

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 Q.4

Model Fitting Information for

Ethane (Bag 2)

This appendix summarizes model fitting for Bag-2 Ethane. 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: 62

No. censored values: 1

Modeling approach: MIXED MODEL

Estimated Dependent Variable model: NO

Models fit for Bag-2 Ethane

Model term	Notation	Model	
		Full	FM1
etOH	Z_e	•	×
Arom	Z_a	•	•
T50	Z_5	•	•
T90	Z_9	•	•

¹ Indicates “Full minus 1,” etc.

Fitting history for Bag-2 Ethane – with “FM1” 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
Full	5	84.42	95.68	0.6829	1	0.41			
FM1	4	85.96	95.62	2.2256	2	0.33	1.54	1	0.21
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 – Ethane (Bag 2).

Effect	Full Model					Best-Fit Model (MM1)				
	Estimate	Std.Err.	d.f.	t -value	Pr> t	Estimate	Std.Err.	d.f.	t -value	Pr> t
Intercept	-7.7241	0.7325	5.00	-10.5	0.00013	-7.7241	0.7320	5.00	-10.55	0.00013
Z_e	0.07345	0.05873	57.00	1.25	0.22					
Z_a	-0.1260	0.05151	57.00	-2.45	0.018	-0.1092	0.05041	57.00	-2.17	0.034
Z_5	0.1815	0.05727	57.00	3.17	0.0025	0.1452	0.05006	57.00	2.90	0.0053
Z_9	0.1322	0.04994	57.00	2.65	0.010	0.1270	0.05044	57.00	2.52	0.015
σ_{veh}^2	2.6785					2.6669				
σ_{ε}^2	0.1458					0.1517				