

Assessing the Effect of Five Gasoline Properties on Exhaust Emissions from Light-Duty Vehicles certified to Tier-2 Standards

Analysis of Data from EPA Phase 3

(EPAct/V2/E-89)

Appendix 0.3

Model Fitting Information for

Benzene (Bag 1)

This appendix summarizes model fitting for Bag-1 Benzene. Model-fitting techniques and approaches summarized in Section 8.7. Features of the data and modeling for this compound are listed below.

Fuel-parameter matrix: REDUCED

Media contamination: NO

No. measurements: 176

No. censored values: 0

Modeling approach: MIXED MODEL

Estimated Dependent Variable model: NO

Models fit for Bag-1 Benzene

Model Term	Notation	Model		
		Main Effects (Full)	MM2	MM3
etOH	Z_e	•	×	
Arom	Z_a	•	•	•
RVP	Z_r			
T50	Z_5	•	•	×
T90	Z_9	•	×	

Fitting history for Bag-1 Benzene – with “MM3” selected as best fit model.

Fit Parameters				Test with respect to Full			Test with respect to Previous Model		
Model	p	-2lnL	BIC ¹	Dev. ¹	d	Pr> χ^2	Dev.	d	Pr> χ^2
Main Effects	5	248.12	267.08						
MM2	3	248.27	261.81	0.144	2	0.93			
MM3	2	250.02	260.85	1.89	3	0.59	1.75	1	0.19
¹ A lower value indicates a better fit.				¹ The deviation is the difference in the -2loglik statistics for the nested and reference models, respectively, per Equation 14.					

Coefficients and Type-III Tests of Effect for the Full and Best-Fit Models – Benzene (Bag 1).

Effect	Full Model					Best-Fit Model (MM3)				
	Estimate	Std.Err.	d.f.	t -value	Pr> t	Estimate	Std.Err.	d.f.	t -value	Pr> t
Intercept	-4.1019	0.1392	15.07	-29.48	<0.0001	-4.1074	0.1391	15.05	-29.52	<0.0001
Z_e	-0.004685	0.03704	161.12	-0.126	0.90					
Z_a	0.4056	0.03389	161.17	11.97	<0.0001	0.4032	0.03284	161.20	12.28	<0.0001
Z_5	0.04142	0.03789	161.15	1.09	0.28					
Z_9	0.01133	0.03255	161.20	0.35	0.73					
σ_{veh}^2	0.2741					0.2739				
σ_{ε}^2	0.1873					0.1896				