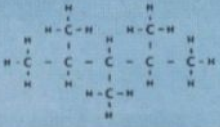
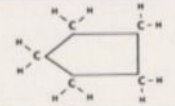
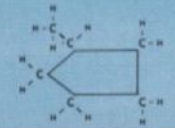
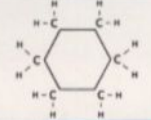
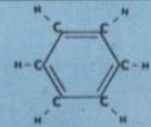
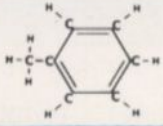
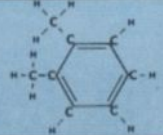
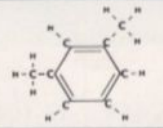


TYPE OF COMPOUND	NO.	COMPLETE NAME	STRUCTURE	PERCENT HYDROGEN	PERCENT CARBON	BOILING (7) POINT ° F.	REID VAPOR PRESSURE LB./SQ. IN.	LATENT HEAT OF EVAPORATION BTU PER LB.	FREEZING POINT ° F.	HEATING VALUE BTU PER LB. (1)	BTU PER U.S. GAL. AT 68° F.	SPECIFIC GRAVITY AT 68° F.	WEIGHT PER U.S. GAL. LB. AT 68° F.	KNOCK VALUE PERFORMANCE NUMBER (2)			
														NO LEAD		LEAD 4 ML.	
														LEAN	RICH	LEAN	RICH
PARAFFIN	1	NORMAL PENTANE		16.8	83.2	97	16	154	-201	19,300	101,000	0.626	5.23	41	41	63	63
PARAFFIN	2	ISO-PENTANE OR 2-METHYL BUTANE		16.8	83.2	82	22	146	-255	19,300	100,000	0.620	5.17	76	—	120	130
PARAFFIN	3	NEO-HEXANE OR 2,2-DIMETHYL BUTANE		16.4	83.6	122	10	133	-148	19,200	104,000	0.649	5.42	78	—	130	130
PARAFFIN	4	2,3-DIMETHYL BUTANE		16.4	83.6	136	8	138	-199	19,200	106,000	0.662	5.52	85	—	140	>160
PARAFFIN	5	NORMAL HEPTANE		16.1	83.9	209	1.7	138	-131	19,200	110,000	0.684	5.71	ZERO O.N.	ZERO O.N. (5)	50 O.N. (5)	50 O.N. (5)
PARAFFIN	6	2,4-DIMETHYL PENTANE		16.1	83.9	177	3.5	128	-183	19,100	107,000	0.673	5.62	62	62	95	95
PARAFFIN	7	TRIPTANE OR 2,2,3-TRIMETHYL BUTANE		16.1	83.9	178	3.6	125	-13	19,100	110,000	0.690	5.76	140	200	200	300
PARAFFIN	8	ISO-OCTANE (OCTANE) OR 2,2,4-TRIMETHYL PENTANE		15.9	84.1	211	1.8	117	-161	19,100	110,000	0.692	5.77	100	100	153	153
PARAFFIN	9	2,2,3-TRIMETHYL PENTANE		15.9	84.1	230	1.2	121	-170	19,100	114,000	0.716	5.98	100	120	150	>160 (6)
PARAFFIN	10	2,3,3-TRIMETHYL PENTANE		15.9	84.1	239	0.9	123	-151	19,100	116,000	0.726	6.06	100	120	150	>160

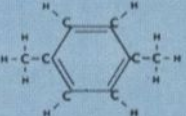
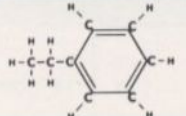
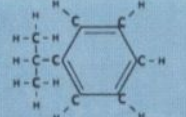
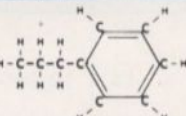
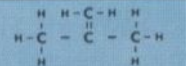
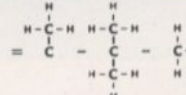
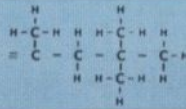
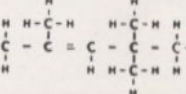
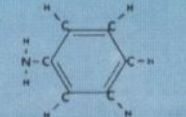
1. Lower heating value which does not allow for heat due to condensation of steam formed during combustion. 2545 BTU equals one horsepower hour.
2. Approximate values.
3. Current rich mixture knock test methods do not assign Performance Numbers to alcohols due to their low heats of combustion. However, alcohols, if tested at very high specific fuel consumptions, have very high Performance Numbers. When blended with water the three alcohols listed all have very high Performance Numbers and very high resistance to preignition.

4. Average maximum values. Straight-run gasoline used in Grade 73 may have a Performance Number of only 40 before the addition of lead (one ml.).
5. All values in Performance Numbers except normal heptane. Zero octane number corresponds to a Performance Number of about 22.
6. > 160 means above 160. < 75 means below 75.
7. At atmospheric pressure.

TYPE OF COMPOUND	NO.	COMPLETE NAME	STRUCTURE	PERCENT HYDROGEN	PERCENT CARBON	BOILING (7) POINT ° F.	REID VAPOR PRESSURE LB./SQ. IN.	LATENT HEAT OF EVAPORATION BTU PER LB.	FREEZING POINT ° F.	HEATING VALUE BTU PER LB. (1)	BTU PER U. S. GAL. AT 68° F.	SPECIFIC GRAVITY AT 68° F.	WEIGHT PER U. S. GAL. LB. AT 68° F.	KNOCK VALUE PERFORMANCE NUMBER (2)			
														NO LEAD		LEAD 4 ML.	
														LEAN	RICH	LEAN	RICH
PARAFFIN	11	2,3,4-TRIMETHYL PENTANE		15.9	84.1	236	1.0	123	-165	19,100	114,000	0.719	6.00	100	120	150	>160
CYCLIC PARAFFIN	12	CYCLOPENTANE		14.4	85.6	121	10.5	160	-137	18,800	117,000	0.745	6.22	65	>100	100	>160
CYCLIC PARAFFIN	13	METHYL CYCLOPENTANE		14.4	85.6	161	4.8	155	-224	18,800	118,000	0.749	6.25	58	—	88	140
CYCLIC PARAFFIN	14	CYCLOHEXANE		14.4	85.6	177	3.5	154	+44	18,800	122,000	0.767	6.50	55	—	84	130
AROMATIC	15	BENZENE OR BENZOL		7.6	92.4	176	3.4	169	+42	17,200	126,000	0.879	7.34	68	>160	68	>160
AROMATIC	16	TOLUENE OR TOLUOL		8.8	91.2	231	1.2	156	-139	17,400	126,000	0.867	7.23	93	>160	95	>160
AROMATIC	17	ORTHO-XYLENE		9.5	90.5	292	0.3	149	-13	17,600	129,000	0.880	7.34	85	85	100	100
AROMATIC	18	META-XYLENE		9.5	90.5	282	0.35	147	-54	17,600	127,000	0.864	7.21	100	>160	>100	>160

1. Lower heating value which does not allow for heat due to condensation of steam formed during combustion. 2545 BTU equals one horsepower hour
2. Approximate values
3. Current rich mixture knock test methods do not assign Performance Numbers to alcohols due to their low heats of combustion. However, alcohols, if tested at very high specific fuel consumptions, have very high Performance Numbers. When blended with water the three alcohols listed all have very high Performance Numbers and very high resistance to preignition.

4. Average maximum values. Straight-run gasoline used in Grade 73 may have a Performance Number of only 40 before the addition of lead (one ml.).
5. All values in Performance Numbers except normal heptane. Zero octane number corresponds to a Performance Number of about 22.
6. > 160 means above 160. < 75 means below 75.
7. At atmospheric pressure.

TYPE OF COMPOUND	NO.	COMPLETE NAME	STRUCTURE	PERCENT HYDROGEN	PERCENT CARBON	BOILING (7) POINT ° F.	REID VAPOR PRESSURE LB./SQ. IN.	LATENT HEAT OF EVAPORATION BTU PER LB.	FREEZING POINT ° F.	HEATING VALUE BTU PER LB. (1)	BTU PER U. S. GAL. AT 68° F.	SPECIFIC GRAVITY AT 68° F.	WEIGHT PER U. S. GAL. LB. AT 68° F.	KNOCK VALUE PERFORMANCE NUMBERS (2)			
														NO LEAD		LEAD 4 ML.	
														LEAN	RICH	LEAN	RICH
AROMATIC	19	PARA-XYLENE		9.5	90.5	281	0.35	146	+ 56	17,600	126,000	0.861	7.19	100	>160	>100	>160
AROMATIC	20	ETHYL BENZENE		9.5	90.5	277	0.4	146	- 139	17,600	127,000	0.867	7.24	93	>160	100	>160
AROMATIC	21	CUMENE OR ISOPROPYL BENZENE		10.1	89.9	306	0.2	134	- 141	17,700	128,000	0.862	7.19	78	>160	93	>160
AROMATIC	22	NORMAL PROPYL BENZENE		10.1	89.9	319	0.15	137	- 147	17,700	127,000	0.862	7.19	78	>160	93	>160
OLEFIN	23	ISO-BUTYLENE		14.4	85.6	20	65	169	- 221	19,400	96,000	0.594	4.96	—	—	—	—
OLEFIN	24	2,3,3-TRIMETHYL-1-BUTENE (TRIPTENE)		14.4	85.6	172	3.6	124	- 169	18,900	111,000	0.705	5.88	75	—	84	—
OLEFIN	25	DIISOBUTYLENE 2,4,4-TRIMETHYL-1-PENTENE		14.4	85.6	215	1.6	—	- 136	18,900	113,000	0.715	5.97	64	—	85	>160
OLEFIN	26	DIISOBUTYLENE 2,4,4-TRIMETHYL-2-PENTENE		14.4	85.6	221	1.4	—	- 160	18,900	114,000	0.721	6.02	64	—	85	>160
AROMATIC AMINE AND ANTIKNOCK	27	ANILINE		7.6	77.4	364	0.04	187	+ 21	15,000	128,000	1.022	8.53	—	—	—	—

- Lower heating value which does not allow for heat due to condensation of steam formed during combustion. 2545 BTU equals one horsepower hour
- Approximate values.
- Current rich mixture knock test methods do not assign Performance Numbers to alcohols due to their low heats of combustion. However, alcohols, if tested at very high specific fuel consumptions, have very high Performance Numbers. When blended with water the three alcohols listed all have very high Performance Numbers and very high resistance to preignition

- Average maximum values. Straight-run gasoline used in Grade 73 may have a Performance Number of only 40 before the addition of lead (one ml.).
- All values in Performance Numbers except normal heptane. Zero octane number corresponds to a Performance Number of about 22.
- > 160 means above 160. < 75 means below 75.
- At atmospheric pressure.

TYPE OF COMPOUND	NO.	COMPLETE NAME	STRUCTURE	PERCENT HYDROGEN	PERCENT CARBON	BOILING (7) POINT ° F.	REID VAPOR PRESSURE LB./SQ. IN.	LATENT HEAT OF EVAPORATION BTU PER LB.	FREEZING POINT ° F.	HEATING VALUE BTU PER LB. (1)	BTU PER U.S. GAL. AT 68° F.	SPECIFIC GRAVITY AT 68° F.	WEIGHT PER U.S. GAL. LB. AT 68° F.	KNOCK VALUE PERFORMANCE NUMBERS (2)			
														NO LEAD		LEAD 4 ML.	
														LEAN	RICH	LEAN	RICH
AROMATIC AMINE AND ANTIKNOCK	28	MONO-METHYL ANILINE		8.5	78.5	384	0.02	172	- 71	15,600	128,000	0.986	8.23	-	-	-	-
AROMATIC AMINE AND ANTIKNOCK	29	2,4-XYLIDINE		9.2	79.3	420	0.005	150	-	15,700	128,000	0.974	8.13	-	-	-	-
AROMATIC AMINE AND ANTIKNOCK	30	2,6-XYLIDINE		9.2	79.3	422	0.005	150	-	15,700	128,000	0.979	8.17	-	-	-	-
ANTIKNOCK	31	TETRAETHYL LEAD		6.2	29.7	360 DE-COMP.	0.02	73	-213	-	-	1.653	13.8	-	-	-	-
ORGANIC HALIDE	32	ETHYLENE DIBROMIDE (1,2-DIBROMO ETHANE)		2.1	12.8	269	0.5	82	+ 50	-	-	2.181	18.2	-	-	-	-
INHIBITOR	33	NORMAL BUTYL PARA-AMINO PHENOL		-	-	500 (2)	-	-	+ 157	-	-	-	-	-	-	-	-
INHIBITOR	34	DI-SECONDARY BUTYL PARA PHENYLENE DIAMINE		-	-	500 (2)	-	-	+ 40	-	-	-	-	-	-	-	-
INHIBITOR	35	DI-METHYL TERTIARY BUTYL PHENOL		-	-	480 (2)	-	-	+ 70	-	-	-	-	-	-	-	-
ALCOHOL	36	METHANOL (WOOD ALCOHOL)		12.6	37.5	148	4.5	470	- 144	8,400	56,000	0.793	6.62	75	-(3)	<75	-(3)

1. Lower heating value which does not allow for heat due to condensation of steam formed during combustion. 2545 BTU equals one horsepower hour.
2. Approximate values.
3. Current rich mixture knock test methods do not assign Performance Numbers to alcohols due to their low heats of combustion. However, alcohols, if tested at very high specific fuel consumptions, have very high Performance Numbers. When blended with water the three alcohols listed all have very high Performance Numbers and very high resistance to preignition.

4. Average maximum values. Straight-run gasoline used in Grade 73 may have a Performance Number of only 40 before the addition of lead (one ml.).
5. All values in Performance Numbers except normal heptane. Zero octane number corresponds to a Performance Number of about 22.
6. > 160 means above 160. < 75 means below 75.
7. At atmospheric pressure.

TYPE OF COMPOUND	NO.	COMPLETE NAME	STRUCTURE	PERCENT HYDROGEN	PERCENT CARBON	BOILING (7) POINT ° F.	REID VAPOR PRESSURE LB./SQ. IN.	LATENT HEAT OF EVAPORATION BTU PER LB.	FREEZING POINT ° F.	HEATING VALUE BTU PER LB. (1)	BTU PER U.S. GAL. AT 68° F.	SPECIFIC GRAVITY AT 68° F.	WEIGHT PER U.S. GAL. LB. AT 68° F.	KNOCK VALUE PERFORMANCE NUMBERS (2)			
														NO LEAD		LEAD 4 ML.	
														LEAN	RICH	LEAN	RICH
ALCOHOL	37	ETHANOL (GRAIN ALCOHOL)	$\begin{array}{c} \text{H} & \text{H} \\ & \\ \text{H}-\text{C}-\text{C}-\text{OH} \\ & \\ \text{H} & \text{H} \end{array}$	13.1	52.1	173	2.5	370	-179	11,600	76,000	0.789	6.58	75	-(3)	<75	-(3)
ALCOHOL	38	ISOPROPANOL (ISOPROPYL ALCOHOL)	$\begin{array}{c} \text{H} & \text{OH} & \text{H} \\ & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ & & \\ \text{H} & \text{H} & \text{H} \end{array}$	13.4	60.0	180	2.1	290	-129	13,000	85,000	0.785	6.55	75	-(3)	<75	-(3)
WATER	39	WATER	H-O-H	11.2	-	212	0.95	970	+32	0	0	0.998	8.33	-	-	-	-
AMMONIA	40	AMMONIA	$\begin{array}{c} \text{H}-\text{N}-\text{H} \\ \\ \text{H} \end{array}$	17.8	-	-28	-	-	-108	-	-	GAS	GAS	-	-	-	-
HYDROCARBON PARAFFIN + CYCLIC PARAFFIN PLUS AROMATIC	41	STRAIGHT RUN GASOLINE (AVIATION)		15.5	84.5	110-300	2 TO 7	140 (2)	<-76	19,000	115,000	0.68-0.74	6	54 (4)	61 (4)	78 (4)	93 (4)
HYDROCARBON PARAFFIN + CYCLIC PARAFFIN PLUS AROMATIC	42	CATALYTICALLY CRACKED GASOLINE (AVIATION)		15	85	110-300	2 TO 7	140 (2)	<-76	19,000	115,000	0.70-0.74	6	61 (4)	85 (4)	93 (4)	130 (4)
HYDROCARBON PARAFFIN ALMOST ENTIRELY	43	ALKYLATE (MOSTLY OCTANES)		15.8	84.2	200-300	ABOUT 1.5	125 (2)	<-76	19,000	115,000	-	-	76 (4)	92 (4)	120 (4)	140 (4)
HYDROCARBON PARAFFIN ALMOST ENTIRELY	44	HOT ACID OCTANE (MOSTLY OCTANES SUCH AS NOS. 8 TO 11 INCL.)		15.8	84.2	200-275	ABOUT 1.5	125 (2)	<-76	19,000	115,000	-	-	100 (4)	120 (4)	150 (4)	>160 (4)
CARBON	45	CARBON (SOLID)	C	-	100	-	-	-	-	14,600	-	-	-	-	-	-	-
HYDROGEN	46	HYDROGEN (GAS)	H-H	100	-	-	-	-	-	43,000	-	-	-	-	-	-	-

- Lower heating value which does not allow for heat due to condensation of steam formed during combustion. 2545 BTU equals one horsepower hour.
- Approximate values.
- Current rich mixture knock test methods do not assign Performance Numbers to alcohols due to their low heats of combustion. However, alcohols, if tested at very high specific fuel consumptions, have very high Performance Numbers. When blended with water the three alcohols listed all have very high Performance Numbers and very high resistance to preignition.

- Average maximum values. Straight-run gasoline used in Grade 73 may have a Performance Number of only 40 before the addition of lead (one ml.).
- All values in Performance Numbers except normal heptane. Zero octane number corresponds to a Performance Number of about 22.
- > 160 means above 160. < 75 means below 75.
- At atmospheric pressure.