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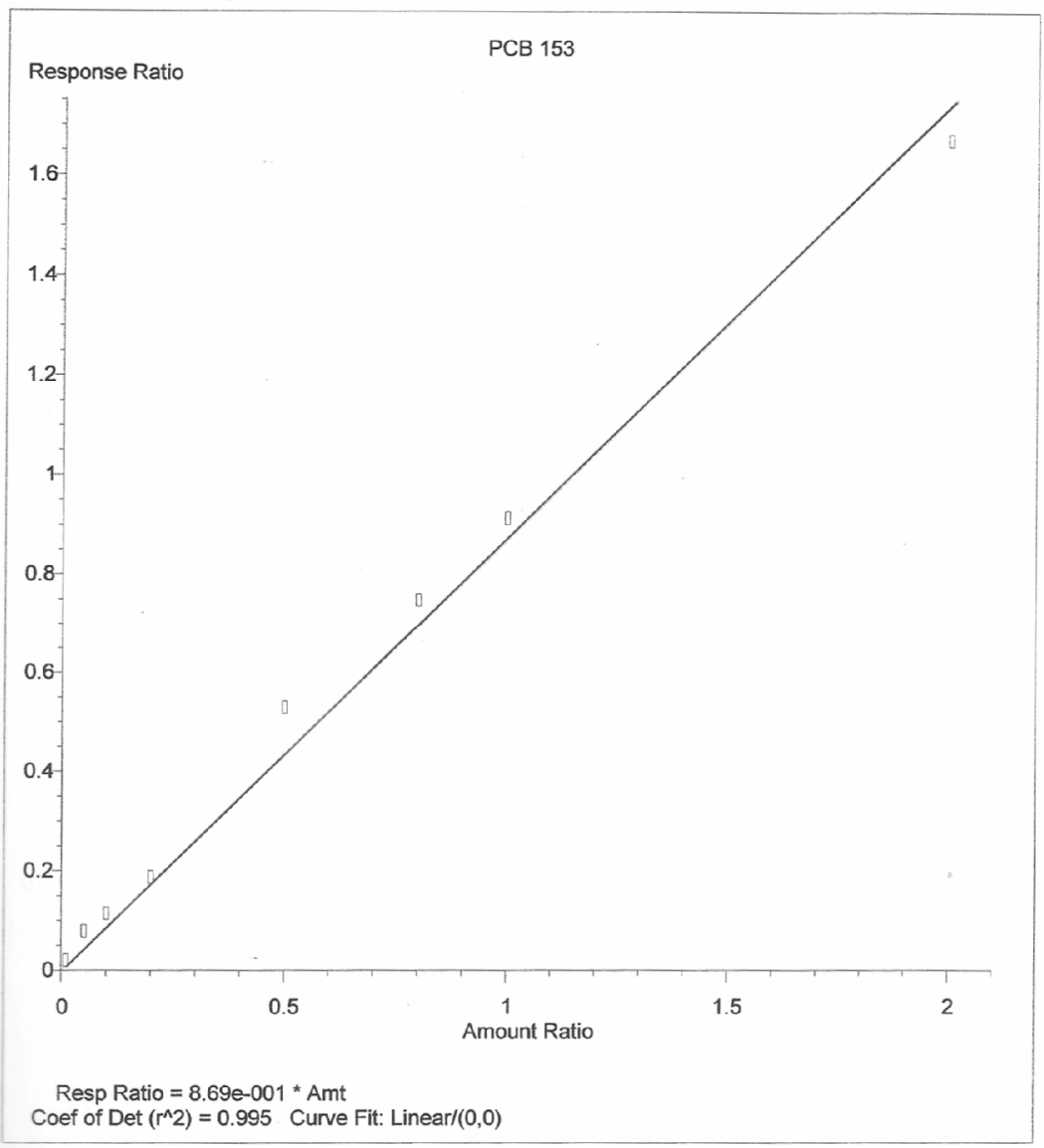
9
Anexos

9.1.
Anexo 1 - Curva analítica usada nas determinações de PCB-153.



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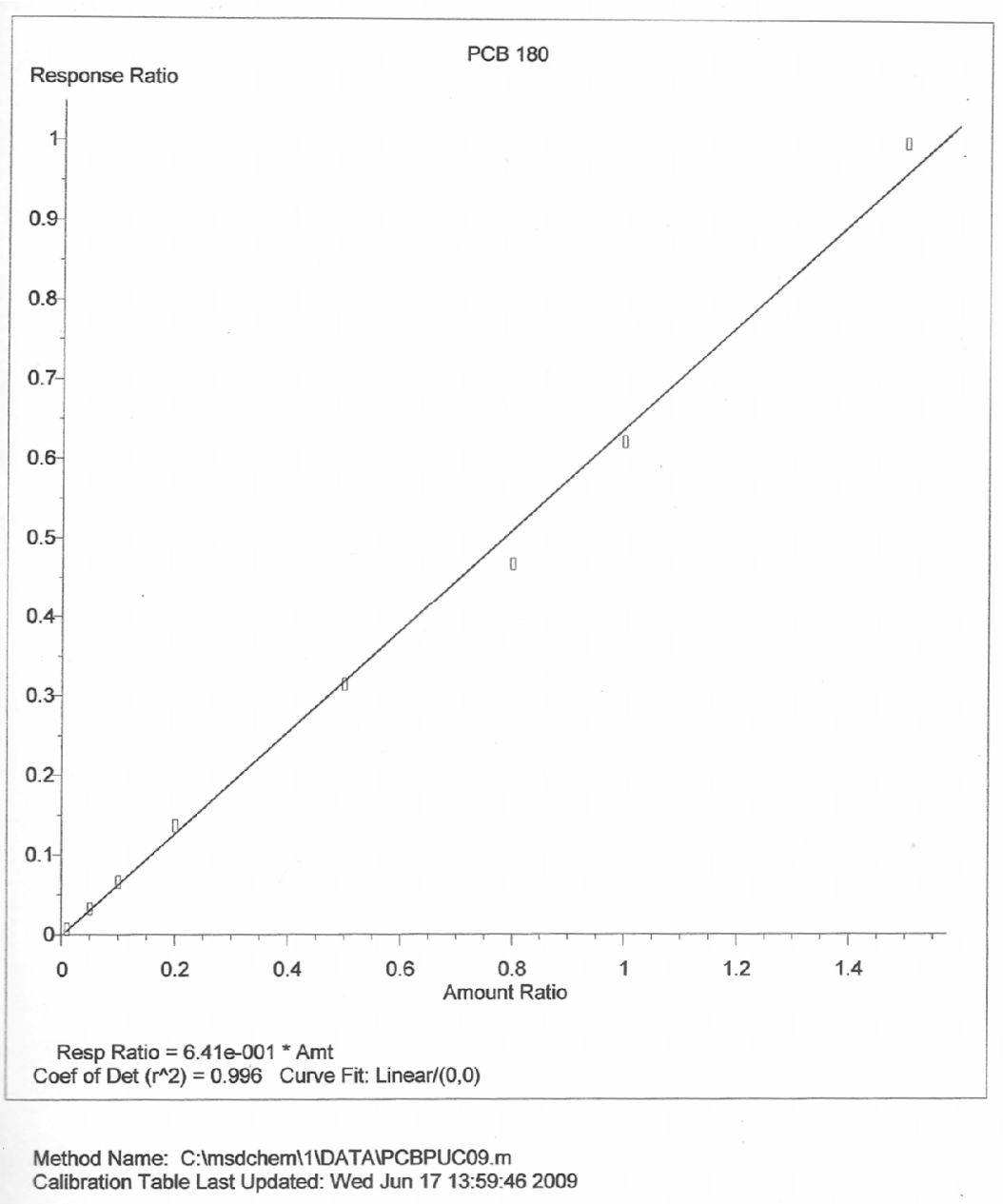
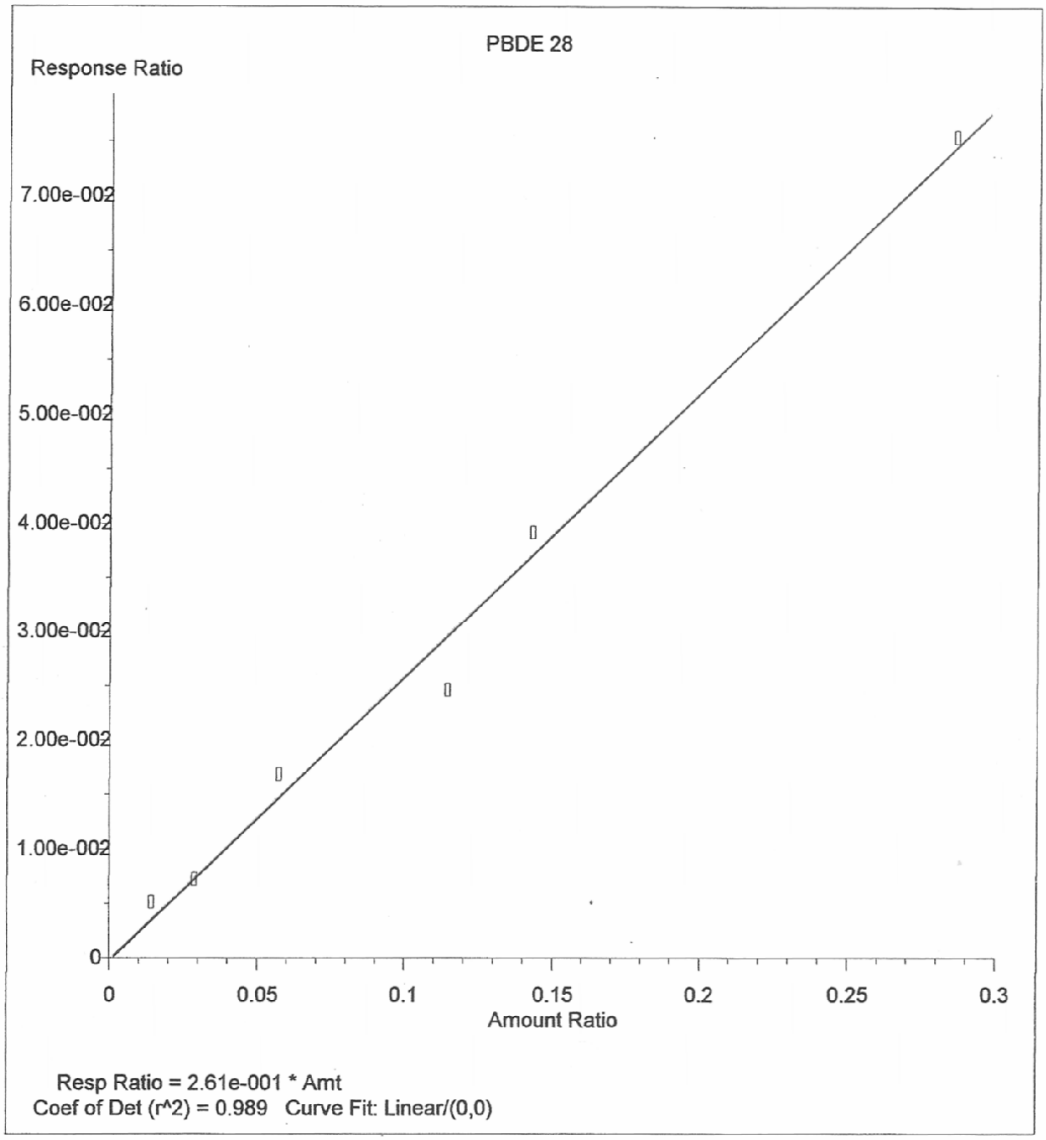
Calibration Table Last Updated: Wed Jun 17 13:59:46 2009

9.2.
Anexo 2 - Curva analítica usada nas determinações de PCB-180.



9.3.
Anexo 3 - Curvas analíticas usadas nas determinações dos BDEs.



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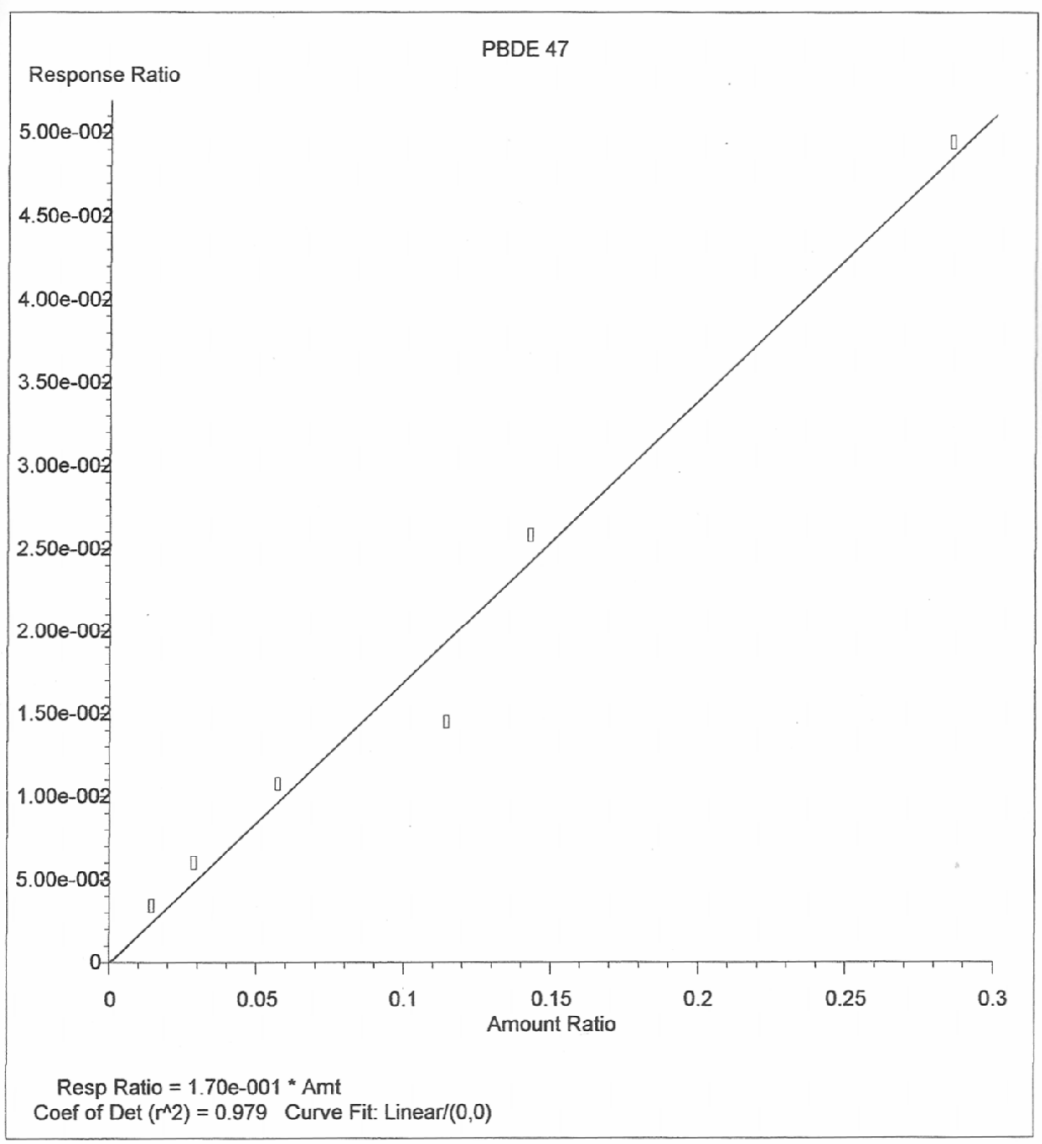

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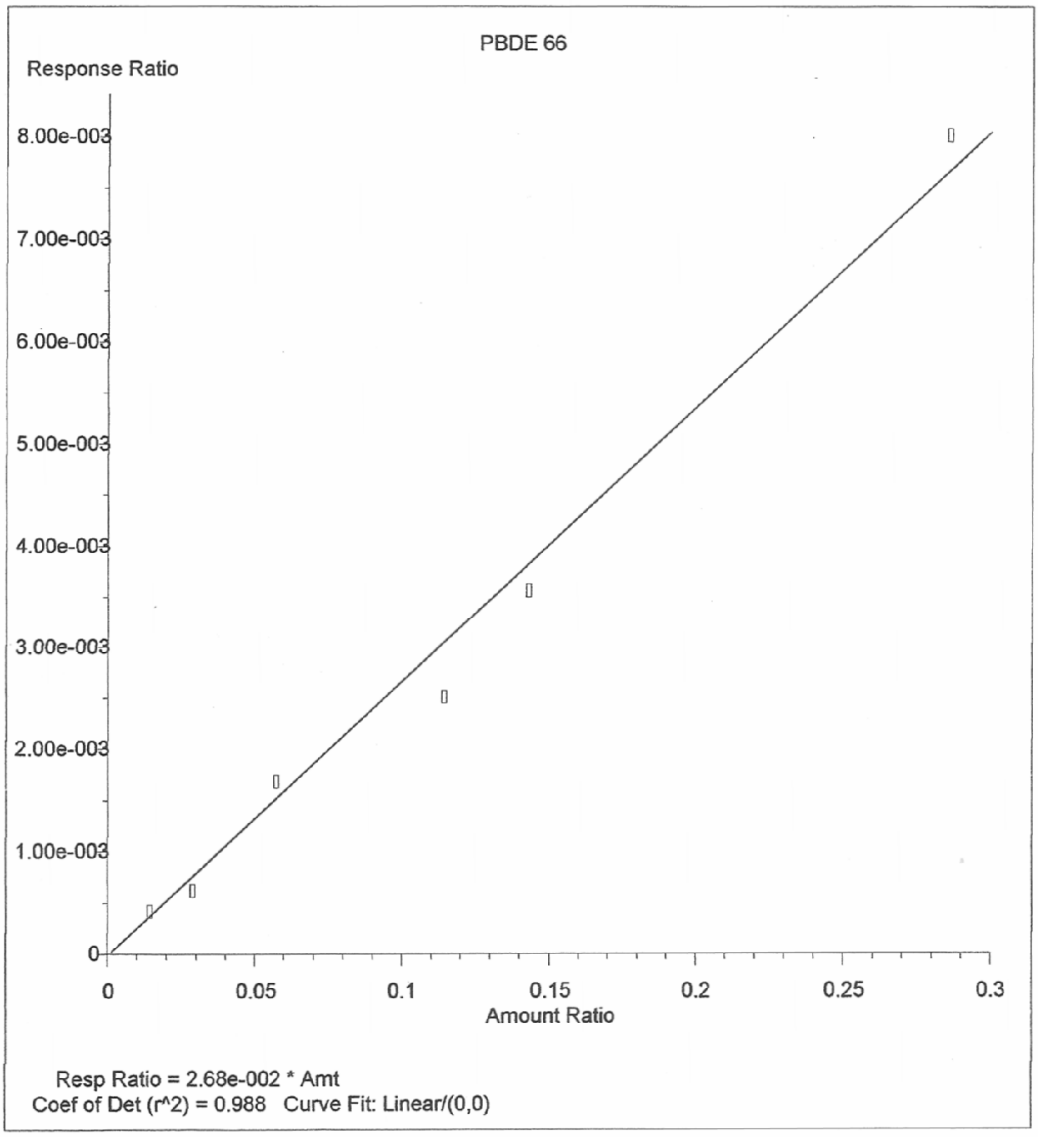

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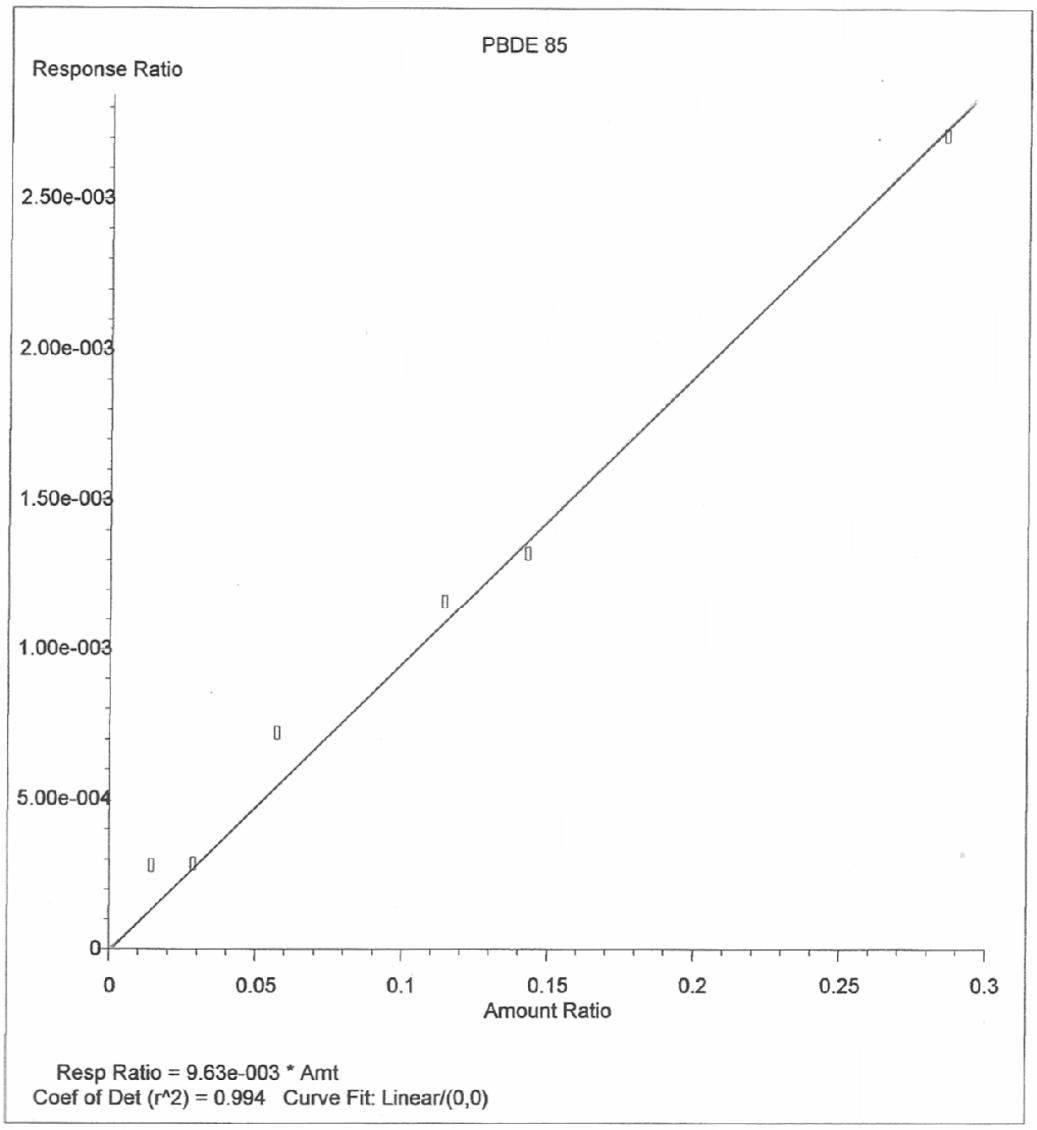

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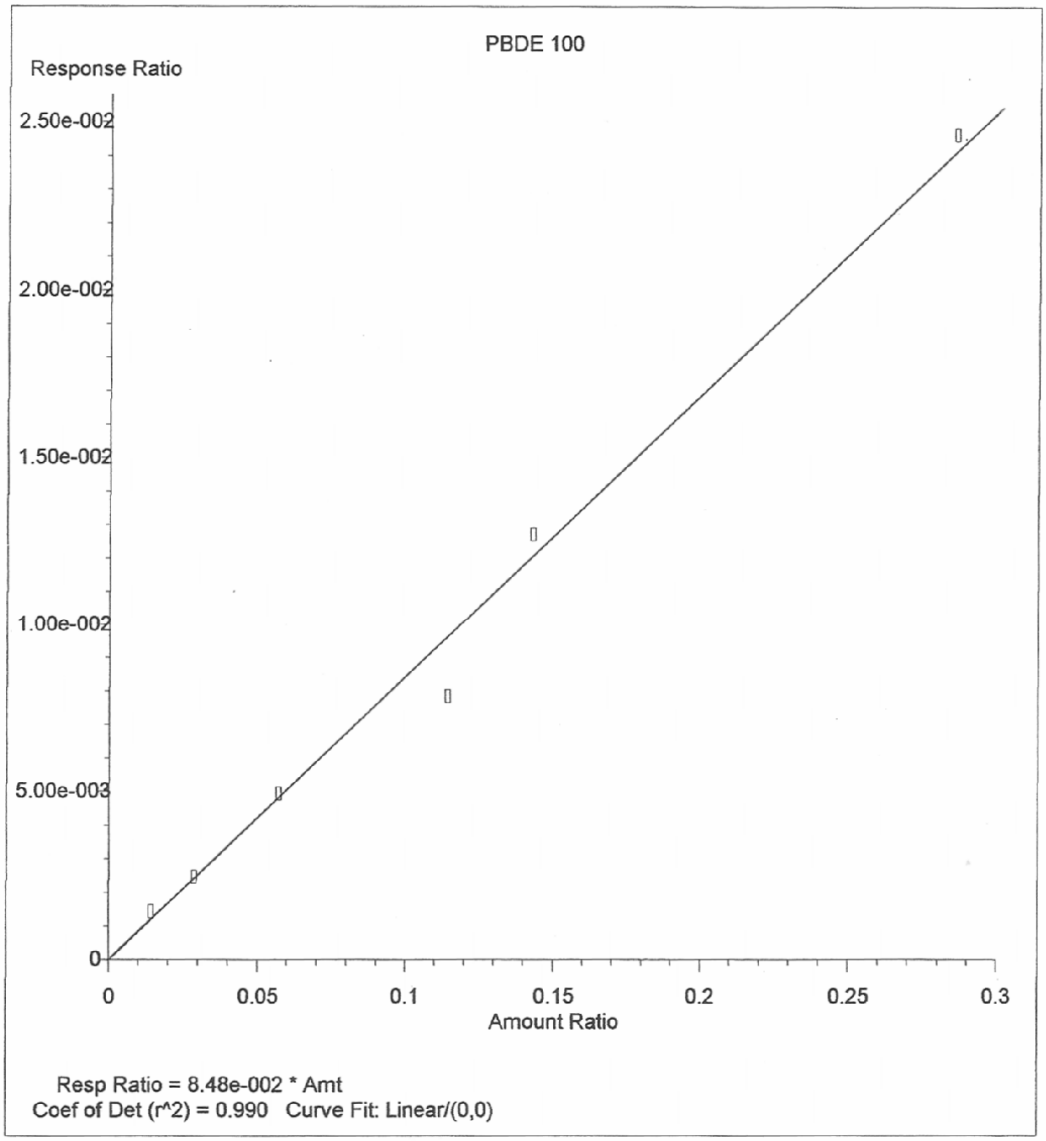

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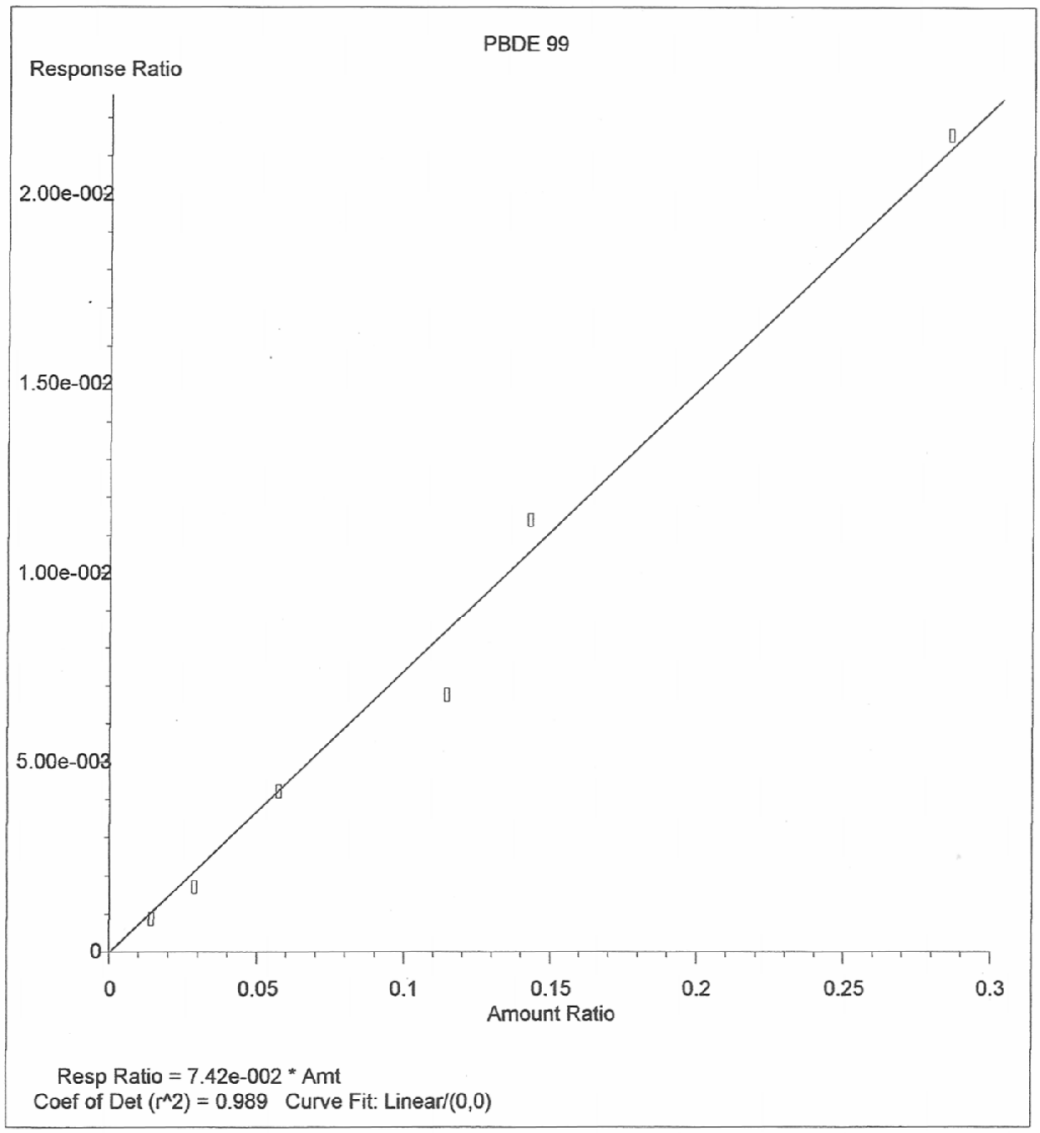

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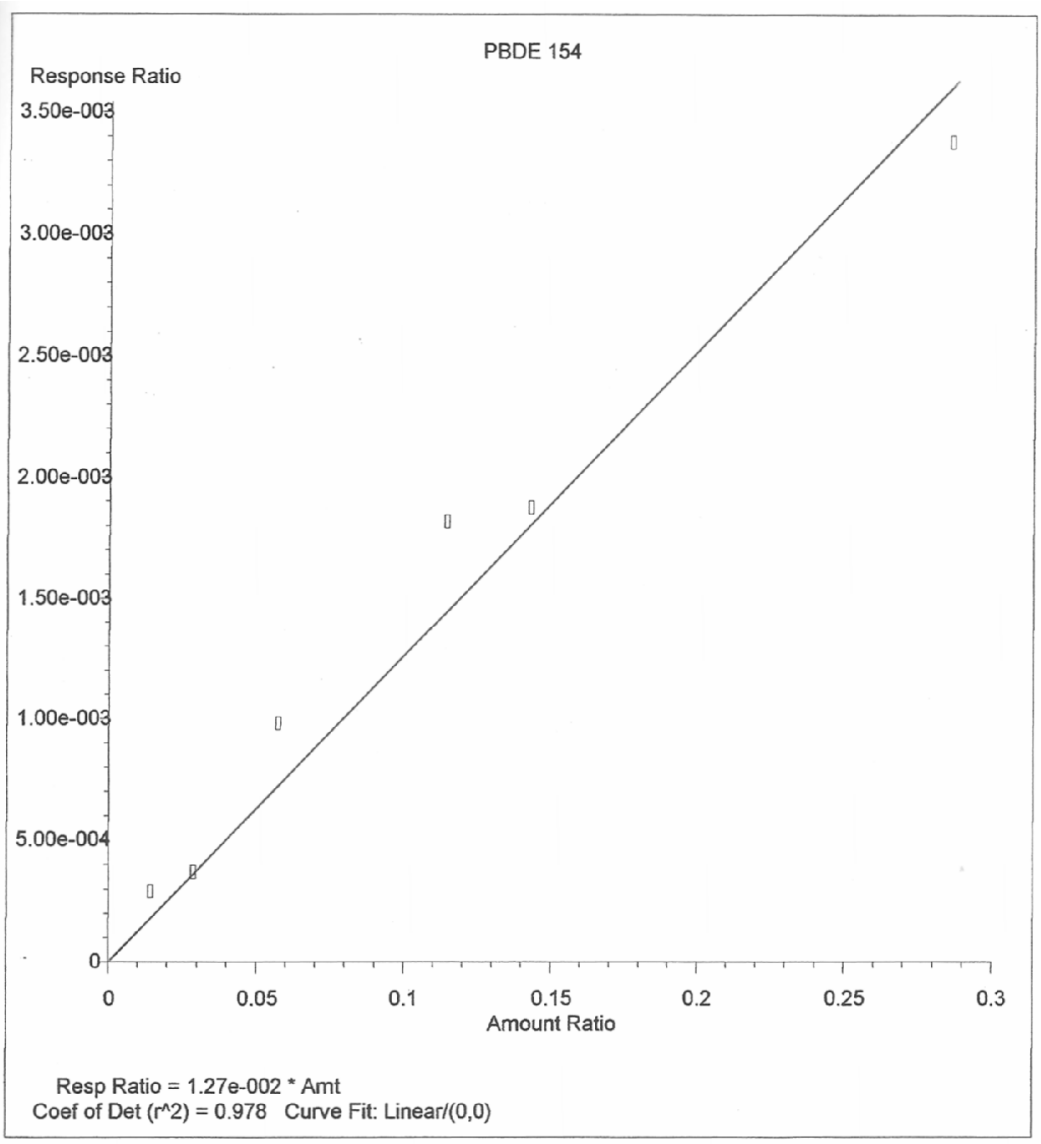

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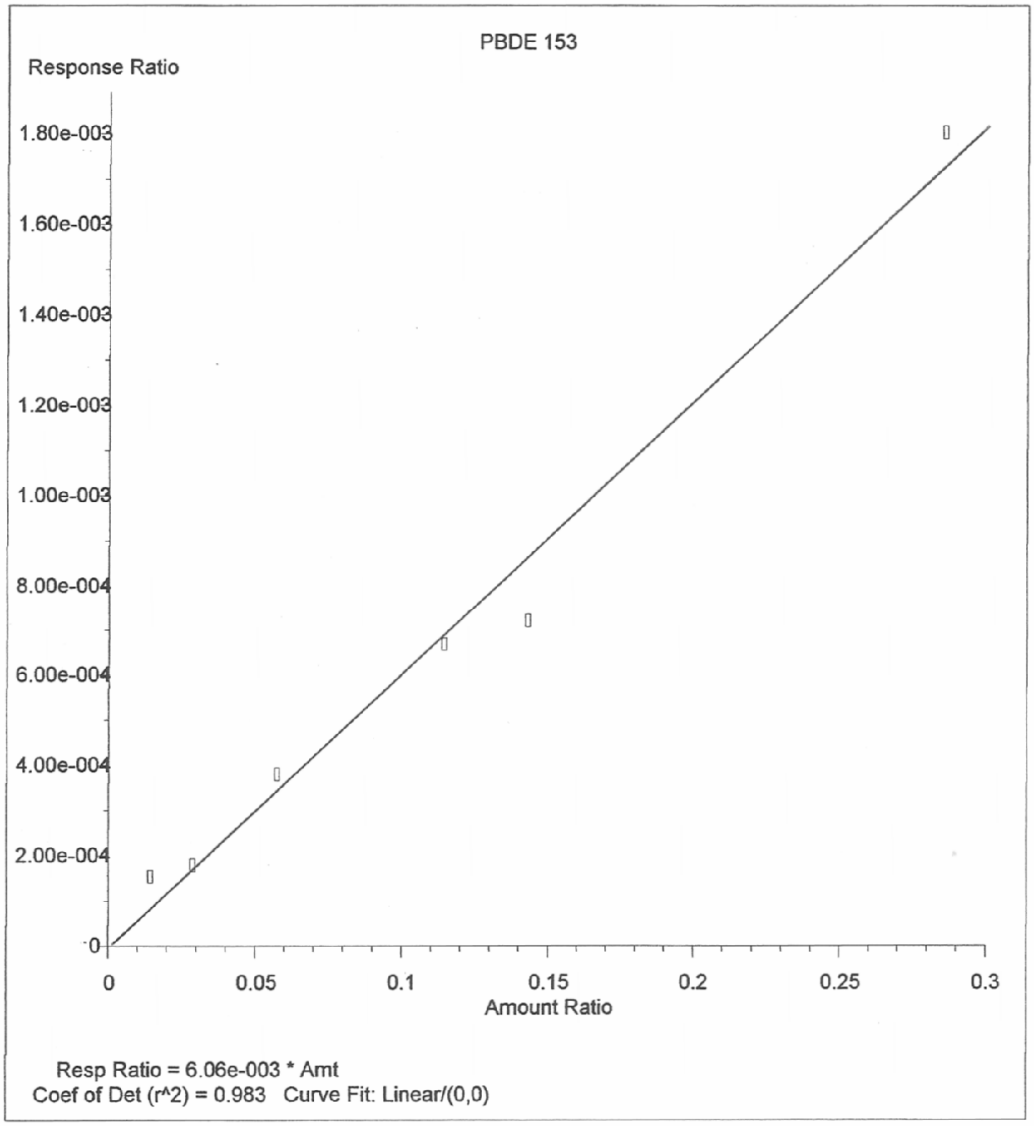

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Calibration Table Last Updated: Fri May 08 11:10:39 2009

9.4.
Anexo 4 - Componentes dos Padrões Certificados

Padrão de referência certificado: Mistura de PBDEs, 9 componentes, (Bromodiphenyl Ethers Lake Michigan Study), AccuStandard, BDE-LMS, contendo 10 µg/mL de cada um dos seguintes PBDEs dissolvidos em isooctano:

Éter difenílico - 2,4,4'-tribromado (BDE-28)

Éter difenílico - 2,2',4,4'-tetrabromado (BDE-47)

Éter difenílico - 2,3',4,4'- tetrabromado (BDE-66)

Éter difenílico - 2,2',3,4,4'- pentabromado (BDE-85)

Éter difenílico - 2,2',4,4',5-pentabromado (BDE-99)

Éter difenílico - 2,2',4,4',6-pentabromado (BDE-100)

Éter difenílico - 2,2',3,4,4',5'-hexabromado (BDE-138)

Éter difenílico - 2,2',4,4',5,5'-hexabromado (BDE-153)

Éter difenílico - 2,2',4,4',5,6'-hexabromado (BDE-154)

Padrão de referência certificado: Mistura de PCBs, 24 componentes, (PCB Congener Mix for West Coast Fish Studies), AccuStandard, C-WCFS, contendo 25 µg/mL de cada um dos seguintes PCBs dissolvidos em isooctano:

Bifenila - 2,4',5-triclorada (PCB 31)
Bifenila - 2',3,4-triclorada (PCB 33)
Bifenila - 2,2',4,5'-tetraclorada (PCB 49)
Bifenila - 2,3,3',4'-tetraclorada (PCB 56)
Bifenila - 2,3,4,4'-tetraclorada (PCB 60)
Bifenila - 2,3',4',5-tetraclorada (PCB 70)
Bifenila - 2,4,4',5-tetraclorada (PCB 74)
Bifenila - 2,2',3,4,5'-pentaclorada (PCB 87)
Bifenila - 2,2',3,5',6-pentaclorada (PCB 95)
Bifenila - 2,2',3',4,5-pentaclorada (PCB 97)
Bifenila - 2,2',4,4',5-pentaclorada (PCB 99)
Bifenila - 2,3,3',4',6-pentaclorada (PCB 110)
Bifenila - 2,2',3,3',4,6'-hexaclorada (PCB 132)
Bifenila - 2,2',3,4,5,5'-hexaclorada (PCB 141)
Bifenila - 2,2',3,4',5',6-hexaclorada (PCB 149)
Bifenila - 2,2',3,5,5',6-hexaclorada (PCB 151)
Bifenila - 2,3,3',4,4',5-hexaclorada (PCB 156)
Bifenila - 2,3,3',4,4',6-hexaclorada (PCB 158)
Bifenila - 2,2',3,3',4,5,6'-heptaclorada (PCB 174)
Bifenila - 2,2',3,3',4',5,6-heptaclorada (PCB 177)
Bifenila - 2,2',3,4,4',5',6-heptaclorada (PCB 183)
Bifenila - 2,2',3,3',4,4',5,5'-octaclorada (PCB 194)
Bifenila - 2,2',3,3',4,5,5',6'-octaclorada (PCB 199)
Bifenila - 2,2',3,4,4',5,5',6-octaclorada (PCB 203)

Padrão de referência certificado: Mistura de PCBs, 28 componentes, (WHO/NIST/NOAA Congener List), AccuStandard, C-WNN, contendo 10µg/mL de cada um dos seguintes PCBs dissolvidos em isooctano:

Bifenila - 2,4'- diclorada (PCB 8)

Bifenila - 2,2',5-triclorada (PCB 18)

Bifenila - 2,4,4'-triclorada (PCB 28)

Bifenila - 2,2',3,5'-tetraclorada (PCB 44)

Bifenila - 2,2',5,5'-tetraclorada (PCB 52)

Bifenila - 2,3',4,4'-tetraclorada (PCB 66)

Bifenila - 3,3',4,4'-tetraclorada (PCB 77)

Bifenila - 3,4,4',5-tetraclorada (PCB 81)

Bifenila - 2,2',4,5,5'-pentaclorada (PCB 101)

Bifenila - 2,3,3',4,4'-pentaclorada (PCB 105)

Bifenila - 2,3,4,4',5-pentaclorada (PCB 114)

Bifenila - 2,3',4,4',5-pentaclorada (PCB 118)

Bifenila - 2',3,4,4',5-pentaclorada (PCB 123)

Bifenila - 3,3',4,4',5-pentaclorada (PCB 126)

Bifenila - 2,2',3,3',4,4'-hexaclorada (PCB 128)

Bifenila - 2,2',3,4,4',5'-hexaclorada (PCB 138)

Bifenila - 2,2',4,4',5,5'-hexaclorada (PCB 153)

Bifenila - 2,3,3',4,4',5-hexaclorada (PCB 156)

Bifenila - 2,3,3',4,4',5'-hexaclorada (PCB 157)

Bifenila - 2,3',4,4',5,5'-hexaclorada (PCB 167)

Bifenila - 3,3',4,4',5,5'-hexaclorada (PCB 169)

Bifenila - 2,2',3,3',4,4',5-heptaclorada (PCB 170)

Bifenila - 2,2',3,4,4',5,5'-heptaclorada (PCB 180)

Bifenila - 2,2',3,4',5,5',6-heptaclorada (PCB 187)

Bifenila - 2,3,3',4,4',5,5'-heptaclorada (PCB 190)

Bifenila - 2,2',3,3',4,4',5,6-octaclorada (PCB 195)

Bifenila - 2,2',3,3',4,4',5,5',6-nonaclorada (PCB 206)

Bifenila – decaclorada (PCB 209)

9.5.
Anexo 5 - Figuras com as tabelas dos resultados dos testes estatísticos (imagens importadas do pacote estatístico PASW statistics, como figuras).

Kruskal-Wallis Test

Ranks			
	Campanhas de Amostragem	N	Mean Rank
massa (g)	1ªcoleta_seca	5	6,00
	2ªcoleta_chuvosa	5	6,60
	3ªcoleta_seca	5	11,40
	Total	15	
comprimento(cm)	1ªcoleta_seca	5	8,00
	2ªcoleta_chuvosa	5	6,60
	3ªcoleta_seca	5	9,40
	Total	15	

Test Statistics[a,b]		
	massa (g)	comprimento (cm)
Chi-Square	4,542	1,093
df	2	2
Asymp. Sig.	0,103	0,579

a. Kruskal Wallis Test

b. Grouping Variable: Campanhas de Amostragem

Figura 60 – Teste de significância (Kruskal-Wallis, p > 0,05) para verificar a hipótese nula de que as populações de músculos de corvinas das três campanhas de amostragens têm distribuições de comprimentos e de massas idênticas.

Kruskal-Wallis Test

Ranks			
	campanha de amostragem	N	Mean Rank
massa (g)	1ªcoleta_seca	5	5,00
	2ªcoleta_chuvosa	5	7,20
	3ªcoleta_seca	5	11,80
	Total	15	
comprimento (cm)	1ªcoleta_seca	5	7,00
	2ªcoleta_chuvosa	5	6,80
	3ªcoleta_seca	5	10,20
	Total	15	

Test Statistics[a,b]		
	massa (g)	comprimento (cm)
Chi-Square	6,243	1,850
df	2	2
Asymp. Sig.	,054	,397

a. Kruskal Wallis Test

b. Grouping Variable: campanha de coleta

Figura 61 - Teste de significância (Kruskal-Wallis, p > 0,05) para verificar a hipótese nula de que as populações de tainhas das três campanhas de amostragens têm distribuições de comprimentos e de massas idênticas. (imagem importada do pacote estatístico PASW statistics).

T-Test

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Ensaio de Recuperação	63	102,3095	12,88205	1,62299

One-Sample Test

	Test Value = 100					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Ensaio de Recuperação	1,423	62	0,160	2,30952	-0,9348	5,5538

Figura 62 – Teste de significância (t de Student, p>0,05) para verificar a hipótese nula de que a média das recuperações foi igual a 100%.

Kruskal-Wallis Test

Ranks

	Campanhas de Amostragem	N	Mean Rank
Lipídios (mg/g-peso seco)	1ªcoleta_seca	5	6,80
	2ªcoleta_chuvosa	5	10,20
	3ªcoleta_seca	5	7,00
	Total	15	

Test Statistics[a,b]

	Lipídios (mg/g-peso seco)
Chi-Square	1,930
df	2
Asymp. Sig.	0,381

a. Kruskal Wallis Test

b. Grouping Variable: Campanhas de Amostragem

Figura 63 - Teste de significância (Kruskal-Wallis, p > 0,05) para verificar a hipótese nula de que as populações de músculos de corvinas das três campanhas de amostragens têm distribuições dos teores de lipídios idênticas.

Kruskal-Wallis Test

Ranks

	Campanhas de Amostragem	N	Mean Rank
Lipídios (mg/g-peso seco)	1ªcoleta_seca	5	6,00
	2ªcoleta_chuvosa	5	13,00
	3ªcoleta_seca	5	5,00
	Total	15	

Test Statistics[a,b]

	Lipídios (mg/g-peso seco)
Chi-Square	9,815
df	2
Asymp. Sig.	0,007

a. Kruskal Wallis Test

b. Grouping Variable: Campanhas de Amostragem

Figura 64 - Teste de significância (Kruskal-Wallis, p > 0,05) para verificar a hipótese nula de que as populações de músculos de tainhas das três campanhas de amostragens têm distribuições dos teores de lipídios idênticas.

Mann-Whitney Test

Ranks

	Campanhas de Amostragem	N	Mean Rank	Sum of Ranks
Lipídios (mg/g-peso seco)	1ªcoleta_seca	5	3,00	15,00
	2ªcoleta_chuvosa	5	8,00	40,00
	Total	10		

Test Statistics[b]

	Lipídios (mg/g-peso seco)
Mann-Whitney U	,000
Wilcoxon W	15,000
Z	-2,660
Asymp. Sig. (2-tailed)	0,008
Exact Sig. [2*(1-tailed Sig.)]	0,008[a]

a. Not corrected for ties.

b. Grouping Variable: Campanhas de Amostragem

Figura 65 - Teste de significância (Mann-Whitney, p>0,05) para verificar a hipótese nula de que as populações de músculos de tainhas das 1ª e 2ª campanhas de amostragens têm distribuições dos teores de lipídios idênticas.

Mann-Whitney Test

Ranks

	Campanhas de Amostragem	N	Mean Rank	Sum of Ranks
Lipídios (mg/g-peso seco)	1ªcoleta_seca	5	6,00	30,00
	3ªcoleta_seca	5	5,00	25,00
	Total	10		

Test Statistics[b]

	Lipídios (mg/g-peso seco)
Mann-Whitney U	10,000
Wilcoxon W	25,000
Z	-0,546
Asymp. Sig. (2-tailed)	0,585
Exact Sig. [2*(1-tailed Sig.)]	0,690[a]

a. Not corrected for ties.

b. Grouping Variable: Campanhas de Amostragem

Figura 66 – Teste de significância (Mann-Whitney, p>0,05) para verificar a hipótese nula de que as populações de músculos de tainhas das 1ª e 3ª campanhas de amostragens têm distribuições dos teores de lipídios idênticas.

Mann-Whitney Test

Ranks

	Campanhas de Amostragem	N	Mean Rank	Sum of Ranks
Lipídios (mg/g-peso seco)	2ªcoleta_chuvosa	5	8,00	40,00
	3ªcoleta_seca	5	3,00	15,00
	Total	10		

Test Statistics[b]

	Lipídios (mg/g-peso seco)
Mann-Whitney U	0,000
Wilcoxon W	15,000
Z	-2,652
Asymp. Sig. (2-tailed)	0,008
Exact Sig. [2*(1-tailed Sig.)]	0,008[a]

a. Not corrected for ties.

b. Grouping Variable: Campanhas de Amostragem

Figura 67 - Teste de significância (Mann-Whitney, p>0,05) para verificar a hipótese nula de que as populações de músculos de tainhas das 2ª e 3ª campanhas de amostragens têm distribuições dos teores de lipídios idênticas.

Kruskal-Wallis Test

Ranks

	Campanhas de Amostragem	N	Mean Rank
Lipídios(mg/g-peso seco)	1ªcoleta_seca	3	5,00
	2ªcoleta_chuvosa	5	11,00
	3ªcoleta_seca	5	4,20
	Total	13	

Test Statistics[a,b]

	Lipídios(mg/g-peso seco)
Chi-Square	8,651
df	2
Asymp. Sig.	0,013

a. Kruskal Wallis Test

b. Grouping Variable: Campanhas de Amostragem

Figura 68 - Teste de significância (Kruskal-Wallis, p > 0,05) para verificar a hipótese nula de que as populações de mexilhões das três campanhas de amostragens têm distribuições dos teores de lipídios idênticas.

Mann-Whitney Test

Ranks

	Campanhas de Amostragem	N	Mean Rank	Sum of Ranks
Lipídios(mg/g-peso seco)	1ªcoleta_seca	3	2,00	6,00
	2ªcoleta_chuvosa	5	6,00	30,00
	Total	8		

Test Statistics[b]

	Lipídios(mg/g-peso seco)
Mann-Whitney U	,000
Wilcoxon W	6,000
Z	-2,236
Asymp. Sig. (2-tailed)	0,025
Exact Sig. [2*(1-tailed Sig.)]	0,036[a]

a. Not corrected for ties.

b. Grouping Variable: Campanhas de Amostragem

Figura 69 - Teste de significância (Mann-Whitney, p>0,05) para verificar a hipótese nula de que as populações de mexilhões das 1ª e 2ª campanhas de amostragens têm distribuições dos teores de lipídios idênticas.

Mann-Whitney Test

Ranks

	Campanhas de Amostragem	N	Mean Rank	Sum of Ranks
Lipídios(mg/g-peso seco)	1ªcoleta_seca	3	5,00	15,00
	3ªcoleta_seca	5	4,20	21,00
	Total	8		

Test Statistics[b]

	Lipídios(mg/g-peso seco)
Mann-Whitney U	6,000
Wilcoxon W	21,000
Z	-0,447
Asymp. Sig. (2-tailed)	0,655
Exact Sig. [2*(1-tailed Sig.)]	0,786[a]

a. Not corrected for ties.

b. Grouping Variable: Campanhas de Amostragem

Figura 70 - Teste de significância (Mann-Whitney, p>0,05) para verificar a hipótese nula de que as populações de mexilhões das 1ª e 3ª campanhas de amostragens têm distribuições dos teores de lipídios idênticas.

Mann-Whitney Test

Ranks

	Campanhas de Amostragem	N	Mean Rank	Sum of Ranks
Lipídios(mg/g-peso seco)	2ªcoleta_chuvosa	5	8,00	40,00
	3ªcoleta_seca	5	3,00	15,00
	Total	10		

Test Statistics[b]

	Lipídios(mg/g-peso seco)
Mann-Whitney U	,000
Wilcoxon W	15,000
Z	-2,611
Asymp. Sig. (2-tailed)	0,009
Exact Sig. [2*(1-tailed Sig.)]	0,008[a]

a. Not corrected for ties.

b. Grouping Variable: Campanhas de Amostragem

Figura 71 - Teste de significância (Mann-Whitney, p>0,05) para verificar a hipótese nula de que as populações de mexilhões das 2ª e 3ª campanhas de amostragens têm distribuições dos teores de lipídios idênticas.

Kruskal-Wallis Test

Ranks			
	Espécies	N	Mean Rank
Lipídios (mg/g de peso seco)	Corvinas	15	8,00
	Tainhas	15	23,00
	mexilhoes	13	37,00
	Total	43	

Test Statistics[a,b]	
	Lipídios (mg/g de peso seco)
Chi-Square	37,435
df	2
Asymp. Sig.	0,000

a. Kruskal Wallis Test

b. Grouping Variable: Espécies

Figura 72 - Teste de significância (Kruskal-Wallis, p > 0,05) para verificar a hipótese nula de que as populações de músculos de corvinas, músculos de tainhas e mexilhões das têm distribuições de teores de lipídios idênticas.

Mann-Whitney Test

Ranks				
	Espécies	N	Mean Rank	Sum of Ranks
Lipídios (mg/g de peso seco)	Corvinas	15	8,00	120,00
	Tainhas	15	23,00	345,00
	Total	30		

Test Statistics[b]	
	Lipídios (mg/g de peso seco)
Mann-Whitney U	0,000
Wilcoxon W	120,000
Z	-4,692
Asymp. Sig. (2-tailed)	0,000
Exact Sig. [2*(1-tailed Sig.)]	0,000[a]

a. Not corrected for ties.

b. Grouping Variable: Espécies

Figura 73 - Teste de significância (Mann-Whitney, p>0,05) para verificar a hipótese nula de que as populações de músculos de corvinas e músculos de tainhas têm distribuições de teores de lipídios idênticas.

Mann-Whitney Test

Ranks

	Espécies	N	Mean Rank	Sum of Ranks
Lipídios (mg/g de peso seco)	Corvinas	15	8,00	120,00
	mexilhoes	13	22,00	286,00
	Total	28		

Test Statistics[b]

	Lipídios (mg/g de peso seco)
Mann-Whitney U	,000
Wilcoxon W	120,000
Z	-4,511
Asymp. Sig. (2-tailed)	,000
Exact Sig. [2*(1-tailed Sig.)]	,000[a]

a. Not corrected for ties.

b. Grouping Variable: Espécies

Figura 74 - Teste de significância (Mann-Whitney, p>0,05) para verificar a hipótese nula de que as populações de músculos de corvinas e mexilhões têm distribuições de teores de lipídios idênticas.

Mann-Whitney Test

Ranks

	Espécies	N	Mean Rank	Sum of Ranks
Lipídios (mg/g de peso seco)	Tainhas	15	8,00	120,00
	mexilhões	13	22,00	286,00
	Total	28		

Test Statistics[b]

	Lipídios (mg/g de peso seco)
Mann-Whitney U	,000
Wilcoxon W	120,000
Z	-4,502
Asymp. Sig. (2-tailed)	,000
Exact Sig. [2*(1-tailed Sig.)]	,000[a]

a. Not corrected for ties.

b. Grouping Variable: Espécies

Figura 75 - Teste de significância (Mann-Whitney, p>0,05) para verificar a hipótese nula de que as populações de músculos de tainhas e mexilhões têm distribuições de teores de lipídios idênticas.

Kruskal-Wallis Test

Ranks

	Campanhas de Amostragem	N	Mean Rank
BDE47 (ng/g-peso seco)	1ªcoleta_seca	5	9,20
	2ªcoleta_chuvosa	5	9,80
	3ªcoleta_seca	5	5,00
	Total	15	
BDEtotal (ng/g-peso seco)	1ªcoleta_seca	5	9,60
	2ªcoleta_chuvosa	5	9,80
	3ªcoleta_seca	5	4,60
	Total	15	

Test Statistics[a,b]

	BDE47 (ng/g-peso seco)	BDEtotal (ng/g-peso seco)
Chi-Square	3,035	3,876
df	2	2
Asymp. Sig.	0,219	0,144

a. Kruskal Wallis Test

b. Grouping Variable: campanhas de Amostragem

Figura 76 - Teste de significância (Kruskal-Wallis, p > 0,05) para verificar a hipótese nula de que as populações de músculos de corvinas das três campanhas de amostragens têm distribuições de teores de BDE-47 e do total de PBDEs idênticas.

Kruskal-Wallis Test

Ranks

	Campanhas de Amostragem	N	Mean Rank
BDE47	1ªcoleta_seca	3	4,67
	2ªcoleta_chuvosa	2	1,50
	3ªcoleta_seca	1	4,00
	Total	6	
BDEtotal	1ªcoleta_seca	3	4,00
	2ªcoleta_chuvosa	2	2,00
	3ªcoleta_seca	1	5,00
	Total	6	

Test Statistics[a,b]

	BDE47 (ng/g-peso seco)	BDEtotal (ng/g-peso seco)
Chi-Square	3,524	2,143
df	2	2
Asymp. Sig.	0,172	0,343

a. Kruskal Wallis Test

b. Grouping Variable: Campanhas de Amostragem

Figura 77 - Teste de significância (Kruskal-Wallis, p > 0,05) para verificar a hipótese nula de que as populações de fígados de tainhas das três campanhas de amostragens têm distribuições de teores de BDE-47 e do total de PBDEs idênticas.

Kruskal-Wallis Test

Ranks

	Campanhas de Amostragem	N	Mean Rank
PCBtotal	1ªcoleta_seca	5	9,80
	2ªcoleta_chuvosa	5	9,00
	3ªcoleta_seca	4	2,75
	Total	14	

Test Statistics[a,b]

	PCBtotal
Chi-Square	7,311
df	2
Asymp. Sig.	0,026

a. Kruskal Wallis Test

b. Grouping Variable: Campanhas de Amostragem

Figura 78 – Teste de significância (Kruskal-Wallis, p > 0,05) para verificar a hipótese nula de que as populações de músculos de corvinas das três campanhas de amostragens têm distribuições de teores de PCBs idênticas.

Mann-Whitney Test

Ranks

	Campanhas de Amostragem	N	Mean Rank	Sum of Ranks
PCBtotal	1ªcoleta_seca	5	5,80	29,00
	2ªcoleta_chuvosa	5	5,20	26,00
	Total	10		

Test Statistics[b]

	PCBtotal
Mann-Whitney U	11,000
Wilcoxon W	26,000
Z	-0,313
Asymp. Sig. (2-tailed)	0,754
Exact Sig. [2*(1-tailed Sig.)]	0,841[a]

a. Not corrected for ties.

b. Grouping Variable: Campanhas de Amostragem

Figura 79 - Teste de significância (Mann-Whitney, p>0,05) para verificar a hipótese nula de que as populações de músculos de corvinas das 1ª e 2ª campanhas de amostragens têm distribuições dos teores de PCBs idênticas.

Mann-Whitney Test

Ranks

	Campanhas de Amostragem	N	Mean Rank	Sum of Ranks
PCBtotal	1ªcoleta_seca	5	7,00	35,00
	3ªcoleta_seca	5	2,50	10,00
	Total	10		

Test Statistics[b]

	PCBtotal
Mann-Whitney U	0,000
Wilcoxon W	10,000
Z	-2,449
Asymp. Sig. (2-tailed)	0,014
Exact Sig. [2*(1-tailed Sig.)]	0,016[a]

a. Not corrected for ties.

b. Grouping Variable: Campanhas de Amostragem

Figura 80 - Teste de significância (Mann-Whitney, p>0,05) para verificar a hipótese nula de que as populações de músculos de corvinas das 1ª e 3ª campanhas de amostragens têm distribuições dos teores de PCBs idênticas.

Mann-Whitney Test

Ranks

	Campanhas de Amostragem	N	Mean Rank	Sum of Ranks
PCBtotal	2ªcoleta_chuvosa	5	6,80	34,00
	3ªcoleta_seca	4	2,75	11,00
	Total	9		

Test Statistics[b]

	PCBtotal
Mann-Whitney U	1,000
Wilcoxon W	11,000
Z	-2,205
Asymp. Sig. (2-tailed)	0,027
Exact Sig. [2*(1-tailed Sig.)]	0,032[a]

a. Not corrected for ties.

b. Grouping Variable: Campanhas de Amostragem

Figura 81 - Teste de significância (Mann-Whitney, p>0,05) para verificar a hipótese nula de que as populações de músculos de corvinas das 2ª e 3ª campanhas de amostragens têm distribuições dos teores de PCBs idênticas

Kruskal-Wallis Test

Ranks			
	Campanhas de Amostragem	N	Mean Rank
PCBtotal	1ªcoleta_seca	5	9,80
	2ªcoleta_chuvosa	5	3,40
	3ªcoleta_seca	5	10,80
	Total	15	

Test Statistics[a,b]	
	PCBtotal
Chi-Square	8,060
df	2
Asymp. Sig.	0,018

a. Kruskal Wallis Test

b. Grouping Variable: Campanhas de Amostragem

Figura 82 - Teste de significância (Kruskal-Wallis, p > 0,05) para verificar a hipótese nula de que as populações de músculos de tainhas das três campanhas de amostragens têm distribuições de teores de PCBs idênticas.

Mann-Whitney Test

Ranks				
	Campanhas de Amostragem	N	Mean Rank	Sum of Ranks
PCBtotal	1ªcoleta_seca	5	7,60	38,00
	2ªcoleta_chuvosa	5	3,40	17,00
	Total	10		

Test Statistics[b]	
	PCBtotal
Mann-Whitney U	2,000
Wilcoxon W	17,000
Z	-2,193
Asymp. Sig. (2-tailed)	0,028
Exact Sig. [2*(1-tailed Sig.)]	0,032[a]

a. Not corrected for ties.

b. Grouping Variable: Campanhas de Amostragem

Figura 83 - Teste de significância (Mann-Whitney, p>0,05) para verificar a hipótese nula de que as populações de músculos de tainhas das 1ª e 2ª campanhas de amostragens têm distribuições dos teores de PCBs idênticas.

Mann-Whitney Test

Ranks

	Campanhas de Amostragem	N	Mean Rank	Sum of Ranks
PCBtotal	1ªcoleta_seca	5	5,20	26,00
	3ªcoleta_seca	5	5,80	29,00
	Total	10		

Test Statistics[b]

	PCBtotal
Mann-Whitney U	11,000
Wilcoxon W	26,000
Z	-0,313
Asymp. Sig. (2-tailed)	0,754
Exact Sig. [2*(1-tailed Sig.)]	0,841[a]

a. Not corrected for ties.

b. Grouping Variable: Campanhas de Amostragem

Figura 84 - Teste de significância (Mann-Whitney, p>0,05) para verificar a hipótese nula de que as populações de músculos de tainhas das 1ª e 3ª campanhas de amostragens têm distribuições dos teores de PCBs idênticas.

Mann-Whitney Test

Ranks

	Campanhas de Amostragem	N	Mean Rank	Sum of Ranks
PCBtotal	2ªcoleta_chuvosa	5	3,00	15,00
	3ªcoleta_seca	5	8,00	40,00
	Total	10		

Test Statistics[b]

	PCBtotal
Mann-Whitney U	,000
Wilcoxon W	15,000
Z	-2,611
Asymp. Sig. (2-tailed)	0,009
Exact Sig. [2*(1-tailed Sig.)]	0,008[a]

a. Not corrected for ties.

b. Grouping Variable: Campanhas de Amostragem

Figura 85 - Teste de significância (Mann-Whitney, p>0,05) para verificar a hipótese nula de que as populações de músculos de tainhas das 2ª e 3ª campanhas de amostragens têm distribuições dos teores de PCBs idênticas.

Kruskal-Wallis Test

Ranks

	Campanhas de Amostragem	N	Mean Rank
PCBtotal	1ªcoleta_seca	5	9,80
	2ªcoleta_chuvosa	5	7,80
	3ªcoleta_seca	5	6,40
	Total	15	

Test Statistics[a,b]

	PCBtotal
Chi-Square	1,460
df	2
Asymp. Sig.	0,482

a. Kruskal Wallis Test

b. Grouping Variable: Campanhas de Amostragem

Figura 86 - Teste de significância (Kruskal-Wallis, p > 0,05) para verificar a hipótese nula de que as populações de fígados de tainhas das três campanhas de amostragens têm distribuições de teores de PCBs idênticas.

Kruskal-Wallis Test

Ranks

	Campanhas de Amostragem	N	Mean Rank
PCBtotal	1ªcoleta_seca	3	6,00
	2ªcoleta_chuvosa	5	6,00
	3ªcoleta_seca	5	8,60
	Total	13	

Test Statistics[a,b]

	PCBtotal
Chi-Square	1,371
df	2
Asymp. Sig.	0,504

a. Kruskal Wallis Test

b. Grouping Variable: Campanhas de Amostragem

Figura 87 - Teste de significância (Kruskal-Wallis, p > 0,05) para verificar a hipótese nula de que as populações de mexilhões das três campanhas de amostragens têm distribuições de teores de PCBs idênticas.

Kruskal-Wallis Test

Ranks

	Campanhas de Amostragem	N	Mean Rank
PCBtotal	Corvinas	14	38,93
	Tainhas	15	21,53
	Figados de tainhas	15	38,73
	Mexilhões	13	15,69
	Total	57	

Test Statistics[a,b]

	PCBtotal
Chi-Square	21,569
df	3
Asymp. Sig.	0,000

a. Kruskal Wallis Test

b. Grouping Variable: Campanhas de Amostragem

Figura 88 – Teste de significância (Kruskal-Wallis, p > 0,05) para verificar a hipótese nula de que as populações de músculos de corvinas, músculos de tainhas, fígados de tainhas e mexilhões têm distribuições de teores de PCBs totais idênticas.

Mann-Whitney Test

Ranks

	Campanhas de Amostragem	N	Mean Rank	Sum of Ranks
PCBtotal	Corvinas	14	19,36	271,00
	Tainhas	15	10,93	164,00
	Total	29		

Test Statistics[b]

	PCBtotal
Mann-Whitney U	44,000
Wilcoxon W	164,000
Z	-2,662
Asymp. Sig. (2-tailed)	,008
Exact Sig. [2*(1-tailed Sig.)]	,007[a]

a. Not corrected for ties.

b. Grouping Variable: Campanhas de Amostragem

Figura 89 – Teste de significância (Mann-Whitney, p > 0,05) para verificar a hipótese nula de que as populações de músculos de corvinas e músculos de tainhas têm distribuições de teores de PCBs totais idênticas.

Mann-Whitney Test

Ranks

	Campanhas de Amostragem	N	Mean Rank	Sum of Ranks
PCBtotal	Corvinas	14	15,14	212,00
	Figados de tainhas	15	14,87	223,00
	Total	29		

Test Statistics[b]

	PCBtotal
Mann-Whitney U	103,000
Wilcoxon W	223,000
Z	-0,087
Asymp. Sig. (2-tailed)	0,930
Exact Sig. [2*(1-tailed Sig.)]	0,949[a]

a. Not corrected for ties.

b. Grouping Variable: Campanhas de Amostragem

Figura 90 – Teste de significância (Mann-Whitney, p > 0,05) para verificar a hipótese nula de que as populações de músculos de corvinas e de fígados de músculos de tainhas têm distribuições de teores de PCBs totais idênticas.

Mann-Whitney Test

Ranks

	Campanha de Amostragem	N	Mean Rank	Sum of Ranks
PCBtotal	Corvinas	14	19,43	272,00
	Mexilhões	13	8,15	106,00
	Total	27		

Test Statistics[b]

	PCBtotal
Mann-Whitney U	15,000
Wilcoxon W	106,000
Z	-3,688
Asymp. Sig. (2-tailed)	0,000
Exact Sig. [2*(1-tailed Sig.)]	0,000[a]

a. Not corrected for ties.

b. Grouping Variable: Campanha de Amostragem

Figura 91 – Teste de significância (Mann-Whitney, p > 0,05) para verificar a hipótese nula de que as populações de músculos de corvinas e de mexilhões têm distribuições de teores de PCBs totais idênticas.

Mann-Whitney Test

Ranks

	Campanhas de Amostragem	N	Mean Rank	Sum of Ranks
PCBtotal	Tainhas	15	11,13	167,00
	Figados de tainhas	15	19,87	298,00
	Total	30		

Test Statistics[b]

	PCBtotal
Mann-Whitney U	47,000
Wilcoxon W	167,000
Z	-2,717
Asymp. Sig. (2-tailed)	0,007
Exact Sig. [2*(1-tailed Sig.)]	0,006[a]

a. Not corrected for ties.

b. Grouping Variable: Campanhas de Amostragem

Figura 92 – Teste de significância (Mann-Whitney, p > 0,05) para verificar a hipótese nula de que as populações de músculos de tainhas e de fígados de tainhas têm distribuições de teores de PCBs totais idênticas.

Mann-Whitney Test

Ranks

	Campanhas de Amostragem	N	Mean Rank	Sum of Ranks
PCBtotal	Figados de tainhas	15	20,00	300,00
	Mexilhões	13	8,15	106,00
	Total	28		

Test Statistics[b]

	PCBtotal
Mann-Whitney U	15,000
Wilcoxon W	106,000
Z	-3,800
Asymp. Sig. (2-tailed)	0,000
Exact Sig. [2*(1-tailed Sig.)]	0,000[a]

a. Not corrected for ties.

b. Grouping Variable: Campanhas de Amostragem

Figura 93 – Teste de significância (Mann-Whitney, p > 0,05) para verificar a hipótese nula de que as populações de fígados de tainhas e mexilhões têm distribuições de teores de PCBs totais idênticas.

Mann-Whitney Test

Ranks

	Campanhas de Amostragem	N	Mean Rank	Sum of Ranks
PCBtotal	Tainhas	15	15,47	232,00
	Mexilhões	13	13,38	174,00
	Total	28		

Test Statistics[b]

	PCBtotal
Mann-Whitney U	83,000
Wilcoxon W	174,000
Z	-,668
Asymp. Sig. (2-tailed)	0,504
Exact Sig. [2*(1-tailed Sig.)]	0,525[a]

a. Not corrected for ties.

b. Grouping Variable: Campanhas de Amostragem

Figura 94 – Teste de significância (Mann-Whitney, p > 0,05) para verificar a hipótese nula de que as populações de músculos de tainhas e de mexilhões têm distribuições de teores de PCBs totais idênticas.

10
Apêndice

10.1.
Apêndice 1 – O “Box-plot”

Gráficos têm a finalidade e o poder de resumir informações, servindo, portanto como uma ferramenta de análise e comunicação. Quando se observa um conjunto de dados numéricos, dificilmente conseguimos desvendar quais padrões de distribuição de valores eles escondem. Vários gráficos foram desenvolvidos para revelar estes "padrões escondidos", transformando dados em informação. O “Box-Plot”, em particular, tem se mostrado muito eficiente pelas análises que permite, principalmente, quando se trata de distribuições de dados não normais.

O “Box-Plot” foi desenvolvido pelo Dr. John Tukey, um químico graduado na Universidade de Princeton, que se tornou matemático e estatístico, que interessava-se pelos aspectos práticos, como questões do tipo: “ Mas o que os dados querem dizer? ". Tukey desenvolveu várias técnicas, voltadas à análise exploratória de dados, tendo como objetivo examiná-los, descrevendo as suas principais características.

O Box-Plot é um gráfico no formato de caixa, cujos limites são o 1º quartil e o 3º quartil, que representam 25% e 75% dos dados respectivamente. Esta caixa é dividida por uma linha, a mediana, que significa 50% dos dados. Existem também dois eixos, ou "bigodes", ligados à caixa estendendo-se aos extremos, isto é ao menor e ao maior valor dos dados, excluindo os valores discrepantes (“outliers”). De um extremo ao outro, temos o espalhamento dos dados. Conforme mostrado na figura 41 (página seguinte), o “Box-Plot” é especialmente útil para mostrar a dispersão de um grupo de dados e as diferenças que existem entre grupos.

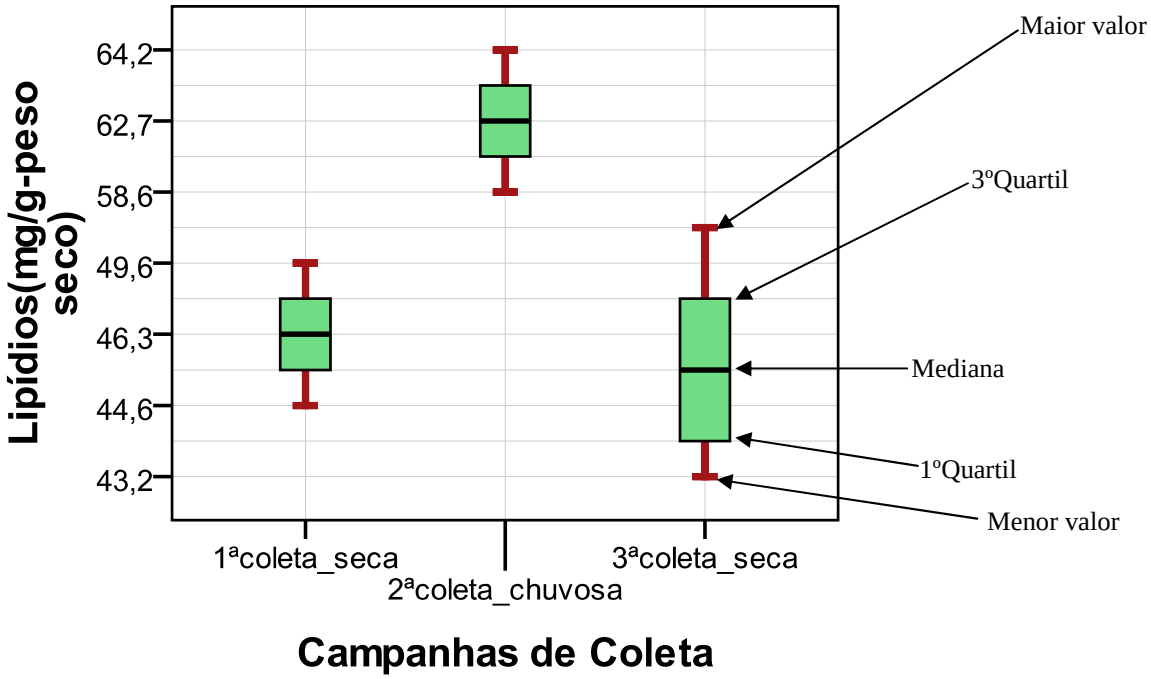

Figura 41 - Dispersão das concentrações de lipídios, dos mexilhões, de cada campanha de amostragem.