been reported, the lowest apparently reliable one has been taken, after due consideration has been given to the size of the apparatus, the composition of the surface that came into contact with the heated mixture, and the method used to determine the ignition temperatures.

C. IGNITION TEMPERATURES IN AIR AND OXYGEN

From an industrial standpoint the minimum ignition temperatures of combustibles in air are what is desired, although occasionally their ignition temperatures in pure oxygen are desired. It is also of interest to compare the ignition temperatures of combustibles in both air and oxygen, since numerous references dealing with ignition temperatures have reported results in which the ignition temperatures in oxygen were sometimes higher than in air. Such reported results appear very unusual because combustibles heated in pure oxygen to reaction temperatures should react and oxidize at a higher rate and therefore ignite at a lower temperature in oxygen than in air.

The results given in Table 4, based on studies that were carried out under similar conditions, prove rather conclusively that combustibles have lower ignition temperatures in oxygen than in air.

III. Flash Points

The flash point may be defined as the minimum temperature at which a liquid gives off vapor sufficient to form a flammable mixture in contact with air. It is a rather rough yet quick way of measuring the relative combustibility of volatile liquids and, in turn, determines the approximate temperature below which combustibles may be stored and used without creating explosive atmospheres. In general, the higher the flash point of a liquid, the greater its safety in respect to fires and explosions. It should be emphasized, however, that the flash point alone

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TABLE 4

Ignition Temperatures of Combustible Gases and Vapors in Air and Oxygen

		Minimum ignition temperatures					
		In air			In oxygen		
Name	Formula	° F.	° C.	Ref. no.	° F.	° C.	Ref. no.
Acetal	$C_6H_{14}O_2$	446	230	73	345	174	73
Acetaldehyde	C_2H_4O	349	176	74	221	105	74
Acetic acid	$C_2H_4O_2$	1022	550	73	914	490	73
Acetic anhydride	$C_4H_6O_3$	738	392	76	682	361	76
Acetone	C_3H_6O	1042	561	77	905	485	73
Acrolein	C_3H_4O	453	234	30	439	226	30
Acrylonitrile	C_3H_3N	898	481	47	860	460	47
Allyl alcohol	C_3H_6O	712	378	80	658	348	73
Allylamine	C_3H_7N	705	374	30	586	308	30
Allyl bromide	C_3H_5Br	583	295	30	516	269	30
Allyl chloride	C_3H_5Cl	909	487	73	759	404	73
Amyl acetate	$C_7H_{14}O_2$	676	358	10	453	234	10
Benzoic acid	$C_7H_6O_2$	1064	573	73	1033	556	73
Benzyl alcohol	C_7H_8O	802	428	80	704	373	82
1,3-Butadiene	C_4H_6	784	418	73	635	335	73
Butane	C_4H_{10}	761	405	75	542	283	73
Isobutane	C_4H_{10}	864	462	10	606	319	10
Butene-1	C_4H_8	723	384	10	590	310	10
Butyl alcohol	$C_4H_{10}O$	653	345	80	622	328	82
Isobutyl alcohol	$C_4H_{10}O$	813	434	80	687	364	86
sec-Butyl alcohol	$C_4H_{10}O$	763	406	75	711	377	73
tert-Butyl alcohol	$C_4H_{10}O$	892	478	73	860	460	73
Butylamine	$C_4H_{11}N$	594	312	31	536	280	31
Isobutylamine	$C_4H_{11}N$	712	378	75	626	330	10
Butylbenzene	$C_{10}H_{14}$	774	412	75	527	275	30
Isobutylbenzene	$C_{10}H_{14}$	802	428	75	588	309	30
sec-Butylbenzene	$C_{10}H_{14}$	784	418	75	700	371	30
Butyl formate	$C_5H_{10}O_2$	633	334	31	540	282	31
Butyraldehyde	C_4H_8O	446	230	73	403	206	73
Carbon disulfide	CS_2	248	120	88	225	107	88
Carbon monoxide	CO	1130	610	89	1090	588	106
Cyanogen	C_2N_2	1562	850	92	1492	811	92
Cyclohexane	C_6H_{12}	500	260	75	489	254	30
Cyclopropane	C_3H_6	928	498	68	849	454	68
Decane	$C_{10}H_{22}$	406	208	75	396	202	30
o-Dichlorobenzene	$C_6H_4Cl_2$	1198	648	31	1123	606	31
1,2-Dichloro-n-butane	$C_4H_8Cl_2$	529	276	73	482	250	73
Diethylamine	$C_4H_{11}N$	594	312	31	554	290	31
1,4-Diethylbenzene	$C_{10}H_{14}$	806	430	75	590	310	38
3,3-Diethylpentane	C_9H_{20}	554	290	75	432	222	38
Dimethylamine	C_2H_7N	756	402	73	655	346	73
2,2-Dimethylbutane	C_6H_{14}	797	425	30	520	271	30
2,3-Dimethylbutane	C_6H_{14}	788	420	73	568	298	73

(continued)