



dl.)

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UTG91 is a certification gasoline with 91 Research Octane

LV = Liquid volume

CORE LABORATORIES

UTG91

MIT 193002-003

ASTM D-6733

Component Name	WT %	LV %	Mol %
Isobutane	0.08	0.11	0.14
N-Butane	2.10	2.68	3.56
Trans-2-butene	0.02	0.02	0.04
2,2-Dimethylpropane	0.01	0.01	0.01
Cis-2-butene	0.03	0.04	0.05
Isopentane	3.65	4.35	4.98
1-Pentene	0.15	0.17	0.21
2-Methyl-1-butene	0.26	0.30	0.37
N-Pentane	1.17	1.38	1.60
Trans-2-pentene	0.43	0.49	0.60
3,3-dimethyl-1-butene	0.25	0.29	0.29
Cis-2-pentene	0.68	0.77	0.95
2-Methyl-2-butene	0.04	0.04	0.06
Cis-1,3-pentadiene	0.03	0.03	0.04
2,2-Dimethylbutane	0.79	0.90	0.90
Cyclopentene	0.13	0.12	0.19
4-Methyl-1-pentene	0.04	0.04	0.05
3-Methyl-1-pentene	0.05	0.06	0.06
Cyclopentane	4.28	4.25	6.01
2,3-Dimethylbutane	0.65	0.73	0.74
2,3-Dimethyl-1-butene	0.04	0.04	0.05
2-Methylpentane	1.58	1.79	1.81
3-Methylpentane	1.01	1.12	1.15
2-Methyl-1-pentene	0.18	0.20	0.21
1-Hexene	0.15	0.16	0.18
N-Hexane	0.85	0.95	0.97
Trans-3-hexene	0.28	0.31	0.33
Cis-3-hexene	0.13	0.14	0.15
Trans-2-hexene	0.27	0.29	0.32
2-Methyl-2-pentene	0.09	0.10	0.11
4-Methylcyclopentene	0.18	0.17	0.22
3-Methyl-cis-2-pentene	0.05	0.05	0.06
Cis-2-hexene	0.16	0.17	0.19
3-Methyl-trans-2-pentene	0.04	0.04	0.05
Methylcyclopentane	0.54	0.53	0.63
2,4-Dimethylpentane	1.89	2.08	1.86
2,3-Dimethyl-2-butene	0.02	0.02	0.02
C7 Olefin	0.06	0.06	0.06
2,3,3-Trimethyl-1-butene	0.02	0.02	0.02
1-Methylcyclopentene	0.30	0.29	0.36
Benzene	0.75	0.63	0.95
2-Methyl-cis-3-hexene	0.29	0.31	0.29
3,3-Dimethylpentane	0.02	0.02	0.02
Cyclohexane	0.10	0.10	0.12
2-Methyl-trans-3-hexene	0.05	0.05	0.05
4-Methyl-1-hexene	0.04	0.04	0.04
4-Methyl-trans-2-hexene	0.10	0.10	0.10
2-Methylhexane	3.92	4.27	3.85



2,3-Dimethylpentane	4.43	4.72	4.35
1,1-Dimethylcyclopentane	0.05	0.05	0.05
Cyclohexene	0.06	0.05	0.07
3-Methylhexane	4.90	5.28	4.82
Cis-1,3-dimethylcyclopentane	0.26	0.26	0.26
Trans-1,3-dimethylcyclopentane	0.25	0.25	0.25
3-Ethylpentane	0.56	0.59	0.55
Trans-1,2-dimethylcyclopentane	0.24	0.24	0.24
2,2,4-Trimethylpentane	6.55	7.01	5.65
2-Ethyl-1-pentene	0.07	0.07	0.07
Trans-3-heptene	0.24	0.25	0.24
N-Heptane	5.53	5.99	5.44
Cis-3-heptene	0.27	0.29	0.27
2-Methyl-2-hexene	0.10	0.11	0.10
3-Methyl-trans-2-hexene	0.06	0.06	0.06
3-Methyl-cis-3-hexene	0.10	0.10	0.10
Trans-2-heptene	0.15	0.16	0.15
3-Ethyl-2-pentene	0.20	0.21	0.20
3-Methyl-cis-2-hexene	0.06	0.06	0.06
Cis-2-heptene	0.15	0.16	0.15
Cis-1,2-dimethylcyclopentane	0.37	0.35	0.37
1,1,3-Trimethylcyclopentane	0.08	0.08	0.07
Ethylcyclopentane	0.15	0.14	0.15
2,5-Dimethylhexane	0.76	0.81	0.66
2,4-Dimethylhexane	0.85	0.90	0.73
Trans,cis-1,2,4-trimethylcyclopentane	0.07	0.07	0.06
Trans,cis-1,2,3-trimethylcyclopentane	0.05	0.05	0.04
C8 Olefin	0.14	0.14	0.12
C8 Olefin	0.06	0.06	0.05
2,3,4-Trimethylpentane	1.92	1.98	1.66
Toluene	7.33	6.27	7.84
2,3,3-Trimethylpentane	1.72	1.77	1.48
C8 Olefins	0.04	0.04	0.04
2,3-Dimethylhexane	0.64	0.67	0.55
2-Methyl-3-Ethylpentane	0.04	0.04	0.03
C8 Olefins	0.11	0.11	0.10
2-Methylheptane	0.68	0.72	0.59
4-Methylheptane	0.38	0.40	0.33
3,4-Dimethylhexane	0.08	0.08	0.07
Cis-1,3 dimethylcyclohexane	0.06	0.06	0.05
3-Methylheptane	0.75	0.79	0.65
3-Ethylhexane	0.21	0.22	0.18
Trans-1,4-dimethylcyclohexane	0.03	0.03	0.03
2,2,5-Trimethylhexane	0.43	0.45	0.33
Cis-1-ethyl-3-methylcyclopentane	0.08	0.08	0.07
1-Octene	0.08	0.08	0.07
1-Ethyl-1-methylcyclopentane	0.03	0.03	0.03
Trans-1,2,dimethylcyclohexane	0.12	0.11	0.11
2,2,4-Trimethylhexane	0.17	0.18	0.13
Cis-1,4-dimethylcyclohexane	0.06	0.06	0.05
N-Octane	0.62	0.65	0.53
Trans-2-Octene	0.06	0.06	0.05
Isopropylcyclopentane	0.03	0.03	0.03
2,3,5-Trimethylhexane	0.06	0.06	0.05
2,4-Dimethylheptane	0.08	0.08	0.06
Ethylcyclohexane	0.09	0.08	0.08
2,6-Dimethylheptane	0.05	0.05	0.04
2,5-Dimethylheptane	0.18	0.19	0.14
Ethylbenzene	2.67	2.28	2.48
Meta-Xylene	4.86	4.17	4.51

Para-Xylene	2.05	1.76	1.90
2,3-Dimethylheptane	0.09	0.09	0.07
4-Ethylheptane	0.06	0.06	0.05
4-Methyloctane	0.19	0.20	0.15
2-Methyloctane	0.24	0.25	0.18
3-Ethylheptane	0.06	0.06	0.05
3-Methyloctane	0.25	0.26	0.19
Ortho-Xylene	2.44	2.06	2.26
2,4,6 Trimethyl heptane	0.22	0.23	0.17
2,2,6-Trimethylheptane	0.11	0.11	0.08
Trans-3-Nonene	0.03	0.03	0.02
N-Nonane	0.19	0.20	0.15
Isopropylbenzene	0.13	0.11	0.11
2,6-Dimethyloctane	0.05	0.05	0.03
2,5-Dimethyloctane	0.05	0.05	0.03
N-propylcyclohexane	0.05	0.05	0.04
n-Propylbenzene	0.60	0.52	0.49
1-Methyl-3-ethylbenzene	1.90	1.63	1.56
1-Methyl-4-ethylbenzene	0.82	0.71	0.67
1,3,5-Trimethylbenzene	0.90	0.77	0.74
C10 Naphthene	0.02	0.02	0.01
5-Methylnonane	0.02	0.02	0.01
1-Methyl-2-ethylbenzene	0.76	0.64	0.62
2-Methylnonane	0.07	0.07	0.05
1,2,3,5 Tet-methylcyclohexane	0.09	0.08	0.06
1,2,3,4 Tet-methylcyclohexane	0.04	0.04	0.03
1,2,4-Trimethylbenzene	2.50	2.12	2.05
Isobutylbenzene	0.10	0.09	0.07
sec-Butylbenzene	0.07	0.06	0.05
N-Decane	0.08	0.08	0.06
1,2,3,4 Tet-methylcyclohexane	0.03	0.03	0.02
1,2,3-Trimethylbenzene	0.50	0.41	0.41
1-Methyl-3-isopropylbenzene	0.04	0.03	0.03
Indan (2,3-Dihydroindene)	0.29	0.22	0.24
1-Methyl-3-n-propylbenzene	0.19	0.16	0.14
1-Methyl-4-n-propylbenzene	0.24	0.21	0.18
1,4-Diethylbenzene	0.41	0.35	0.30
N-Butylbenzene	0.13	0.11	0.10
1,3-Dimethyl-5-ethylbenzene	0.37	0.32	0.27
1,2-Diethylbenzene	0.03	0.03	0.02
1-Methyl-2-n-propylbenzene	0.13	0.11	0.10
5-Methyldecane	0.02	0.02	0.01
1,4-Dimethyl-2-ethylbenzene	0.25	0.21	0.18
1,3-Dimethyl-4-ethylbenzene	0.51	0.43	0.37
1,2-Dimethyl-4-ethylbenzene	0.25	0.21	0.18
1,3-Dimethyl-2-ethylbenzene	0.02	0.02	0.01
1,2-Dimethyl-3-Ethylbenzene	0.03	0.02	0.02
N-Undecane	0.05	0.05	0.03
1,2,4,5-Tetramethylbenzene	0.19	0.16	0.14
1,2,3,5-Tetramethylbenzene	0.26	0.22	0.19
4-Methylindan	0.24	0.19	0.18
5-Methylindan	0.27	0.21	0.20
1,2,3,4-Tetramethylbenzene	0.16	0.13	0.12
5-Methylundecane	0.04	0.04	0.02
4-Methylundecane	0.06	0.06	0.03
Naphthalene	0.38	0.28	0.29
1,1 Dimethylindan	0.10	0.08	0.07
1,2 Dimethylindan	0.06	0.05	0.04
1,6 Dimethylindan	0.07	0.05	0.05
C11 Aromatic	0.30	0.26	0.20



1-ethylindan	0.04	0.03	0.03
2-ethylindan	0.10	0.08	0.07
N-Dodecane	0.03	0.03	0.02
1,3,5-triethylbenzene	0.03	0.03	0.02
1,3 Dimethylindan	0.06	0.05	0.04
1,2,4-triethylbenzene	0.02	0.02	0.01
2-Methylnaphthalene	0.21	0.16	0.15
4,5 Dimethylindan	0.03	0.02	0.02
Tridecanes	0.13	0.12	0.07
1-Methylnaphthalene	0.11	0.08	0.08
N-Tetradecane	0.02	0.02	0.01
Pentadecanes	0.07	0.06	0.03
Unidentified	0.98	1.05	0.65
Total	100.00	100.00	100.00
Total Paraffins	10.62	12.01	12.36
Total Isoparaffins	40.57	43.94	39.63
Total Olefins	6.54	6.97	7.64
Total Naphthenes	7.17	7.07	8.86
Total Aromatics	33.90	28.76	30.75
Unclassified	1.20	1.25	0.76

**UTG91 (fridge)**

**ASTM D-6733**

**MIT 193002-003**

<b>Component Type</b>	<b>WT %</b>	<b>LV %</b>	<b>Mol %</b>
Total C4	2.23	2.85	3.79
Total C5	10.83	11.91	15.02
Total C6	8.56	9.17	9.99
Total C7	31.86	32.56	32.01
Total C8	28.41	27.48	25.31
Total C9	10.53	9.34	8.54
Total C10	5.05	4.33	3.69
Total C11	1.15	0.93	0.79
Total C12	0.18	0.18	0.10
C4 Paraffin	2.10	2.68	3.56
C5 Paraffin	1.17	1.38	1.60
C6 Paraffin	0.85	0.95	0.97
C7 Paraffin	5.53	5.99	5.44
C8 Paraffin	0.62	0.65	0.53
C9 Paraffin	0.19	0.20	0.15
C10 Paraffin	0.08	0.08	0.06
C11 Paraffin	0.05	0.05	0.03
C12 Paraffin	0.03	0.03	0.02
C4 Isoparaffin	0.08	0.11	0.14
C5 Isoparaffin	3.66	4.36	4.99
C6 Isoparaffin	4.03	4.54	4.60
C7 Isoparaffin	15.72	16.96	15.45
C8 Isoparaffin	14.58	15.39	12.58
C9 Isoparaffin	1.86	1.93	1.44
C10 Isoparaffin	0.52	0.53	0.37
C11 Isoparaffin	0.02	0.02	0.01
C12 Isoparaffin	0.10	0.10	0.05
C4 Olefin	0.05	0.06	0.09
C5 Olefin	1.72	1.92	2.42
C6 Olefin	2.29	2.42	2.72



C7 Olefin	1.96	2.05	1.96
C8 Olefin	0.49	0.49	0.43
C9 Olefin	0.03	0.03	0.02
C5 Naphthene	4.28	4.25	6.01
C6 Naphthene	0.64	0.63	0.75
C7 Naphthene	1.32	1.29	1.32
C8 Naphthene	0.70	0.68	0.62
C9 Naphthene	0.05	0.05	0.04
C10 Naphthene	0.18	0.17	0.12
C6 Aromatic	0.75	0.63	0.95
C7 Aromatic	7.33	6.27	7.84
C8 Aromatic	12.02	10.27	11.15
C9 Aromatic	8.40	7.13	6.89
C10 Aromatic	4.27	3.55	3.14
C11 Aromatic	1.08	0.86	0.75
C12 Aromatic	0.05	0.05	0.03
Mol WT of Sample, gm/mol	98.50		
Density of Sample, gm/cc	0.7456		





