

OG Speciation Profile for E10 Summer Gasoline Fuel—2013 update (OG692)

Wenli Yang, PhD, PE

Air Quality Planning and Science Division

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1 Introduction

This document describes the development of a new speciation profile for E10 summer gasoline. The new profile, OG692, will replace the existing profile, OG690, which was created in 2012 based on four fuel samples collected at various gas stations in the Los Angeles area during the summer of 2010 and 2011 [1].

To ensure that the composition of the most recent gasoline fuel is reflected in the next round of SIP modeling, speciation analysis for four more summer grade E10 samples were requested from the Light Duty Vehicle Surveillance Program Series 19 (VSP 19) in 2013. The new 2013 fuel test data from VSP19 are then composited with the existing profile (OG690) to form an updated E10 summer gasoline speciation profile, OG692. There are only minor differences between profiles OG692 and OG690. The new profile ,OG692, will replace the current profile, OG690, for the inventory categories associated with on-road gasoline vehicle hot soak emissions, on-road gasoline vehicle running loss evaporative, and spillage of vehicle refueling at gasoline dispensing facilities for 2010 and later years for which E10 is in use. The related SCCs/EICs are summarized in Appendix 1.

2 Methodology

From May to July 2013, four fuel samples were extracted from the tanks of four candidate VSP 19 light-duty gasoline vehicles, respectively. The vehicles accepted into this program were selected from the in-use fleet within a radius of 50 miles from the Hagen-Smit Laboratory in El Monte, CA [2]. Detailed hydrocarbon analyses (DHA) of fuel samples were performed at Southwest Research Institute (San Antonio, TX) and oxygenate analyses were conducted in the Fuel Analysis and Method Evaluation Section (FAMES) fuel lab in ARB's Hagen-Smit Laboratory located in El Monte, CA.

In the DHA tests, over two hundred hydrocarbon compounds were detected in the liquid fuel samples using ASTM6729 (*Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 100 Meter Capillary High Resolution Gas Chromatography*). Because this method is focused on hydrocarbon analysis, oxygenates in the samples were quantified separately in CARB’s fuel lab using ASTM D4815 (*Standard Test Method for Determination of MTBE, ETBE, TAME, DIPE, tertiary-Amyl Alcohol and C₁ to C₄ Alcohols in Gasoline by Gas Chromatography*). Among the species identified in the analyses, five of them are not included in the existing CARB core chemical database— the CEIDARS POLLUTANT table. Thus, new CARB SAROAD codes are generated for these five species as follows (Table 1):

Table 1. New CARB SAROAD codes to be added to the CEIDARS POLLUTANT table

<i>CARB SAROAD</i>	<i>CAS</i>	<i>Chemical Name</i>	<i>Formula</i>	<i>Molecular Weight</i>
43381	17851-27-2	1-ethyl-2,4,5-trimethylbenzene	C ₁₁ H ₁₆	148.24
43382	3877-19-8	1,2,3,4-tetrahydro-2-methylnaphthalene	C ₁₁ H ₁₄	146.23
43383	4941-53-1	5-undecene	C ₁₁ H ₁₂	154.29
43384	3404-72-6	2,3-dimethyl-1-pentene	C ₇ H ₁₄	98.19
43385	42775-75-7	5-ethyl-1,2,3,4-tetrahydronaphthalene	C ₁₂ H ₁₆	160.26

Since profile OG690 was based on E10 summer fuel as well, the new profile OG692 (2013) is being updated by compositing the new VSP 19 test results and profile OG690. The details of the new profile OG692 are shown in Appendix 2.

3 Results and Discussion

The most abundant species in OG692 include ethanol (10.3%), isopentane (6.3%), toluene (5.8%), 2-methylhexane (4.5%) and m-xylene (3.5%). These compounds are also the major species in OG690. For easy comparison, the two profiles are summarized by carbon number and chemical group in Figure 1 and Figure 2, respectively. It is shown in Figure 1 that the new profile OG692 has about 1% more C₅- and C₆-compounds than OG690; however, C₇- and C₈-compounds are about 1% less than in OG690. If the profile species are summarized into more general groups (including paraffins, isoparaffins, olefins, naphthenes, aromatics, oxygenates and others) as exhibited in Figure 2, the updated E10 profile OG692 is very consistent with profile OG690.

The ROG/TOG ratio of OG692 is 1.00. Assuming that the mass of FID-THC is based on the molecular weight of methane per carbon measured, the TOG/THC fraction is 1.069 based on the profile (Appendix 2) and it can be used to convert THC emission mass to actual weight TOG.

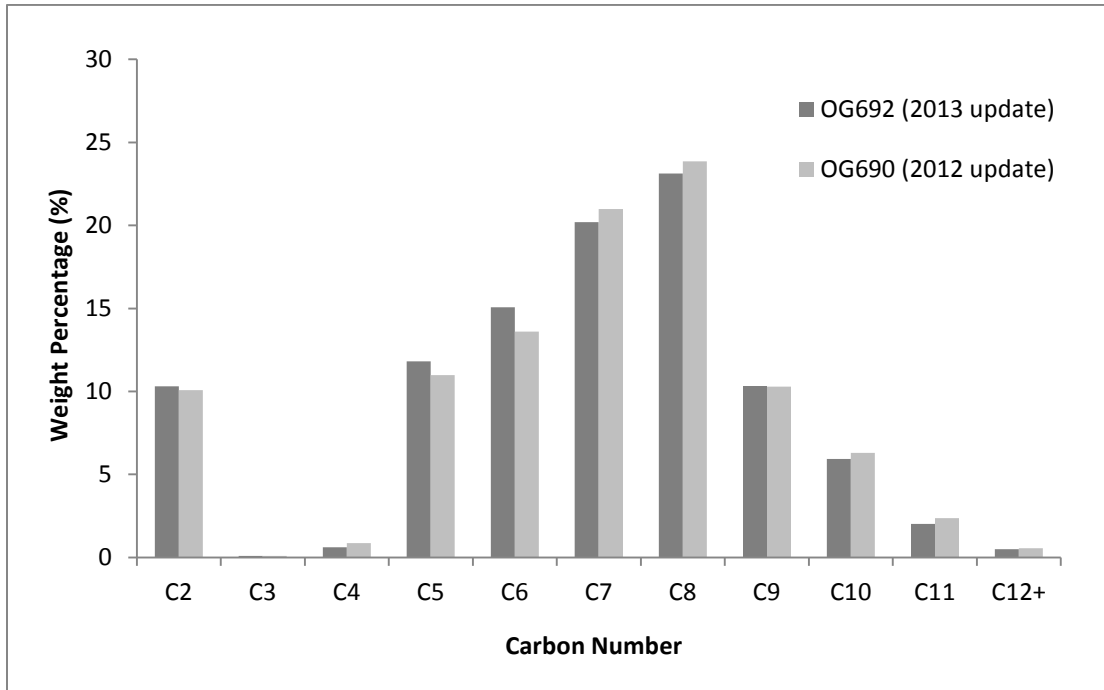


Figure 1. Speciation profile comparison between OG692 and OG690 by carbon number

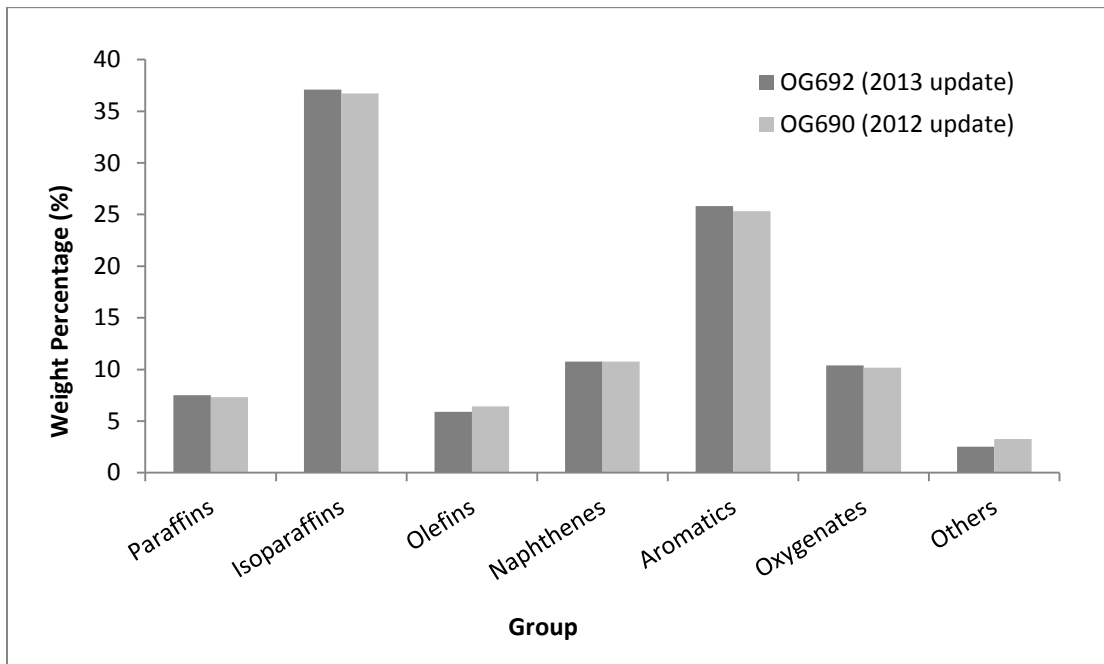


Figure 2. Speciation profile comparison between OG692 and OG690 by group

4 Version Control

This section will be completed after management approval and after the CEIDARS FRACTION table and ORGPROFILE table are updated. Version information from the CEIDARS FRACTION table will be copied here.

References:

1. Yang, W. *Organic Gas Speciation Profile (OG690) for E10 Summer Liquid Gasoline*; California Air Resources Board: 2012.
2. Magbuhat, S. *Supplemental Test Procedures Amendment 2 For Light-Duty Vehicle Surveillance Program Series 19*; California Air Resources Board: 2012.

Appendix 1. SCCs/EICs associated with liquid gasoline profile

<i>SCC/EIC</i>	<i>Names</i>		
6	EMFAC/DTIM		HOT SOAK
9	EMFAC/DTIM	GASOLINE	RUNNING EVAPORATIVES
206	EMFAC/DTIM	LIGHT-MED DUTY GASOLINE	HOT SOAK
209	EMFAC/DTIM	LIGHT-MED DUTY GASOLINE	RUNNING EVAPORATIVES
306	EMFAC/DTIM	HEAVY DUTY GASOLINE	HOT SOAK
309	EMFAC/DTIM	HEAVY DUTY GASOLINE	RUNNING EVAPORATIVES
46508	ON-ROAD VEHICLES	LIGHT DUTY PASSENGER	HOT SOAK
46565	GASOLINE DISP. FACIL	VEHICLE REFUELING	SPILLAGE
47506	ON-ROAD VEHICLES	LIGHT DUTY TRUCKS	HOT SOAK
48025	ON-ROAD VEHICLES	MOTORCYCLES	HOT SOAK
48041	ON-ROAD VEHICLES	HD GAS TRUCKS	HOT SOAK
54239	ON-ROAD VEHICLES	MEDIUM DUTY TRUCKS	HOT SOAK
82693	ON-ROAD VEHICLES	LIGHT DUTY PASSENGER	CAT HOT SOAK
82701	ON-ROAD VEHICLES	LIGHT DUTY PASSENGER	NON-CAT HOT SOAK
82719	ON-ROAD VEHICLES	LIGHT/MEDIUM TRUCKS	CAT HOT SOAK
82727	ON-ROAD VEHICLES	LIGHT/MEDIUM TRUCKS	NON-CAT HOT SOAK
83113	ON-ROAD VEHICLES	HEAVY GAS TRUCKS	NON-CAT HOT SOAK
83162	ON-ROAD VEHICLES	HEAVY GAS TRUCKS	CAT HOT SOAK
83386	ON-ROAD VEHICLES	LIGHT DUTY PASSENGER	CAT RUNNING EVAP
83394	ON-ROAD VEHICLES	LIGHT DUTY PASSENGER	NON-CAT RUNNING EVAP
83402	ON-ROAD VEHICLES	LIGHT/MEDIUM TRUCKS	CAT RUNNING EVAP
83410	ON-ROAD VEHICLES	LIGHT/MEDIUM TRUCKS	NON-CAT RUNNING EVAP
83428	ON-ROAD VEHICLES	HD GAS TRUCKS	NON-CAT RUNNING EVAP
83436	ON-ROAD VEHICLES	HD GAS TRUCKS	CAT RUNNING EVAP
83444	ON-ROAD VEHICLES	MOTORCYCLES	RUNNING EVAP
84087	ON-ROAD VEHICLES	LT. DUTY TRUCKS – 1	NON-CAT RUNNING EVAP
84103	ON-ROAD VEHICLES	LT. DUTY TRUCKS – 1	NON-CAT HOT SOAK
84178	ON-ROAD VEHICLES	LT. DUTY TRUCKS – 1	CAT RUNNING EVAP
84194	ON-ROAD VEHICLES	LT. DUTY TRUCKS – 1	CAT HOT SOAK
84293	ON-ROAD VEHICLES	MEDIUM TRUCKS	NON-CAT RUNNING EVAP
84319	ON-ROAD VEHICLES	MEDIUM TRUCKS	NON-CAT HOT SOAK
84384	ON-ROAD VEHICLES	MEDIUM TRUCKS	CAT RUNNING EVAP
84400	ON-ROAD VEHICLES	MEDIUM TRUCKS	CAT HOT SOAK
84459	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 1	NON-CAT RUNNING EVAP
84475	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 1	NON-CAT HOT SOAK
84533	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 1	CAT RUNNING EVAP
84558	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 1	CAT HOT SOAK
84608	ON-ROAD VEHICLES	MED HVY GAS TRUCKS	NON-CAT RUNNING EVAP
84624	ON-ROAD VEHICLES	MED HVY GAS TRUCKS	NON-CAT HOT SOAK
84681	ON-ROAD VEHICLES	MED HVY GAS TRUCKS	CAT RUNNING EVAP
84707	ON-ROAD VEHICLES	MED HVY GAS TRUCKS	CAT HOT SOAK
86157	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 2	NON-CATALYST RUNNING EVAP
86173	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 2	NON-CATALYST HOT SOA
86249	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 2	CATALYST RUNNING EVAP
86264	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 2	CATALYST HOT SOAK

86462	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 2	NON-CATALYST RUNNING EVAP
86488	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 2	NON-CATALYST HOT SOA
86561	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 2	CATALYST RUNNING EVAP
86587	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 2	CATALYST HOT SOAK
86694	ON-ROAD VEHICLES	HEAVY HEAVY DUTY GAS	NON-CATALYST RUNNING EVAP
86710	ON-ROAD VEHICLES	HEAVY HEAVY DUTY GAS	NON-CATALYST HOT SOA
86793	ON-ROAD VEHICLES	HEAVY HEAVY DUTY GAS	CATALYST RUNNING EVAP
86819	ON-ROAD VEHICLES	HEAVY HEAVY DUTY GAS	CATALYST HOT SOAK
86983	ON-ROAD VEHICLES	MOTORCYCLES (MCY)	CATALYST RUNNING EVAP
87007	ON-ROAD VEHICLES	MOTORCYCLES (MCY)	CATALYST HOT SOAK
87072	ON-ROAD VEHICLES	HEAVY DUTY GAS URBAN	NON-CATALYST RUNNING EVAP
87098	ON-ROAD VEHICLES	HEAVY DUTY GAS URBAN	NON-CATALYST HOT SOA
87163	ON-ROAD VEHICLES	HEAVY DUTY GAS URBAN	CATALYST RUNNING EVAP
87189	ON-ROAD VEHICLES	HEAVY DUTY GAS URBAN	CATALYST HOT SOAK
87247	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	NON-CATALYST RUNNING EVAP
87262	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	NON-CATALYST HOT SOA
87338	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	CATALYST RUNNING EVAP
87353	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	CATALYST HOT SOAK
87452	ON-ROAD VEHICLES	MOTOR HOMES (MH)	NON-CATALYST RUNNING EVAP
87478	ON-ROAD VEHICLES	MOTOR HOMES (MH)	NON-CATALYST HOT SOA
87544	ON-ROAD VEHICLES	MOTOR HOMES (MH)	CATALYST RUNNING EVAP
87569	ON-ROAD VEHICLES	MOTOR HOMES (MH)	CATALYST HOT SOAK
40600602	PETROLEUM MARKTNG	MISCELLANEOUS	SPILL LOSS W/O CNTLS
33038011000000	GASOLINE DISP. FACIL	VEHICLE REFUELING	SPILLAGE
71070811000000	ON-ROAD VEHICLES	LIGHT DUTY PASSENGER	NON-CAT RUNNING EVAP
71071211000000	ON-ROAD VEHICLES	LIGHT DUTY PASSENGER	NON-CAT HOT SOAK
71073611000000	ON-ROAD VEHICLES	LIGHT DUTY PASSENGER	CAT RUNNING EVAP
71074011000000	ON-ROAD VEHICLES	LIGHT DUTY PASSENGER	CAT HOT SOAK
72070811000000	ON-ROAD VEHICLES	LIGHT/MEDIUM TRUCKS	NON-CAT RUNNING EVAP
72071211000000	ON-ROAD VEHICLES	LIGHT/MEDIUM TRUCKS	NON-CAT HOT SOAK
72073611000000	ON-ROAD VEHICLES	LIGHT/MEDIUM TRUCKS	CAT RUNNING EVAP
72074011000000	ON-ROAD VEHICLES	LIGHT/MEDIUM TRUCKS	CAT HOT SOAK
72270811000000	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 1	NON-CAT RUNNING EVAP
72271211000000	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 1	NON-CAT HOT SOAK
72273611000000	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 1	CAT RUNNING EVAP
72274011000000	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 1	CAT HOT SOAK
72370811000000	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 2	NON-CATALYST RUNNING EVAP
72371211000000	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 2	NON-CATALYST HOT SOA
72373611000000	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 2	CATALYST RUNNING EVAP
72374011000000	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 2	CATALYST HOT SOAK
72470811000000	ON-ROAD VEHICLES	MEDIUM TRUCKS	NON-CAT RUNNING EVAP
72471211000000	ON-ROAD VEHICLES	MEDIUM TRUCKS	NON-CAT HOT SOAK
72473611000000	ON-ROAD VEHICLES	MEDIUM TRUCKS	CAT RUNNING EVAP
72474011000000	ON-ROAD VEHICLES	MEDIUM TRUCKS	CAT HOT SOAK
73070811000000	ON-ROAD VEHICLES	HD GAS TRUCKS	NON-CAT RUNNING EVAP
73071211000000	ON-ROAD VEHICLES	HEAVY GAS TRUCKS	NON-CAT HOT SOAK
73073611000000	ON-ROAD VEHICLES	HD GAS TRUCKS	CAT RUNNING EVAP
73074011000000	ON-ROAD VEHICLES	HEAVY GAS TRUCKS	CAT HOT SOAK

73270811000000	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 1	NON-CAT RUNNING EVAP
73271211000000	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 1	NON-CAT HOT SOAK
73273611000000	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 1	CAT RUNNING EVAP
73274011000000	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 1	CAT HOT SOAK
73370811000000	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 2	NON-CATALYST RUNNING EVAP
73371211000000	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 2	NON-CATALYST HOT SOA
73373611000000	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 2	CATALYST RUNNING EVAP
73374011000000	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 2	CATALYST HOT SOAK
73470811000000	ON-ROAD VEHICLES	MED. HVY. DTY TRUCKS	NON-CAT RUNNING EVAP
73471211000000	ON-ROAD VEHICLES	MED. HVY. DTY TRUCKS	NON-CAT HOT SOAK
73473611000000	ON-ROAD VEHICLES	MED. HVY. DTY TRUCKS	CAT RUNNING EVAP
73474011000000	ON-ROAD VEHICLES	MED. HVY. DTY TRUCKS	CAT HOT SOAK
73670811000000	ON-ROAD VEHICLES	HVY. HVY. DTY TRUCKS	NON-CATALYST RUNNING EVAP
73671211000000	ON-ROAD VEHICLES	HVY. HVY. DTY TRUCKS	NON-CATALYST HOT SOA
73673611000000	ON-ROAD VEHICLES	HVY. HVY. DTY TRUCKS	CATALYST RUNNING EVAP
73674011000000	ON-ROAD VEHICLES	HVY. HVY. DTY TRUCKS	CATALYST HOT SOAK
75070811000000	ON-ROAD VEHICLES	MOTORCYCLES	RUNNING EVAP
75071211000000	ON-ROAD VEHICLES	MOTORCYCLES	HOT SOAK
75073611000000	ON-ROAD VEHICLES	MOTORCYCLES (MCY)	CATALYST RUNNING EVAP
75074011000000	ON-ROAD VEHICLES	MOTORCYCLES (MCY)	CATALYST HOT SOAK
76270811000000	ON-ROAD VEHICLES	HVY. GAS URBAN BUSES	NON-CATALYST RUNNING EVAP
76271211000000	ON-ROAD VEHICLES	HVY. GAS URBAN BUSES	NON-CATALYST HOT SOA
76273611000000	ON-ROAD VEHICLES	HVY. GAS URBAN BUSES	CATALYST RUNNING EVAP
76274011000000	ON-ROAD VEHICLES	HVY. GAS URBAN BUSES	CATALYST HOT SOAK
77070811000000	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	NON-CATALYST RUNNING EVAP
77071211000000	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	NON-CATALYST HOT SOA
77073611000000	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	CATALYST RUNNING EVAP
77074011000000	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	CATALYST HOT SOAK
77170811000000	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	NON-CATALYST RUNNING EVAP
77171211000000	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	NON-CATALYST HOT SOAK
77173611000000	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	CATALYST RUNNING EVAP
77174011000000	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	CATALYST HOT SOAK
77670811000000	ON-ROAD VEHICLES	OTHER BUSES (OB)	NON-CATALYST RUNNING EVAP
77671211000000	ON-ROAD VEHICLES	OTHER BUSES (OB)	NON-CATALYST HOT SOAK
77673611000000	ON-ROAD VEHICLES	OTHER BUSES (OB)	CATALYST RUNNING EVAP
77674011000000	ON-ROAD VEHICLES	OTHER BUSES (OB)	CATALYST RUNNING EVAP
77770811000000	ON-ROAD VEHICLES	OTHER BUSES (OB)	NON-CATALYST RUNNING EVAP
77771211000000	ON-ROAD VEHICLES	OTHER BUSES (OB)	NON-CATALYST HOT SOAK
77773611000000	ON-ROAD VEHICLES	OTHER BUSES (OB)	CATALYST RUNNING EVAP
77774011000000	ON-ROAD VEHICLES	OTHER BUSES (OB)	CATALYST HOT SOAK
78070811000000	ON-ROAD VEHICLES	MOTOR HOMES (MH)	NON-CATALYST RUNNING EVAP
78071211000000	ON-ROAD VEHICLES	MOTOR HOMES (MH)	NON-CATALYST HOT SOA
78073611000000	ON-ROAD VEHICLES	MOTOR HOMES (MH)	CATALYST RUNNING EVAP
78074011000000	ON-ROAD VEHICLES	MOTOR HOMES (MH)	CATALYST HOT SOAK

Appendix 2. OG speciation profiles for E10 summer liquid gasoline fuel—OG692

<i>Species Name</i>	<i>SAROAD</i>	<i>Weight Percentage (%)</i>
(2-methylpropyl)benzene	45235	0.064221
1,1,3-trimethylcyclohexane	91064	0.077460
1,1,3-trimethylcyclopentane	91030	0.137352
1,1,4-trimethylcyclohexane	91057	0.048384
1,2,3,4-tetrahydro-2-methylnaphthalene	43382	0.012421
1,2,3,5-tetramethylbenzene	91104	0.220584
1,2,3-trimethylbenzene	45225	0.453559
1,2,4,5-tetramethylbenzene	91103	0.172517
1,2,4-triethylbenzene	91119	0.025560
1,2,4-trimethylbenzene	45208	1.952473
1,2,4-trimethylcyclohexane	99099	0.049046
1,2-diethylbenzene	98154	0.050395
1,2-dimethyl-3-ethylbenzene	45254	0.102661
1,2-dimethyl-4-ethylbenzene	45252	0.360628
1,2-isodipropylbenzene	91114	0.081935
1,3,5-triethylbenzene	91117	0.018380
1,3,5-trimethylbenzene	45207	0.663528
1,3-diethylbenzene	45113	0.104980
1,3-dimethyl-2-ethylbenzene	45253	0.091904
1,3-dimethyl-4-ethylbenzene	45251	0.206314
1,3-dimethyl-5-ethylbenzene	45257	0.265951
1,3-dipropylbenzene	45237	0.114436
1,4-diethylbenzene	45114	0.172405
1,4-dimethyl-1-cyclohexene	43188	0.002919
1,4-dimethyl-2-ethylbenzene	45250	0.181650
1-butene	43213	0.008394
1-ethyl-2,4,5-trimethylbenzene	43381	0.013284
1-ethyl-4-isopropylbenzene	91102	0.032099
1-hexene	43245	0.298045
1-methyl-1-ethylcyclohexane	91081	0.116365
1-methyl-2-ethylbenzene	99915	0.399565
1-methyl-2-n-butylbenzene	45243	0.018795
1-methyl-2-n-propylbenzene	98178	0.091697
1-methyl-3-ethylbenzene	99912	1.222994
1-methyl-3-isopropylbenzene	98153	0.015412
1-methyl-3-n-propylbenzene	98152	0.358753
1-methyl-4-(1-methylpropyl)benzene	43189	0.064825
1-methyl-4-ethylbenzene	99914	0.546120
1-methyl-4-isobutylbenzene	99064	0.040597
1-methyl-4-isopropylbenzene	91094	0.009499
1-methyl-4-t-butylbenzene	91100	0.022871
1-methylcyclopentene	92000	0.214892
1-methylnaphthalene	91124	0.068789
1-pentene	43224	0.153661
2,2,3-trimethylbutane	43160	0.036068

2,2,3-trimethylhexane	91059	0.008227
2,2,3-trimethylpentane	43296	0.035508
2,2,4-trimethylheptane	98174	0.318633
2,2,4-trimethylpentane	43276	3.361002
2,2,5-trimethylhexane	98033	0.828837
2,2-dimethylbutane	43291	0.750017
2,2-dimethylheptane	91056	0.131765
2,2-dimethylhexane	98138	0.037755
2,2-dimethyloctane	98175	0.089442
2,2-dimethylpropane	98130	0.005977
2,3,3-trimethyl-1-butene	91002	0.009378
2,3,3-trimethylpentane	43280	0.485739
2,3,4-trimethylpentane	43279	1.166969
2,3,5-trimethylhexane	98141	0.111607
2,3-dimethyl-1-hexene	43190	0.010117
2,3-dimethyl-1-pentene	43384	0.012952
2,3-dimethyl-2-heptene	91079	0.004261
2,3-dimethylbutane	98001	1.204401
2,3-dimethylhexane	98139	0.532985
2,4-dimethylhexane	43277	0.625847
2,4-dimethyloctane	98149	0.137104
2,4-dimethylpentane	43271	1.394818
2,5-dimethylheptane	98143	0.296591
2,5-dimethylhexane	43278	0.531170
2,5-dimethyloctane	98176	0.124557
2,6-dimethylheptane	98157	0.155759
2,6-dimethylnaphthalene	98185	0.033531
2,6-dimethyloctane	98177	0.138346
2,7-dimethyloctane	99095	0.050800
2-ethyl-1-butene	98002	0.003125
2-ethyl-1-pentene	91022	0.085478
2-methyl-1-butene	43225	0.318993
2-methyl-1-hexene	91020	0.131374
2-methyl-1-octene	91067	0.024225
2-methyl-1-pentene	98040	0.130955
2-methyl-2-butene	43228	0.688112
2-methyl-2-hexene	90028	0.070611
2-methyl-2-octene	91068	0.039529
2-methyl-2-pentene	98004	0.214515
2-methyl-cis-3-hexene	91004	0.032168
2-methylheptane	98140	0.791675
2-methylhexane	43275	4.496126
2-methylindan	91108	0.130478
2-methylnaphthalene	91123	0.180210
2-methyloctane	98146	0.325284
2-methylpentane	43229	3.409702
2-undecene, (e)-	43191	0.009524
3,3-diethylpentane	91072	0.088732

3,3-dimethyl-1-pentene	91000	0.190730
3,3-dimethylhexane	98171	0.047882
3,4-dimethyl-2-pentene	91011	0.043179
3,4-dimethylhexane	98150	0.006084
3,5-dimethylheptane	98144	0.080942
3-ethyl-2-pentene	98007	0.023853
3-ethyl-3-hexene	43192	0.007683
3-ethyl-3-methylheptane	43193	0.097270
3-ethyl-3-methylpentane	91036	0.037831
3-ethylheptane	91071	0.082344
3-ethylhexane	91039	0.320921
3-ethylnonane	91097	0.014675
3-ethyloctane	91089	0.033212
3-methyl-1-butene	43223	0.235398
3-methyl-1-hexene	90030	0.005858
3-methyl-5-ethylheptane	91287	0.068714
3-methyl-cis-2-hexene	90029	0.004999
3-methyl-cis-2-pentene	98163	0.194748
3-methyl-cis-3-hexene	91024	0.061038
3-methylheptane	43298	0.937340
3-methylhexane	43295	2.149981
3-methylnonane	91090	0.112465
3-methyloctane	98172	0.391189
3-methylpentane	43230	2.165209
3-methyl-trans-2-hexene	91027	0.052765
3-methyl-trans-3-hexene	90032	0.054489
4-methyl-1-hexene	91008	0.001219
4-methyl-cis-2-pentene	98170	0.024372
4-methylheptane	43297	0.408473
4-methylindan	91107	0.188192
4-methylnonane	99122	0.115191
4-methyloctane	98173	0.241810
4-methyl-trans-2-hexene	90031	0.037839
4-methyl-trans-2-pentene	43293	0.075171
5-ethyl-1,2,3,4-tetrahydronaphthalene	43385	0.001097
5-methyl-1-hexene	91005	0.119795
5-methylindan	91106	0.174828
5-methylnonane	91088	0.065262
5-undecene	43383	0.002936
benzene	45201	0.701959
butylcyclohexane	90101	0.029377
c10 olefins	43125	0.168593
c11 aromatics	45505	0.171650
c11 cycloalkanes	98071	0.005126
c13 alkyl benzenes	45249	0.001344
c2 alkyl indan	98084	0.022166
c7 cycloalkanes	43115	0.035614
c7 external olefins	43294	0.016765

c8 alkenes	43290	0.190801
c8 cycloalkanes	43116	0.045799
c9 cycloalkanes	43117	0.043841
c9-c12 isoalkanes	99275	0.874771
cis,trans,cis-1,2,4-trimethylcyclohexane	91073	0.050034
cis-1,2-dimethylcyclohexane	91055	0.124619
cis-1,3-dimethylcyclopentane	91018	0.558989
cis-1,trans-2,3-trimethylcyclopentane	91038	0.152087
cis-1,trans-2,4-trimethylcyclopentane	91031	0.049438
cis-1-ethyl-2-methylcyclopentane	99093	0.073867
cis-1-ethyl-3-methylcyclopentane	99071	0.210443
cis-2-butene	43217	0.049559
cis-2-hexene	98035	0.143483
cis-2-pentene	43227	0.246696
cis-3-heptene	91025	0.058544
cis-3-nonene	91084	0.003529
cyclohexane	43248	0.878691
cyclohexene	43273	0.033192
cyclopentane	43242	1.047566
cyclopentene	43292	0.113243
dimethylcyclopentene	90065	0.058981
dimethylindans	46750	0.326584
dimethylindene	46752	0.009668
ethanol	43302	10.307375
ethylbenzene	45203	1.414346
ethylcyclohexane	43288	0.333309
ethylcyclopentane	98057	0.411807
indan	98044	0.271589
indene	98048	0.126453
isobutane	43214	0.057434
isobutylcyclohexane	99100	0.003536
isobutylene	43215	0.003901
isopentane	98132	6.341122
isoprene	43243	0.009837
isopropylbenzene	98043	0.084186
isopropylcyclohexane	90120	0.016742
isopropylcyclopentane	43178	0.018823
methylcyclohexane	43261	1.347297
methylcyclopentane	43262	2.410541
methylheptyne	90044	0.001460
methylnonenes	99358	0.025266
m-xylene	45205	3.491298
naphthalene	98046	0.205096
n-butane	43212	0.459906
n-butylbenzene	91098	0.071880
n-decane	43238	0.167918
n-dodecane	43255	0.036806
n-heptane	43232	1.494475

n-hexane	43231	1.891804
n-nonane	43235	0.504267
n-octane	43233	0.634044
n-pentadecane	43260	0.000486
n-pentane	43220	2.197479
n-pentylbenzene	45255	0.058391
n-propanol	43303	0.088736
n-propylbenzene	45209	0.369146
n-tetradecane	43259	0.005749
n-tridecane	43258	0.026561
n-undecane	43241	0.079256
other c12	99035	0.106314
other c8	99031	0.001339
other c9	99032	0.131025
o-xylene	45204	1.959565
pentamethylbenzene	91122	0.028895
propane	43204	0.002581
propylcyclopentane	90116	0.001625
p-xylene	45206	1.461854
t-butylbenzene	45215	0.065693
tert-Pentylbenzene	43194	0.100277
toluene	45202	5.803067
trans-1,2-cis-4-trimethylcyclopentane	43312	0.262750
trans-1,2-dimethylcyclopentane	91021	0.601260
trans-1,3-diethylcyclopentane	43195	0.173498
trans-1,3-dimethylcyclohexane	98059	0.489338
trans-1,3-dimethylcyclopentane	91019	0.645536
trans-1,3-pentadiene	90100	0.008506
trans-1-ethyl-3-methylcyclopentane	99085	0.140775
trans-1-ethyl-4-methylcyclohexane	99082	0.043751
trans-1-methyl-2-propylcyclopentane	43183	0.107467
trans-2-butene	43216	0.040053
trans-2-heptene	91026	0.050884
trans-2-hexene	98034	0.204066
trans-2-nonene	91075	0.000729
trans-2-octene	43263	0.018784
trans-2-pentene	43226	0.450697
trans-3-heptene	98006	0.095270
trans-3-hexene	98136	0.113227
trans-3-nonene	91080	0.062044
trans-3-octene	91049	0.069335
trans-4-Nonene	43197	0.002066
trimethylindan	46755	0.041828
trimethyloctanes	90096	0.744329
unidentified	99999	2.499948
<i>Total</i>		<i>100.000000</i>