

Análisis de la Corriente, 723 (Experimento para determinación de Curvatura)
CB_723_SQ_03252006.sgp (CB_723_SQ_03262006.sfx)
16/04/2006 4:15 p.m.

Analysis Summary

File name: C:\Documents and Settings\Edward A. Moscoso\Mis documentos\Statgraphics\CB_723_SQ_03

Estimated effects for Ol y Ona 723

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-----  
average      = 170,657 +/- 0,44945  
A:Carga      = 22,033 +/- 0,852771  
B:Vapor_E530 = 12,0895 +/- 0,492348  
C:P_C525     = 22,8537 +/- 1,10092  
D:Nivel_V540 = 23,0432 +/- 1,10092  
E:Vapor_E532 = 10,3956 +/- 0,852771  
AB           = 2,57389 +/- 0,603  
AD           = 2,05185 +/- 0,603  
BC           = 4,60407 +/- 0,603  
BD           = 1,19796 +/- 0,603  
BE           = -2,65648 +/- 0,603  
CC           = -5,92321 +/- 0,852771  
CD           = 4,65426 +/- 0,603  
CE           = 8,53093 +/- 0,603  
DE           = -2,28352 +/- 0,603  
EE           = -4,14432 +/- 0,852771  
ABC          = 3,36944 +/- 0,738521  
ACC          = -3,14852 +/- 1,04443  
ACD          = -1,53361 +/- 0,738521  
ACE          = 3,27361 +/- 0,738521  
ADE          = -1,62167 +/- 0,738521  
BBC          = -3,02556 +/- 1,04443  
CCD          = -2,84315 +/- 1,04443  
CCE          = -6,77611 +/- 1,04443  
CDE          = 3,87611 +/- 0,738521  
CEE          = 6,18722 +/- 1,04443  
DEE          = -3,54093 +/- 1,04443  
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```

Standard errors are based on total error with 216 d.f.

The StatAdvisor

This table shows each of the estimated effects and interactions. Also shown is the standard error of each of the effects, which measures their sampling error. To plot the estimates in decreasing order of importance, select Pareto Charts from the list of Graphical Options. To test the statistical significance of the effects, select ANOVA Table from the list of Tabular Options. You can then remove insignificant effects by pressing the alternate mouse button, selecting Analysis Options, and pressing the Exclude button.

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Analysis of Variance for Ol y Ona 723

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
A:Carga	6553,59	1	6553,59	667,55	0,0000
B:Vapor_E530	5919,32	1	5919,32	602,94	0,0000
C:P_C525	4230,56	1	4230,56	430,92	0,0000
D:Nivel_V540	4301,02	1	4301,02	438,10	0,0000
E:Vapor_E532	1458,91	1	1458,91	148,60	0,0000
AB	178,872	1	178,872	18,22	0,0000
AD	113,673	1	113,673	11,58	0,0008
BC	572,332	1	572,332	58,30	0,0000
BD	38,7481	1	38,7481	3,95	0,0482
BE	190,536	1	190,536	19,41	0,0000
CC	473,64	1	473,64	48,24	0,0000
CD	584,877	1	584,877	59,58	0,0000
CE	1964,97	1	1964,97	200,15	0,0000
DE	140,79	1	140,79	14,34	0,0002
EE	231,868	1	231,868	23,62	0,0000
ABC	204,357	1	204,357	20,82	0,0000
ACC	89,2185	1	89,2185	9,09	0,0029
ACD	42,3353	1	42,3353	4,31	0,0390
ACE	192,898	1	192,898	19,65	0,0000
ADE	47,3364	1	47,3364	4,82	0,0292
BBC	82,3859	1	82,3859	8,39	0,0042
CCD	72,7514	1	72,7514	7,41	0,0070
CCE	413,241	1	413,241	42,09	0,0000
CDE	270,436	1	270,436	27,55	0,0000
CEE	344,535	1	344,535	35,09	0,0000
DEE	112,843	1	112,843	11,49	0,0008
Total error	2120,57	216	9,81745		
Total (corr.)	71424,4	242			

R-squared = 97,031 percent
 R-squared (adjusted for d.f.) = 96,6737 percent
 Standard Error of Est. = 3,13328
 Mean absolute error = 2,21932
 Durbin-Watson statistic = 1,5014 (P=0,0000)
 Lag 1 residual autocorrelation = 0,244781

The StatAdvisor

The ANOVA table partitions the variability in Ol y Ona 723 into separate pieces for each of the effects. It then tests the statistical significance of each effect by comparing the mean square against an estimate of the experimental error. In this case, 26 effects have P-values less than 0,05, indicating that they are significantly different from zero at the 95,0% confidence level. The R-Squared statistic indicates that the model as fitted explains 97,031% of the variability in Ol y Ona 723. The adjusted R-squared statistic, which is more suitable for comparing models with different numbers of independent variables, is 96,6737%. The standard error of the estimate shows the standard deviation of the residuals to be 3,13328. The mean absolute error (MAE) of 2,21932 is the average value of the residuals. The Durbin-Watson (DW) statistic tests the residuals to determine if there is any significant correlation based on the order in which they occur in your data file. Since the P-value is less than 0.05, there is an indication of possible serial correlation. Plot the residuals versus row order to see if there is any pattern which can be seen.

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Regression coeffs. for Ol y Ona 723

```
-----  
constant      = 170,657  
A:Carga       = 11,0165  
B:Vapor E530  = 6,04475  
C:P C525      = 11,4269  
D:Nivel V540  = 11,5216  
E:Vapor E532  = 5,19778  
AB            = 1,28694  
AD            = 1,02593  
BC            = 2,30204  
BD            = 0,598981  
BE            = -1,32824  
CC            = -2,9616  
CD            = 2,32713  
CE            = 4,26546  
DE            = -1,14176  
EE            = -2,07216  
ACC           = -1,57426  
BBC           = 0,0  
CCD           = 0,0  
CCE           = 0,0  
CEE           = 3,09361  
DEE           = -1,77046  
ABC           = 0,171944  
ACD           = -2,18838  
ACE           = -1,75125  
ADE           = -0,810833  
BCD           = -2,93435  
BCE           = -4,90083  
CDE           = -2,87157  
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```

The StatAdvisor

This pane displays the regression equation which has been fitted to the data. The equation of the fitted model is

$$\begin{aligned} \text{Ol y Ona 723} = & 170,657 + 11,0165 * \text{Carga} + 6,04475 * \text{Vapor E530} + \\ & 11,4269 * \text{P C525} + 11,5216 * \text{Nivel V540} + 5,19778 * \text{Vapor E532} + \\ & 1,28694 * \text{Carga} * \text{Vapor E530} + 1,02593 * \text{Carga} * \text{Nivel V540} + \\ & 2,30204 * \text{Vapor E530} * \text{P C525} + 0,598981 * \text{Vapor E530} * \text{Nivel V540} - \\ & 1,32824 * \text{Vapor E530} * \text{Vapor E532} - 2,9616 * \text{P C525}^2 + \\ & 2,32713 * \text{P C525} * \text{Nivel V540} + 4,26546 * \text{P C525} * \text{Vapor E532} - \\ & 1,14176 * \text{Nivel V540} * \text{Vapor E532} - 2,07216 * \text{Vapor E532}^2 + \\ & 0,171944 * \text{Carga} * \text{Vapor E530} * \text{P C525} - 1,57426 * \text{Carga} * \text{P C525}^2 - \\ & 2,18838 * \text{Carga} * \text{P C525} * \text{Nivel V540} - 1,75125 * \text{Carga} * \text{P C525} * \text{Vapor E532} - \\ & 0,810833 * \text{Carga} * \text{Nivel V540} * \text{Vapor E532} + 0,0 * \text{Vapor E530}^2 * \text{P C525} - \\ & 2,93435 * \text{Vapor E530} * \text{P C525} * \text{Nivel V540} - \\ & 4,90083 * \text{Vapor E530} * \text{P C525} * \text{Vapor E532} + 0,0 * \text{P C525}^2 * \text{Nivel V540} + \\ & 0,0 * \text{P C525}^2 * \text{Vapor E532} - 2,87157 * \text{P C525} * \text{Nivel V540} * \text{Vapor E532} + \\ & 3,09361 * \text{P C525} * \text{Vapor E532}^2 - 1,77046 * \text{Nivel V540} * \text{Vapor E532}^2 \end{aligned}$$

where the values of the variables are specified in their original units. To have STATGRAPHICS evaluate this function, select Predictions from the list of Tabular Options. To plot the function, select Response Plots from the list of Graphical Options.

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Estimation Results for Ol y Ona 723

Row	Observed Value	Fitted Value	Lower 95,0% CL for Mean	Upper 95,0% CL for Mean
1	136,84	132,643	129,874	135,413
2	142,94	141,517	139,397	143,636
3	149,02	150,39	147,62	153,16
4	137,28	136,0	133,582	138,418
5	144,62	144,476	142,591	146,36
6	151,49	152,951	150,533	155,369
7	144,02	142,383	139,613	145,153
8	149,22	150,461	148,341	152,58
9	158,34	158,538	155,769	161,308
10	145,2	137,827	135,521	140,133
11	150,64	145,72	143,883	147,557
12	152,44	153,613	151,307	155,918
13	145,9	143,314	141,309	145,32
14	155,0	152,494	150,934	154,054
15	165,1	161,674	159,668	163,679
16	146,65	148,801	146,495	151,107
17	157,09	159,268	157,431	161,105
18	171,97	169,734	167,429	172,04
19	148,7	149,855	147,085	152,625
20	152,44	153,619	151,499	155,739
21	152,41	157,383	154,613	160,152
22	153,94	157,472	155,054	159,89
23	163,41	164,208	162,323	166,092
24	170,34	170,943	168,525	173,361
25	160,68	162,064	159,294	164,834
26	171,51	171,771	169,651	173,891
27	182,4	181,478	178,708	184,248
28	138,38	138,523	136,474	140,572
29	147,62	150,0	148,44	151,56
30	159,5	161,477	159,428	163,526
31	137,97	142,479	140,828	144,13
32	150,74	153,558	152,2	154,916
33	163,33	164,637	162,986	166,289
34	147,72	149,461	147,412	151,51
35	158,77	160,142	158,582	161,702
36	172,52	170,823	168,774	172,872
37	148,89	146,284	144,58	147,988
38	156,78	156,014	154,656	157,372
39	167,73	165,743	164,039	167,447
40	150,79	152,37	150,97	153,771
41	163,15	163,387	162,266	164,507
42	174,55	174,403	173,002	175,804
43	159,81	158,456	156,752	160,16
44	170,4	170,76	169,402	172,118
45	181,49	183,063	181,359	184,767
46	153,42	158,047	155,998	160,096
47	162,25	162,88	161,321	164,44
48	168,81	167,714	165,665	169,763
49	166,3	166,263	164,611	167,914
50	174,94	174,068	172,71	175,426
51	181,37	181,874	180,222	183,525
52	169,29	171,453	169,404	173,502
53	179,2	182,23	180,671	183,79
54	195,41	193,007	190,958	195,056
55	143,93	144,403	141,633	147,173
56	156,32	158,483	156,364	160,603
57	168,82	172,564	169,794	175,333
58	154,16	148,958	146,54	151,376
59	162,89	162,64	160,756	164,525
60	174,15	176,323	173,905	178,741
61	157,94	156,538	153,769	159,308
62	168,33	169,823	167,703	171,943
63	181,91	183,108	180,338	185,878
64	156,32	154,741	152,435	157,047
65	168,17	166,308	164,471	168,145
66	179,08	177,874	175,568	180,18
67	162,02	161,426	159,421	163,432
68	176,27	174,28	172,72	175,839

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69	187,37	187,133	185,127	189,138
70	171,31	168,111	165,806	170,417
71	182,44	182,252	180,415	184,089
72	193,94	196,392	194,086	198,698
73	161,68	166,238	163,468	169,008
74	177,27	172,142	170,022	174,261
75	178,19	178,045	175,276	180,815
76	175,78	175,053	172,635	177,471
77	186,45	183,929	182,044	185,813
78	191,03	192,804	190,386	195,222
79	178,87	180,843	178,073	183,612
80	192,67	192,69	190,57	194,809
81	209,32	204,537	201,767	207,306
82	137,86	138,817	136,448	141,186
83	143,69	146,864	144,996	148,733
84	157,18	154,912	152,543	157,28
85	138,3	140,846	138,811	142,88
86	146,11	148,495	146,791	150,199
87	156,0	156,145	154,11	158,179
88	148,74	145,9	143,531	148,269
89	150,44	153,152	151,283	155,021
90	162,47	160,403	158,035	162,772
91	145,79	144,986	142,995	146,976
92	154,17	153,689	152,092	155,286
93	161,95	162,393	160,402	164,384
94	146,95	149,144	147,406	150,883
95	158,12	159,135	157,734	160,536
96	170,08	169,126	167,387	170,864
97	151,18	153,303	151,313	155,294
98	165,62	164,581	162,984	166,178
99	175,72	175,858	173,868	177,849
100	150,81	151,223	148,854	153,591
101	158,86	157,434	155,565	159,303
102	166,64	163,646	161,277	166,014
103	159,23	157,512	155,477	159,546
104	168,01	166,695	164,991	168,399
105	177,31	175,878	173,843	177,912
106	163,74	160,775	158,406	163,144
107	176,56	172,93	171,061	174,798
108	190,0	185,085	182,716	187,453
109	141,03	144,198	142,41	145,987
110	151,26	154,038	152,638	155,439
111	163,3	163,878	162,09	165,667
112	145,35	146,826	145,384	148,268
113	155,47	156,268	154,954	157,582
114	167,19	165,71	164,268	167,152
115	152,93	152,479	150,691	154,267
116	165,13	161,524	160,123	162,924
117	176,23	170,568	168,78	172,356
118	149,4	154,882	153,44	156,324
119	159,65	164,612	163,602	165,622
120	169,75	174,341	172,899	175,784
121	155,94	159,64	158,419	160,861
122	170,71	170,657	169,771	171,542
123	183,48	181,673	180,452	182,894
124	163,59	164,398	162,956	165,84
125	176,2	176,701	175,691	177,711
126	173,15	189,005	187,563	190,447
127	161,28	162,792	161,003	164,58
128	169,49	169,262	167,862	170,663
129	176,52	175,733	173,945	177,521
130	169,97	169,68	168,238	171,122
131	181,91	179,122	177,808	180,436
132	189,49	188,564	187,122	190,006
133	175,26	173,542	171,754	175,33
134	185,8	185,956	184,555	187,357
135	199,73	198,37	196,581	200,158
136	148,6	149,579	147,211	151,948
137	163,43	161,212	159,343	163,081
138	177,27	172,845	170,476	175,214
139	155,48	152,806	150,772	154,841
140	168,37	164,041	162,337	165,745
141	182,43	175,276	173,241	177,311

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142	161,28	159,058	156,69	161,427
143	171,77	169,896	168,027	171,764
144	188,22	180,733	178,364	183,101
145	161,45	164,779	162,788	166,77
146	172,91	175,534	173,937	177,132
147	183,9	186,29	184,299	188,281
148	168,35	170,136	168,398	171,874
149	180,1	182,178	180,778	183,579
150	195,15	194,221	192,482	195,959
151	172,39	175,493	173,502	177,483
152	186,17	188,822	187,225	190,419
153	197,74	202,151	200,161	204,142
154	181,19	174,361	171,992	176,73
155	181,19	181,09	179,222	182,959
156	189,41	187,82	185,451	190,189
157	181,83	181,848	179,813	183,882
158	192,35	191,549	189,845	193,253
159	199,78	201,25	199,216	203,285
160	184,76	186,309	183,94	188,678
161	196,64	198,982	197,113	200,851
162	210,36	211,655	209,286	214,024
163	140,64	138,2	135,43	140,97
164	146,92	145,421	143,302	147,541
165	153,88	152,643	149,873	155,412
166	141,4	138,901	136,483	141,318
167	147,28	145,724	143,84	147,608
168	153,48	152,548	150,13	154,966
169	145,29	142,627	139,857	145,396
170	147,62	149,052	146,933	151,172
171	153,77	155,478	152,708	158,248
172	148,49	151,541	149,235	153,847
173	159,96	161,055	159,218	162,892
174	169,69	170,57	168,264	172,876
175	151,74	154,371	152,366	156,377
176	161,19	165,173	163,613	166,733
177	176,08	175,974	173,969	177,98
178	164,57	157,202	154,896	159,508
179	168,37	169,29	167,453	171,127
180	181,37	181,379	179,073	183,685
181	160,11	158,174	155,404	160,944
182	166,15	166,833	164,714	168,953
183	175,13	175,492	172,723	178,262
184	166,44	163,135	160,717	165,553
185	181,72	174,766	172,881	176,65
186	185,24	186,396	183,978	188,814
187	160,87	165,07	162,3	167,84
188	167,44	179,672	177,553	181,792
189	196,75	194,275	191,505	197,044
190	141,99	139,542	137,493	141,591
191	149,99	147,745	146,185	149,305
192	152,81	155,948	153,899	157,997
193	142,79	140,841	139,19	142,493
194	148,67	148,647	147,289	150,005
195	155,61	156,452	154,801	158,103
196	143,54	145,166	143,117	147,215
197	149,27	152,574	151,014	154,134
198	155,67	159,982	157,933	162,031
199	158,37	159,336	157,632	161,04
200	168,48	169,066	167,708	170,424
201	179,77	178,795	177,091	180,499
202	161,12	162,766	161,365	164,166
203	176,3	173,782	172,662	174,903
204	188,15	184,799	183,398	186,199
205	169,23	166,195	164,491	167,899
206	179,89	178,499	177,141	179,857
207	194,03	190,802	189,098	192,506
208	167,67	169,58	167,531	171,629
209	179,28	177,687	176,127	179,247
210	181,05	185,795	183,746	187,844
211	168,54	175,139	173,488	176,791
212	189,07	186,219	184,86	187,577
213	198,21	197,298	195,646	198,949
214	179,02	177,674	175,625	179,723

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215	193,24	191,724	190,165	193,284
216	204,81	205,775	203,726	207,824
217	144,99	140,884	138,114	143,653
218	150,56	150,069	147,949	152,188
219	154,12	159,254	156,484	162,023
220	144,28	142,782	140,364	145,2
221	150,64	151,569	149,685	153,454
222	157,57	160,357	157,939	162,775
223	145,06	147,706	144,936	150,476
224	150,86	156,096	153,976	158,215
225	157,46	164,485	161,715	167,255
226	164,83	167,132	164,826	169,437
227	179,22	177,076	175,239	178,913
228	190,41	187,021	184,715	189,327
229	172,28	171,16	169,155	173,166
230	183,92	182,392	180,832	183,951
231	197,23	193,623	191,618	195,629
232	178,85	175,189	172,883	177,494
233	192,66	187,707	185,87	189,544
234	204,98	200,226	197,92	202,531
235	179,33	180,986	178,216	183,755
236	189,07	188,541	186,422	190,661
237	196,96	196,097	193,327	198,867
238	184,99	187,144	184,726	189,562
239	197,35	197,672	195,787	199,556
240	206,47	208,199	205,781	210,617
241	191,66	190,277	187,508	193,047
242	203,54	203,776	201,657	205,896
243	216,03	217,275	214,506	220,045

The StatAdvisor

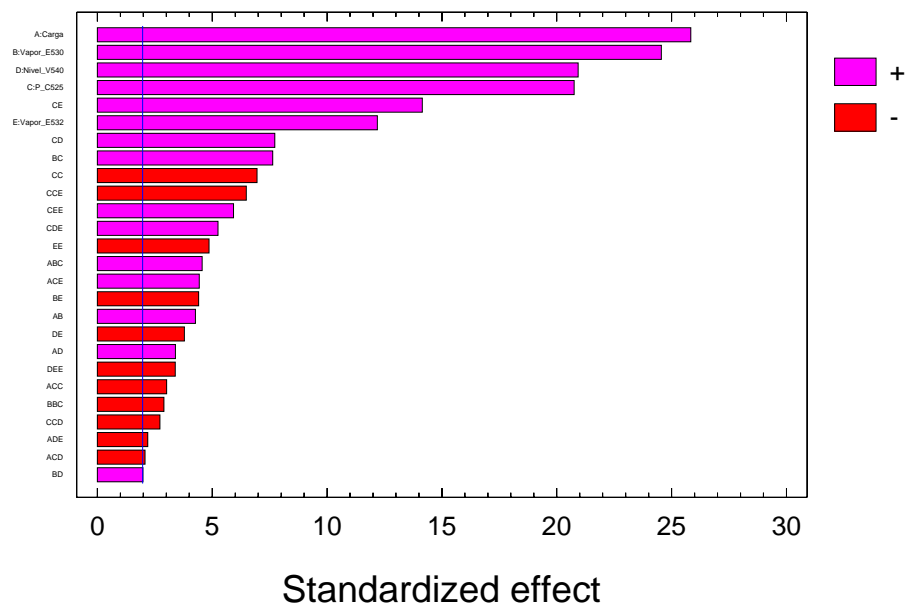
 This table contains information about values of Ol_y_Ona_723 generated using the fitted model. The table includes:

- (1) the observed value of Ol y Ona 723 (if any)
- (2) the predicted value of Ol y Ona 723 using the fitted model
- (3) 95,0% confidence limits for the mean response

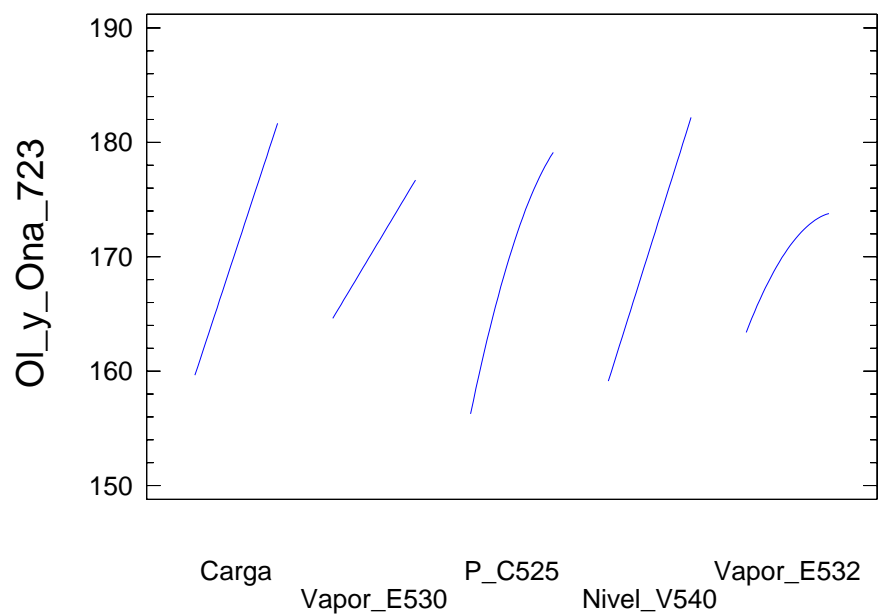
Each item corresponds to the values of the experimental factors in a specific row of your data file. To generate forecasts for additional combinations of the factors, add additional rows to the bottom of your data file. In each new row, enter values for the experimental factors but leave the cell for the response empty. When you return to this pane, forecasts will be added to the table for the new rows, but the model will be unaffected.

Análisis de la Corriente, 723 (Experimento para determinación de Curvatura)
CB_723_SQ_03252006.sgp (CB_723_SQ_03262006.sfx)
16/04/2006 4:15 p.m.

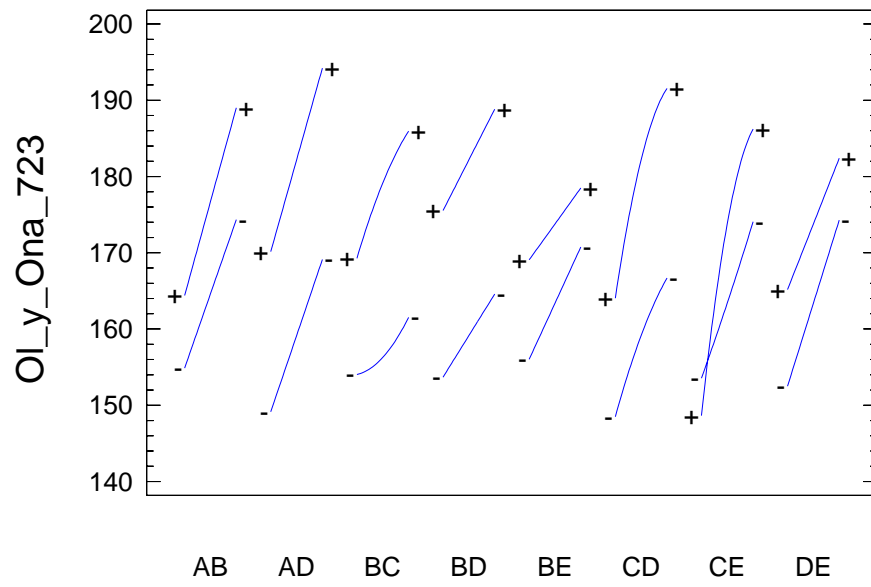
Standardized Pareto Chart for OI_y_Ona_723



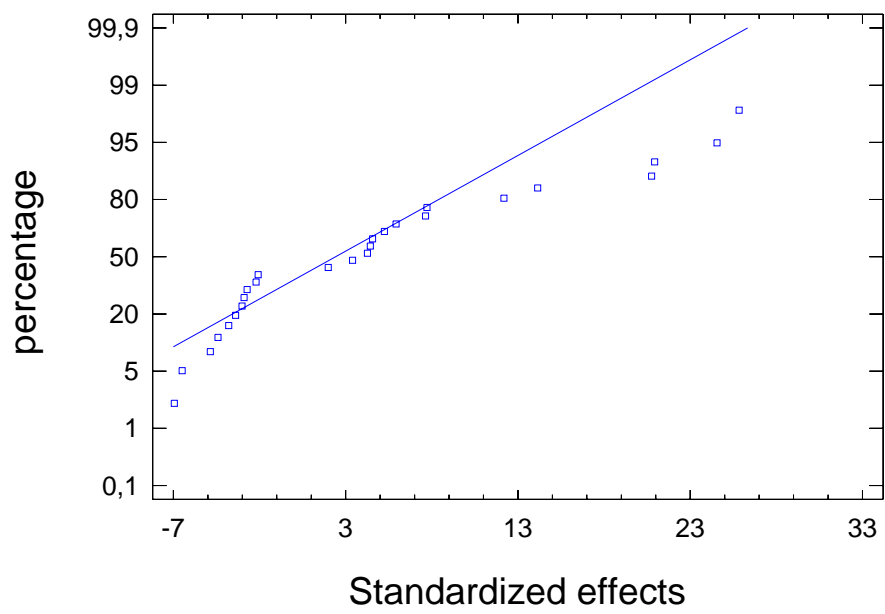
Main Effects Plot for Ol_y_Ona_723



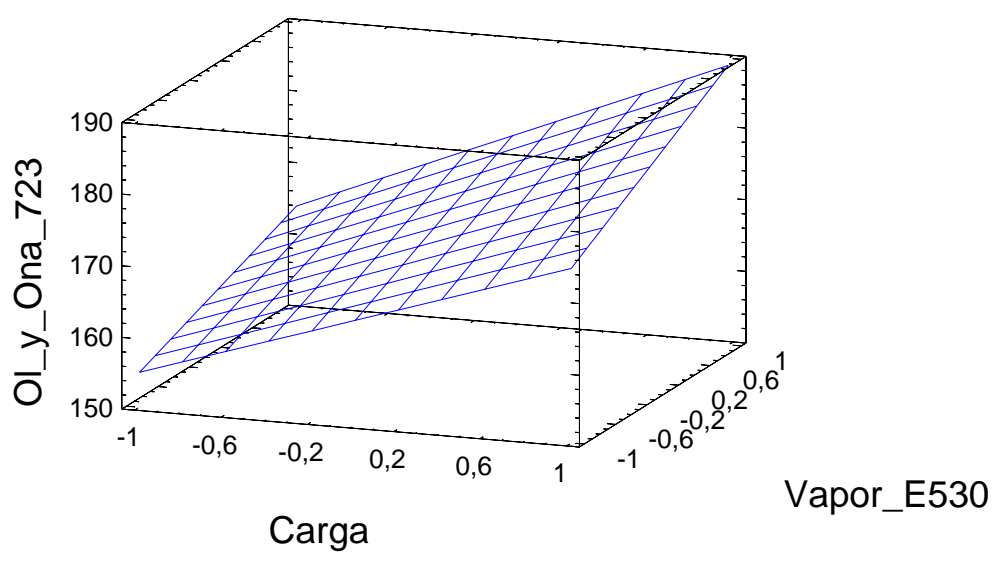
Interaction Plot for Ol_y_Ona_723



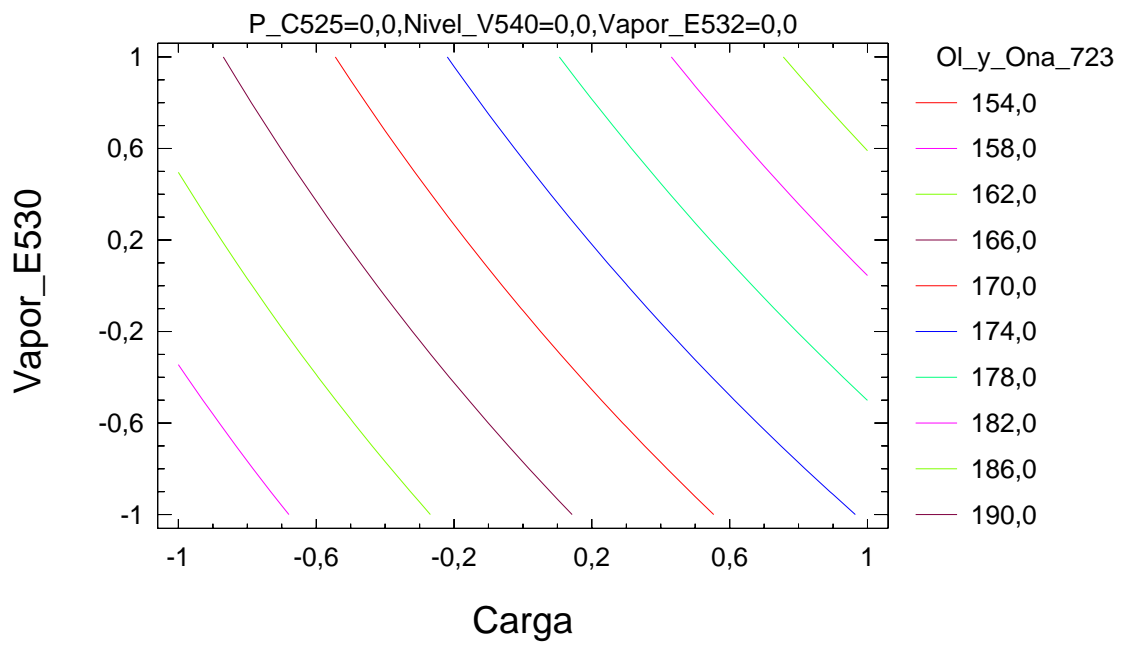
Normal Probability Plot for OI_y_Ona_723



Estimated Response Surface
P_C525=0,0,Nivel_V540=0,0,Vapor_E532=0,0



Contours of Estimated Response Surface



n de Curvatura)
Q 03262006.sfx)
2006 4:15 p.m.

Residual Plot for Ol_y_Ona_723

