloroacrolein	29 31 ¹⁷		1.463								Diethylacetal, b p 158-60			
2	4-Chloro- <i>n</i> -butyraldehyde	50 1 ¹¹		1.44662 ^{8,5}		134.5	110		74.5						
3	<i>d,l</i> -2,3-Dichloropropionaldehyde	48 ¹⁴		1.4762								Dimethylacetal, b p 78-82 ¹³ , n _D ¹⁸ 1.144			
4	2-Heptynal	54 ¹³		1.4521 ¹⁷		74									
5	2,4-Hexadienal (Sorbalddehyde)	65 ¹¹		1.5372 ²²				102	160						
6	4-Hydroxy- <i>n</i> -butyraldehyde	68 ⁸		1.4403		118									
7	3-Hydroxy-2-isopropylpropionaldehyde	84 ¹⁰				126									
8	3-Hydroxy-3-methyl- <i>n</i> -butyraldehyde	67 ¹³					142								
9	4-Methoxy-2-methyl- <i>n</i> -butyraldehyde	66 ⁵⁵		1.4280 ²⁵		88									
10	5-Methyl-2-thiophene-carboxaldehyde	114 ²⁵		1.5782 ²⁹				126							
11	3-Methyl-2-thiophene-carboxyaldehyde	114 ²⁵		1.5833 ²⁵				149							
12	4-Octenal	84 ¹³		1.4463 ²⁵		108									
13	Phenylpropargyl aldehyde	116 7 ¹⁷		1.6032 ²⁵					108, lgr						
14	2-Phenylpropionaldehyde	76 ⁴				135									
15	3-Pyridinecarboxaldehyde (Nicotinaldehyde)	99 ²⁶						158							
16	2,2,4-Trichloro- <i>n</i> -butyraldehyde		f p -78									HNO ₃ → acid, 73.5			
17	2,4,6-Trihydroxybenzaldehyde (Phloroglucinaldehyde)		d						195d, (hyd), w			2,4,6 Triacetate 156.7, al 2-Benzoate 198 200, chl			
18	4-Vinylbenzaldehyde (4-Formylstyrene)	93 ¹⁴		1.5960 ²⁵				131							

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