Appendices

Appendix 1

Additional Information Associated with Chapter 1: An Introduction to ICP-MS Analysis

Figure 90. An Isotopic Abundance Table.

Percentage Relative Abundances of Naturally Occuring Isotopes

A >>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	<< A	eV
H	99.9	0.02																			H	13.6
He				100																	He	14.6
Li						7.5	92.5														Li	5.4
Be									100												Be	9.3
B										19.9	80.1										B	8.3
C												98.9	1.1								C	11.3
N														99.6	0.37						N	14.5
O																99.8	0.04	0.2			O	13.6
F																			100		F	17.4
Ne																				90.5	Ne	21.6
A >>	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	<< A	eV
Ne	0.27	9.22																			Ne	21,6
Na			100																		Na	5.1
Mg				79	10	11															Mg	7.6
Al							100														Al	6
Si								92.2	4.67	3.1											Si	8.2
P											100										P	10.5
S												95	0.75	4.21		0.02					S	10.4
Cl															75.8		24.2				Cl	13
Ar																0.34		0.06		99.6	Ar	15.8
K																			93.3	0.01	K	4.3
Ca																				96.9	Ca	6.1
A >>	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	<< A	eV
K	6.73																				K	4.3
Ca		0.65	0.14	2.09				0.19													Ca	6.1
Sc					100																Sc	6.5
Ti						8	7.3	73.8	5.5	5.4											Ti	6.8
V										0.25	99.8										V	6.7
Cr										4.35		83.8	9.5	2.37							Cr	6.8
Mn															100						Mn	7.4
Fe														5.8		91.7	2.2	0.28			Fe	7.9
Co																			100		Co	7.9
Ni																		68.3		26.1	Ni	7.6
A >>	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	<< A	eV
Ni	1.13	3.59		0.91																	Ni	7.6
Cu			69.2		30.8																Cu	7.7
Zn				48.6		27.9	4.1	18.8		0.6											Zn	9.4
Ga									60.1		39.9										Ga	6
Ge										20.5		27.4	7.8	36.5		7.8					Ge	7.9
As															100						As	9.8
Se														0.9		9	7.6	23.6		49.7	Se	9.8
Br																			50.7		Br	11.8
Kr																		0.35		2.25	Kr	14
A >>	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	<< A	eV
Se		9.2																			Se	9.8
Br	49.3																				Br	11.8
Kr		11.6	11.5	57		17.3															Kr	14
Rb					72.2		27.8														Rb	4.2
Sr				0.56		9.86	7	82.6													Sr	5.7
Y									100												Y	6.4
Zr										51.5	11.2	17.2		17.4		2.8					Zr	6.8
Nb													100								Nb	6.9
Mo												14.8		9.25	15.9	16.7	9.55	24.1		9.63	Mo	7.1
Tc																					Tc	7.3
Ru																5.52		1.88	12.7	12.6	Ru	7.4

A >>	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	<< A	eV
Ru	17	31.6		18.7																	Ru	7.4
Rh			100																		Rh	7.5
Pd		1.02		11.1	22.3	27.3		26.5		11.7											Pd	8.3
Ag							51.8		48.2												Ag	7.6
Cd						1.25		0.89		12.5	12.8	24.1	12.2	28.7		7.49					Cd	9
In													4.3		95.7						In	5.8
Sn												0.97		0.65	0.36	14.5	7.68	24.2	8.58	32.6	Sn	7.3
Sb																					Sb	8.6
Te																				0.1	Te	9
A >>	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	<< A	eV
Sn		4.63		5.79																	Sn	7.3
Sb	57.3		42.7																		Sb	8.6
Te		2.6	0.91	4.82	7.14	19		31.7		33.8											Te	9
I							100														I	10.5
Xe				0.1		0.09		1.91	26.4	4.1	21.1	26.9		10.4		8.9					Xe	12.1
Cs													100								Cs	3.9
Ba										0.11		0.1		2.42	6.59	7.85	11.2	71.7			Ba	5.2
La																		0.09	99.9		La	5.6
Ce																0.19		0.25		88.5	Ce	5.5
A >>	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	<< A	eV
Ce		11.1																			Ce	5.5
Pr	100																				Pr	5.4
Nd		27.1	12.2	23.8	8.3	17.2		5.76		5.64											Nd	5.5
Pm																					Pm	5.6
Sm				3.1			15	11.3	13.8	7.4		26.7		22.7							Sm	5.6
Eu											47.8		52.2								Eu	5.7
Gd												0.2		2.18	14.8	20.5	15.7	24.8		21.9	Gd	6.1
Tb																			100		Tb	5.9
Dy																0.06		0.1		2.34	Dy	5.9
A >>	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	<< A	eV
Dy	18.9	25.5	24.9	28.2																	Dy	5.9
Ho					100																Ho	6
Er		0.14		1.61		33.6	23	26.8		14.9											Er	6.1
Tm									100												Tm	6.2
Yb								0.13		3.05	14.3	21.9	16.1	31.8		12.7					Yb	6.3
Lu															97.4	2.59					Lu	5.4
Hf														0.16		5.21	18.6	27.3	13.6	35.1	Hf	7
Ta																				0.01	Ta	7.9
W																				0.13	W	8
A >>	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	<< A	eV
Ta	99.9																				Ta	7.9
W		26.3	14.3	30.7		28.6															W	8
Re					37.4		62.6														Re	7.9
Os				0.02		1.58	1.6	13.3	16.1	26.4		41									Os	8.7
Ir											37.3		62.7								Ir	9.1
Pt										0.01		0.79		32.9	33.8	25.3		7.2			Pt	9
Au																	100				Au	9.2
Hg																0.14		10	16.8	23.1	Hg	10.4
A >>	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	<< A	eV
Hg	13.2	29.8		6.85																	Hg	10.4
Tl			29.5		70.5																Tl	6.1
Pb				1.4		24.1	22.1	52.4													Pb	7.4
Bi									100												Bi	7.3
A >>	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	<< A	eV
Th												100									Th	7
Pa																					Pa	-
U														0.01	0.72			99.3			U	6.9

Table 53. A Table of Examples of Spectroscopic Interferences in ICP-MS.

Analyte	Isobaric Overlap	Polyatomic Ion Interferences	Doubly Charged Ions (M^{2+})
^{18}O		$^{18}H_2O^+$	
^{28}Si		$^{14}N_2^+$, $^{28}CO^+$	
^{29}Si		$^{29}N_2H^+$	
^{31}P		$^{31}NOH^+$, $^{31}NNH^+$, $^{31}NO^+$	
^{32}S		$^{16}O_2^+$, $^{32}NO^+$, $^{32}NOH^+$	
^{35}Cl		$^{35}O_2H^+$, $^{35}SH^+$	
^{36}S	^{36}Ar		
^{39}K		$^{39}ArH^+$	
^{40}K	^{40}Ar, ^{40}Ca		
^{44}Ca		$^{44}N_2O^+$, $^{44}CO_2^+$	$^{88}Sr^{2+}$
^{50}V	^{50}Ti, ^{50}Cr		
^{51}V		$^{51}SOH^+$, $^{51}ClO^+$, $^{51}ArC^+$	
^{52}Cr		$^{52}ArC^+$, $^{52}ArO^+$, $^{52}ClOH^+$	
^{54}Fe	^{54}Cr	$^{54}ArN^+$	
^{56}Fe		$^{56}ArO^+$, $^{56}ArNH^+$, $^{56}ClOH^+$, $^{56}CaO^+$	
^{57}Fe		$^{57}ArOH^+$, $^{57}CaOH^+$	
^{58}Fe	^{58}Ni		
^{64}Ni	^{64}Zn	$^{64}TiO^+$, $^{64}POOH^+$	
^{66}Zn		$^{66}POOH^+$	
^{68}Zn		$^{68}ArCO^+$	
^{69}Ga			$^{138}Ba^{2+}$, $^{139}La^{2+}$
^{70}Ge	^{70}Zn		$^{140}Ce^{2+}$
^{74}Se	^{74}Ge		
^{75}As		$^{75}ArCl^+$, $^{75}ArK^+$, $^{75}CoO^+$	
^{76}Se	^{76}Ge	$^{76}Ar_2^+$	
^{77}Se		$^{77}ArCl$	$^{154}Sm^{2+}$
^{78}Se	^{78}Kr	$^{78}Ar_2$	
^{80}Se	^{80}Kr	$^{40}Ar_2^+$, $^{80}BrH^+$	
^{82}Se	^{82}Kr		
^{84}Sr	^{84}Kr		
^{85}Rb			$^{170}Er^{2+}$
^{88}Sr			$^{176}Yb^{2+}$
^{92}Zr	^{92}Mo		
^{103}Rh		$^{103}ArCu^+$	
^{114}Cd	^{114}Sn	$^{114}MoO^+$, $^{114}RuO^+$	
^{115}In	^{115}Sn		
^{116}Sn			$^{232}Th^{2+}$
^{119}Sn			$^{238}U^{2+}$
^{124}Te	^{124}Sn, ^{124}Xe		
^{148}Nd	^{148}Sm		
^{154}Sm ^{154}Gd		$^{154}BaO^+$	
^{155}Gd		$^{155}BaOH^+$, $^{155}LaO^+$	
^{156}Gd	^{156}Dy	$^{156}CeO^+$	
^{160}Gd	^{160}Dy		
^{176}Lu	^{176}Yb, ^{176}Hf		
^{181}Ta		$^{181}HoO^+$	
^{192}Os ^{192}Pt		$^{192}LuO^+$	
^{196}Pt	^{196}Hg		
^{204}Pb	^{204}Hg		
^{254}Es ^{254}Cf		$^{254}UO^+$	

Appendix 2

Additional Information Associated with Chapter 2: Method Development Studies for the Determination of Phosphorus and Sulphur Isotopes by ICP-QMS

Table 54. A Table of ICP-MS Instrument Parameters for Method 1: The Determination of $^{31}P^{16}O^{+}$ and $^{32}S^{16}O^{+}$ Ions in a Collision Cell Incorporating He and O_2 Under IKEE Conditions.

Instrument Parameter	Parameter Value
Analyser Pressure	7.50 x 10^{-1} mBar
Expansion Pressure	2.1 mBar
Nebuliser Pressure	2.73 Bar
Plasma Forward Power	1350 W
Plasma Reflected Power	1.8 W
Plasma Gas: Cool Flow	12.7 l min^{-1}
Plasma Gas: Auxilliary Flow	0.80 l min^{-1}
Plasma Gas: Nebuliser Flow	1.08 l min^{-1}
Torch Position: Sampling Depth	380
Torch Position: Vertical	252
Torch Position: Horizontal	-115
Extraction Lens Voltage	-874 V
D1 Lens Voltage	-26.7 V
L1 Lens Voltage	-6.2 V
L2 Lens Voltage	-143.0 V
L3 Lens Voltage	-166.9 V
Focus Lens Voltage	+22.6 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	Not Applicable
Applied Hexapole Voltage: Collision Cell Mode	Established During Experimentation, See Section 2.4.1.

Table 55. Data Generated During IKEE (He = 0.2 ml min^{-1} and O_2 = 0.3 ml min^{-1}) $^{31}P^{16}O^+$ and $^{32}S^{16}O^+$ Formation Maximisation Experiments.

Sample	V_h (V)	$^{31}P^+$ (*m/z* = 31) Signal (cps)	$^{32}S^+$ (*m/z* = 32) Signal (cps)	$^{31}P^{16}O^+$ (*m/z* = 47) Signal (cps)	$^{32}S^{16}O^+$ (*m/z* = 48) Signal (cps)
2% HNO_3 Blank	10	3557.783	49682528	375.005	3771.831
	8	24192.47	4.76E+08	2046.48	16657.71
	6	25202.88	6.77E+08	2257.512	34537.03
	4	20143.53	5.09E+08	1499.079	36113.92
	2	14784.31	1.69E+08	930.364	15582.49
	0	14338.86	1.07E+08	943.698	12213.89
	-2	13330.55	85289411	850.692	10724.69
	-4	12710.65	76775315	992.703	9463.467
1000 µg l^{-1} P	10	11122.01	33607880	10662.69	5316.99
	8	1185349	4.21E+08	116541.5	35294.21
	6	2444770	6.64E+08	109321.4	56212.38
	4	2808038	5.25E+08	70202.75	58838.25
	2	2959531	1.77E+08	45442.83	34687.06
	0	3013312	1.07E+08	31758.6	30437.73
	-2	3129148	83411775	23292.98	28645.02
	-4	3156334	71838590	17629.21	27461.71
1000 µg l^{-1} S	10	1943.467	34683582	258.669	7059.418
	8	17670.26	4.3E+08	1662.43	79001.19
	6	17697.29	6.75E+08	1821.116	174302.3
	4	13121.02	5.34E+08	1213.718	184787.5
	2	7347.223	1.81E+08	681.35	137986.7
	0	6835.636	1.16E+08	661.349	104847.4
	-2	6123.979	89384867	605.346	78841.98
	-4	5532.405	79076748	578.012	60795.09

Table 56. A Table of ICP-MS Instrument Parameters for Method 2: The Determination of $^{31}P^{16}O^+$ and $^{32}S^{16}O^+$ Ions in a Collision Cell Incorporating O_2 Only Under IKEE Conditions.

Instrument Parameter	Parameter Value
Analyser Pressure	7.30 x 10^{-7} mBar
Expansion Pressure	2 mBar
Nebuliser Pressure	2.85 Bar
Plasma Forward Power	1350 W
Plasma Reflected Power	0 W
Plasma Gas: Cool Flow	12.7 l min^{-1}
Plasma Gas: Auxilliary Flow	0.80 l min^{-1}
Plasma Gas: Nebuliser Flow	1.08 l min^{-1}
Torch Position: Sampling Depth	381
Torch Position: Vertical	169
Torch Position: Horizontal	-41
Extraction Lens Voltage	-709 V
D1 Lens Voltage	-25.7 V
L1 Lens Voltage	-3.1 V
L2 Lens Voltage	-141.1 V
L3 Lens Voltage	-156.0 V
Focus Lens Voltage	+23.8 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	Not Applicable
Applied Hexapole Voltage: Collision Cell Mode	Established During Experimentation, See Section 2.4.2.

Table 57. Data Generated During IKEE (O_2 = 0.3 ml min^{-1}) $^{31}P^{16}O^+$ and $^{32}S^{16}O^+$ Formation Maximisation Experiments.

Sample	V_h (V)	$^{31}P^+$ (*m/z* = 31) Signal (cps)	$^{32}S^+$ (*m/z* = 32) Signal (cps)	$^{31}P^{16}O^+$ (*m/z* = 47) Signal (cps)	$^{32}S^{16}O^+$ (*m/z* = 48) Signal (cps)
2% HNO_3 Blank	-2	28115.31	57996981	720.685	3678.474
	0	30158.14	66696884	788.022	4218.623
	2	34288.28	87567322	891.695	5229.291
	4	35348.02	2.04E+08	1063.04	10730.03
	6	41842.68	3.37E+08	1546.417	14218.74
	7	41953.55	3.98E+08	1518.081	13573.78
	8	42208.64	3.24E+08	1508.08	8174.339
	9	36713.13	2.58E+08	1284.058	7450.276
	10	14953.22	87726048	664.682	3449.083
1000 µg l^{-1} P	-2	1921341	58581482	17573.47	3236.367
	0	1891200	63872425	22923.38	3936.542
	2	1907748	82937573	31365.73	5051.56
	4	1804126	2E+08	47761.05	10461.83
	6	1724341	3.34E+08	73592.44	13845.71
	7	1691442	3.92E+08	87017.92	12863.79
	8	1395548	3.27E+08	103494.6	7600.355
	9	1112262	2.53E+08	100742.1	6513.818
	10	100222.3	84440235	48469.59	3033.989
1000 µg l^{-1} S	-2	30037.21	64504563	889.694	46695.2
	0	31319.97	70367554	840.025	63176.06
	2	34816.72	88286433	914.696	83176.78
	4	36402.34	2.08E+08	1205.384	112254.3
	6	41299.35	3.46E+08	1711.103	133391.6
	7	42372.77	4.05E+08	1697.768	129150.5
	8	44080.59	3.45E+08	1885.791	92457.59
	9	37492.83	2.68E+08	1545.75	69170.75
	10	16425.46	97085169	830.024	22680.02

Table 58. Data Generated During the Analysis of P and S Calibration Standards by ICP-MS Employing 'Method 2' Conditions.

	P Calibration Stds		S Calibration Stds	
P and S Calibration Std Conc^n (µg l^{-1})	**$^{31}P^{16}O^+$ *m/z* = 47 (cps)**	**$^{32}S^{16}O^+$ *m/z* = 48 (cps)**	**$^{31}P^{16}O^+$ *m/z* = 47 (cps)**	**$^{32}S^{16}O^+$ *m/z* = 48 (cps)**
2 % HNO_3 Blank	431.34	8301.41	286.003	13135.7
0.5	539.344	9957.47	397.339	16581.3
1	1122.04	11389.5	991.034	20195.9
2	630.347	10645.6	515.343	19453.9
5	1257.06	11893.3	1054.04	22107.8
10	1546.75	12034.8	1501.41	24393.8
20	2361.2	17635.6	1718.1	25480.7
50	7512.98	31522.8	5397.69	43819.1

Table 59. A Table of ICP-MS Instrument Parameters for Method 3: Selective Removal of Polyatomic Ions in a Collision Cell Incorporating a He Collision Gas Under KED Conditions.

Instrument Parameter	Parameter Value
Analyser Pressure	7.00 x 10^{-7} mBar
Expansion Pressure	2.4 mBar
Nebuliser Pressure	3.13 Bar
Plasma Forward Power	1350 W
Plasma Reflected Power	0 W
Plasma Gas: Cool Flow	12.8 l min^{-1}
Plasma Gas: Auxilliary Flow	0.75 l min^{-1}
Plasma Gas: Nebuliser Flow	1.16 l min^{-1}
Torch Position: Sampling Depth	345
Torch Position: Vertical	84
Torch Position: Horizontal	24
Extraction Lens Voltage	-573 V
D1 Lens Voltage	-27.3 V
L1 Lens Voltage	+1.0 V
L2 Lens Voltage	-168.0 V
L3 Lens Voltage	-113.5 V
Focus Lens Voltage	+18.1 V
Applied Quadrupole Voltage	Established During Experimentation, See Section 2.4.3.
Applied Hexapole Voltage: Standard Mode	Not Applicable
Applied Hexapole Voltage: Collision Cell Mode	Established During Experimentation, See Section 2.4.3.

Table 60. Data Accrued During the Analysis of 2 % HNO_3 Blank and 200 µg l^{-1} P solutions Using a Collision Cell with Various He Flows and KED Conditions (KED Spread = +1 V).

He Flow (ml/min)	V_q (V)	V_h (V)	2 % HNO_3 *m/z* = 31 Signal (cps)	200 µg l^{-1} P *m/z* = 31 Signal (cps)	Blank Subtracted Data (cps)	Sample : Blank Ratio
0	**0**	**-1**	-	-	-	-
0.5			11501.631	281163.96	269662.329	25.45
1			3168.685	95372.075	92203.39	30.10
1.5			748.02	27484.104	26736.084	36.74
2			171.334	7168.467	6997.133	41.84
2.5			44	1718.77	1674.77	39.06
3			10	379.338	369.338	37.93
3.5			4.667	87.667	83	18.78
4			4.667	18.667	14	4.00
0	**+1**	**0**	19296.358	476394.06	457097.702	24.69
0.5			14359.884	300839.92	286480.036	20.95
1			3761.162	98726.764	94965.602	26.25
1.5			881.694	27537.53	26655.836	31.24
2			199.335	6448.457	6249.122	32.35
2.5			31.333	1497.412	1466.079	47.79
3			6.667	281.003	274.336	42.15
3.5			3.667	134.001	130.334	36.54
4			3	13	10	4.33
0	**+2**	**+1**	22184.553	474993.1	452808.547	21.41
0.5			15842.446	313775.33	297932.884	19.81
1			4257.968	98605.58	94347.612	23.16
1.5			916.029	25831.341	24915.312	28.20
2			186.001	6017.935	5831.934	32.35
2.5			37	1265.723	1228.723	34.21
3			5	270.336	265.336	54.07
3.5			3.333	39	35.667	11.70
4			2	13.333	11.333	6.67

Table 60 (Continued). Data Accrued During the Analysis of 2 % HNO_3 Blank and 200 µg l^{-1} P solutions Using a Collision Cell with Various He Flows and KED Conditions (KED Spread = +1 V).

He Flow (ml/min)	V_q (V)	V_h (V)	2 % HNO_3 *m/z* = 31 Signal (cps)	200 µg l^{-1} P *m/z* = 31 Signal (cps)	Blank Subtracted Data (cps)	Sample : Blank Ratio
0	+3	+2	21066.188	327711.49	306645.302	15.56
0.5			9911.438	167203.48	157292.042	16.87
1			1925.797	37548.281	35622.484	19.50
1.5			341.337	7582.012	7240.675	22.21
2			63.333	1355.731	1292.398	21.41
2.5			19.333	262.336	243.003	13.57
3			9	48.333	39.333	5.37
3.5			12.333	12	-0.333	0.97
4			6.333	7.333	1	1.16
0	+4	+3	34829.408	159576.61	124747.202	4.58
0.5			13536.412	113658.69	100122.278	8.40
1			1947.133	19092.417	17145.284	9.81
1.5			287.003	3024.32	2737.317	10.54
2			49.333	458.341	409.008	9.29
2.5			10.667	65.667	55	6.16
3			8.667	16.333	7.666	1.88
3.5			2	7.667	5.667	3.83
4			2.333	1	-1.333	0.43
0	+5	+4	9137.922	109679.09	100541.168	12.00
0.5			2689.253	36511.271	33822.018	13.58
1			330.337	5019.215	4688.878	15.19
1.5			46	633.681	587.681	13.78
2			15.667	84.667	69	5.40
2.5			8.333	17.333	9	2.08
3			6.333	7	0.667	1.11
3.5			4	4.333	0.333	1.08
4			5.333	2.333	-3	0.44

Table 60 (Continued). Data Accrued During the Analysis of 2 % HNO_3 Blank and 200 µg l^{-1} P solutions Using a Collision Cell with Various He Flows and KED Conditions (KED Spread = +1 V).

He Flow (ml/min)	V_q (V)	V_h (V)	2 % HNO_3 m/z = 31 Signal (cps)	200 µg l^{-1} P m/z = 31 Signal (cps)	Blank Subtracted Data (cps)	Sample : Blank Ratio
0	+6	+5	4480.703	42143.424	37662.721	9.41
0.5			1724.771	16503.194	14778.423	9.57
1			140.667	1903.127	1762.46	13.53
1.5			20.667	90.667	70	4.39
2			8.667	14	5.333	1.62
2.5			4	8.333	4.333	2.08
3			3.667	1.667	-2	0.45
3.5			3.333	3	-0.333	0.90
4			2.333	1.333	-1	0.57

Table 61. Data Accrued During the Analysis of 2 % HNO_3 Blank and 200 µg l^{-1} P solutions Using a Collision Cell with Various He Flows and KED Conditions (KED Spread = +2 V).

He Flow (ml/min)	V_q (V)	V_h (V)	2 % HNO_3 *m/z* = 31 Signal (cps)	200 µg l^{-1} P *m/z* = 31 Signal (cps)	Blank Subtracted Data (cps)	Sample : Blank Ratio
0	**0**	**-2**	1596.423	66328.651	64732.228	41.55
0.5			6107.639	207989.86	201882.221	34.05
1			1591.755	68173.967	66582.212	42.83
1.5			325.004	17488.701	17163.697	53.81
2			76	4602.075	4526.075	60.55
2.5			22.333	917.029	894.696	41.06
3			9.667	199.001	189.334	20.59
3.5			-	-	-	-
4			7	5	5	1.71
0	**+2**	**0**	9249.663	392142.7	382893.037	42.40
0.5			6066.288	232286	226219.712	38.29
1			1548.084	67982.056	66433.972	43.91
1.5			338.337	16439.459	16101.122	48.59
2			62.333	3595.119	3532.786	57.68
2.5			18	722.685	704.685	40.15
3			5.333	136.334	131.001	25.56
3.5			4	32.333	28.333	8.08
4			5.667	9.667	4	1.71
0	**+4**	**+2**	7692.738	341379.16	333686.422	44.38
0.5			4608.41	191887.98	187279.57	41.64
1			798.022	38950.051	38152.029	48.81
1.5			130.001	7138.453	7008.452	54.91
2			28.333	1213.052	1184.719	42.81
2.5			9	218.335	209.335	24.26
3			7	39	32	5.57
3.5			4.667	14.333	9.666	3.07
4			4	8	4	2

Table 61 (Continued). Data Accrued During the Analysis of 2 % HNO_3 Blank and 200 µg l^{-1} P solutions Using a Collision Cell with Various He Flows and KED Conditions (KED Spread = +2 V).

He Flow (ml/min)	V_q (V)	V_h (V)	2 % HNO_3 m/z = 31 Signal (cps)	200 µg l^{-1} P m/z = 31 Signal (cps)	Blank Subtracted Data (cps)	Sample : Blank Ratio
0			6103.304	186888.89	180785.586	30.62
0.5			2816.278	81868.971	79052.693	29.07
1			291.67	11393.542	11101.872	39.06
1.5			43	1467.409	1424.409	34.13
2	**+6**	**+4**	7.333	191.335	184.002	26.09
2.5			4.667	30	25.333	6.43
3			5	6	1	1.2
3.5			2	4	2	2
4			2.333	2.667	0.334	1.14
0			600.679	15247.47	14646.791	25.38
0.5			237.669	5039.224	4801.555	21.20
1			22.333	438.673	416.34	19.64
1.5			7	53.333	46.333	7.619
2	**+8**	**+6**	3	10	7	3.33
2.5			3	4.333	1.333	1.44
3			2.667	3.667	1	1.37
3.5			2.667	1.667	-1	0.63
4			3	3.667	0.667	1.22

Table 62. Data Accrued During the Analysis of 2 % HNO_3 Blank and 200 µg l^{-1} P solutions Using a Collision Cell with Various He Flows and KED Conditions (KED Spread = +3 V).

He Flow (ml/min)	V_q (V)	V_h (V)	2 % HNO_3 *m/z* = 31 Signal (cps)	200 µg l^{-1} P *m/z* = 31 Signal (cps)	Blank Subtracted Data (cps)	Sample : Blank Ratio
0	+3	0	38660.579	435116.03	396455.451	11.25
0.5			13352.571	202357.16	189004.589	15.15
1			2119.157	34862.163	32743.006	16.45
1.5			336.337	4345.571	4009.234	12.92
2			52.667	888.694	836.027	16.87
2.5			8.667	150.001	141.334	17.31
3			3	20.333	17.333	6.78
3.5			2.667	3.667	1	1.37
4			3.667	1.667	-2	0.45
0	+6	+3	3814.51	40320.156	36505.646	10.57
0.5			874.027	14026.221	13152.194	16.05
1			81.334	1306.393	1225.059	16.06
1.5			12	128.667	116.667	10.72
2			5	14.667	9.667	2.93
2.5			4	4.333	0.333	1.08
3			1.667	3.333	1.666	2.00
3.5			2	1.333	-0.667	0.67
4			1.667	1.333	-0.334	0.80

Table 63. Data Generated During the Analysis of P Calibration Standards by ICP-MS Employing Method 3 Conditions.

P Calibration Standard Concentration ($\mu g\ l^{-1}$)	$^{31}P^{+}$ (m/z = 31) Signal (cps)
2 % HNO_3 Blank	1757.44
0.5	1925.46
1	2707.92
2	2117.16
5	3183.36
10	3606.12
20	4009.56
50	9340.39
75	12753.7

Table 64. A Table of ICP-MS Instrument Parameters for Method 4: The Determination of $^{31}P^{16}O^+$ and $^{32}S^{16}O^+$ Ions Formed Under 'Cool/Cold Plasma'.

Instrument Parameter	Parameter Value
Analyser Pressure	7.30×10^{-7} mBar
Expansion Pressure	2 mBar
Nebuliser Pressure	2.5 Bar
Plasma Forward Power	Established During Experimentation, See Section 2.4.4.
Plasma Reflected Power	1.8 W
Plasma Gas: Cool Flow	12.7 l min^{-1}
Plasma Gas: Auxilliary Flow	0.80 l min^{-1}
Plasma Gas: Nebuliser Flow	1.03 l min^{-1}
Torch Position: Sampling Depth	380
Torch Position: Vertical	253
Torch Position: Horizontal	-103
Extraction Lens Voltage	-929 V
D1 Lens Voltage	-26.3 V
L1 Lens Voltage	-9.5 V
L2 Lens Voltage	-139.0 V
L3 Lens Voltage	-169.8 V
Focus Lens Voltage	+23.1 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	-1.97 V
Applied Hexapole Voltage: Collision Cell Mode	Not Applicable

Table 65. Data Generated During Reduced Forward Power Signal Optimisation Experiments for a HNO_3 Blank Solution (V_q = +1V).

Forward Power (W)	$^{31}P^+$ (*m/z* = 31) Signal (cps)	$^{32}S^+$ (*m/z* = 32) Signal (cps)	$^{31}P^{16}O^+$ (*m/z* = 47) Signal (cps)	$^{32}S^{16}O^+$ (*m/z* = 48) Signal (cps)
1700	2093.15	-	483.342	1496.08
1650	2406.87	-	527.676	1707.77
1600	2683.25	-	571.011	1903.79
1550	3094.67	-	619.68	2161.16
1500	3096	-	617.347	2091.49
1450	4005.23	-	619.347	2413.87
1400	4718.78	-	614.68	2581.23
1350	5587.76	54818897	546.344	2607.24
1300	6692.57	83611419	393.339	2475.88
1250	7161.8	-	360.005	2097.15
1200	7317.54	1.66E+08	314.67	1628.43
1150	7796.79	3.87E+08	234.002	1226.72
1100	9272.68	5.25E+08	172.001	999.035
1050	13135.7	7.69E+08	148.334	759.354
1000	22541.2	7.52E+08	100	611.68
950	46128.7	6.28E+08	63	443.674
900	99718.5	1.72E+08	51.667	447.674
875	175012	-	50	511.009
850	276212	-	51.333	571.678
825	367680	-	79	739.686
812	370677	-	79.334	741.686
800	454989	-	126.334	845.692
787	434138	-	106	832.691
775	381385	-	142.667	726.352
762	366308	-	128.001	722.018
750	260010	-	120.001	493.342
725	140209	-	92.667	266.669

Table 66. Data Generated During Reduced Forward Power Signal Optimisation Experiments for a 1000 µg l^{-1} P Solution (V_q = +1V).

Forward Power (W)	$^{31}P^{+}$ (*m/z* = 31) Signal (cps)	$^{32}S^{+}$ (*m/z* = 32) Signal (cps)	$^{31}P^{16}O^{+}$ (*m/z* = 47) Signal (cps)	$^{32}S^{16}O^{+}$ (*m/z* = 48) Signal (cps)
1700	399880	-	1801.45	1739.11
1650	517872	-	23366.86	2125.83
1600	644826	-	2871.96	2622.91
1550	754374	-	3305.05	2797.27
1500	773949	-	3272.38	2667.25
1450	969032	-	3862.86	3108.01
1400	1175799	-	4525.72	3545.11
1350	1322572	56281828	4709.44	3606.46
1300	1432787	84267870	4543.72	3406.07
1250	1412386	-	3901.87	3019.99
1200	1261710	1.68E+08	3270.04	2419.21
1150	1039912	4.02E+08	2524.56	1807.45
1100	873516	5.35E+08	2249.84	1416.07
1050	745871	7.74E+08	1976.14	1139.38
1000	658999	7.64E+08	2190.17	1166.72
950	634859	6.29E+08	3716.82	788.355
900	658848	1.71E+08	9336.05	750.353
875	702665	-	15162	872.027
850	771908	-	25950.6	1018.37
825	836771	-	38002.2	1316.73
812	804830	-	36986.2	1240.05
800	832371	-	45895.6	1481.41
787	788393	-	44964.7	1394.07
775	629036	-	39445.4	1205.38
762	582132	-	38471.7	1153.71
750	377820	-	26979.5	871.693
725	191556	-	141123.6	468.674

Table 67. Data Generated During Reduced Forward Power Signal Optimisation Experiments for a 1000 µg l^{-1} S Solution (V_q = +1V).

Forward Power (W)	$^{31}P^+$ (m/z = 31) Signal (cps)	$^{32}S^+$ (m/z = 32) Signal (cps)	$^{31}P^{16}O^+$ (m/z = 47) Signal (cps)	$^{32}S^{16}O^+$ (m/z = 48) Signal (cps)
1700	2189.17	-	412.673	3355.4
1650	2300.52	-	470.341	3592.45
1600	2699.59	-	565.011	4104.26
1550	3102	-	551.677	4791.47
1500	2965.98	-	576.012	4561.4
1450	4027.9	-	544.677	5993.26
1400	4623.08	-	526.343	6548.5
1350	5498.06	56281828	482.008	6840.3
1300	6452.46	84267870	364.338	6306.73
1250	7053.74	-	329.337	5355.34
1200	7048.74	1.68E+08	269.003	4285.98
1150	7690.4	4.02E+08	207.668	3214.03
1100	9163.94	5.35E+08	169.334	2496.22
1050	13389.3	7.74E+08	128.001	1946.13
1000	23247.9	7.64E+08	87.667	1621.43
950	46858.1	6.29E+08	54.667	1711.77
900	103692	1.71E+08	48	2446.21
875	187752	-	39.333	3985.22
850	264123	-	53	5644.45
825	366029	-	68.667	8157
812	375600	-	74	8412.14
800	451147	-	109	10643.6
787	430730	-	104	10655
775	381752	-	130.334	9732.31
762	353872	-	109.334	9204.97
750	257919	-	103.334	6855.98
725	139171	-	86.334	3686.81

Table 68. Data Accrued for Calibration Experiments Carried out for 'Method 4'.

P and S Calibration Standard Concentration (µg l^{-1})	$^{31}P^{16}O^+$ m/z = 47 Signal (cps)	$^{32}S^{16}O^+$ m/z = 48 Signal (cps)
2 % HNO_3 Blank	408.839	4082.42
0.5	355.004	4104.92
1	462.674	4059.91
5	700.351	4343.66
10	-	4542.06
20	2078.15	5011.88
50	5647.78	7054.74
75	8446.16	8264.39

Table 69. A Table of ICP-MS Instrument Parameters for Method 5: The Determination of $^{31}P^{16}O^{+}$ and $^{32}S^{16}O^{+}$ Ions Formed Under 'Cool/Cold Plasma' Incorporating an Additional O_2 Nebuliser Flow.

Instrument Parameter	Parameter Value
Analyser Pressure	8.30 x 10^{-7} mBar
Expansion Pressure	2.5 mBar
Nebuliser Pressure	2.77 Bar
Plasma Forward Power	Established During Experimentation, See Section 2.4.5.
Plasma Reflected Power	1.2 W
Plasma Gas: Cool Flow	13.4 l min^{-1}
Plasma Gas: Auxilliary Flow	0.77 l min^{-1}
Plasma Gas: Nebuliser Flow	1.40 l min^{-1}
Torch Position: Sampling Depth	322
Torch Position: Vertical	88
Torch Position: Horizontal	16
Extraction Lens Voltage	-428 V
D1 Lens Voltage	-27.2 V
L1 Lens Voltage	-5.0 V
L2 Lens Voltage	-188.8 V
L3 Lens Voltage	-196.4 V
Focus Lens Voltage	+26.2 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	-1.97 V
Applied Hexapole Voltage: Collision Cell Mode	Not Applicable

Table 70. Data Generated During the Introduction of O_2 to the Nebuliser Flow Whilst Analysing Under 'Cold/Cool Plasma' Conditions Described in Section 2.4.4.

Sample	O_2 Introduction Flow Rate (ml min^{-1})	$^{31}P^{16}O^+$ (m/z = 47) Signal (cps)	$^{32}S^{16}O^+$ (m/z = 48) Signal (cps)
2 % HNO_3 Blank	0	346.004	5683.464
	2	373.672	6857.312
	4	437.007	7527.984
	6	449.007	8189.013
	8	509.009	8830.061
	10	531.01	8774.029
	12	535.343	8740.34
	14	511.009	8719.661
	18	481.675	8230.704
1000 µg l^{-1} P	0	110890.4	-
	2	108714.1	-
	4	117005.6	-
	6	122740.7	-
	8	123179.5	-
	10	119660.7	-
	12	115659.3	-
	14	108429.6	-
	18	105155.6	-
1000 µg l^{-1} S	0	-	46912.24
	2	-	51085.85
	4	-	57735.44
	6	-	63206.19
	8	-	64417.24
	10	-	65665.92
	12	-	65018.96
	14	-	61096.04
	18	-	59245.6

Table 71. Data Accrued for Calibration Experiments Carried out Under 'Method 5' Conditions.

P and S Calibration Standard Concentration (µg l^{-1})	$^{31}P^{16}O^+$ *m/z* = 47 Signal (cps)	$^{32}S^{16}O^+$ *m/z* = 48 Signal (cps)
2 % HNO_3 Blank	365.671	3830.847
1	418.339	3770.498
2	532.677	4766.129
5	622.347	4264.637
10	1308.727	4639.42
20	2259.179	5102.245
50	6291.719	7948.212
75	-	8726.666
100	14490.01	-

Figure 91. A Photograph of the Two Torch Bonnets Manufactured for the Exclusion of Entrained Atmospheric Gases from the ICP.

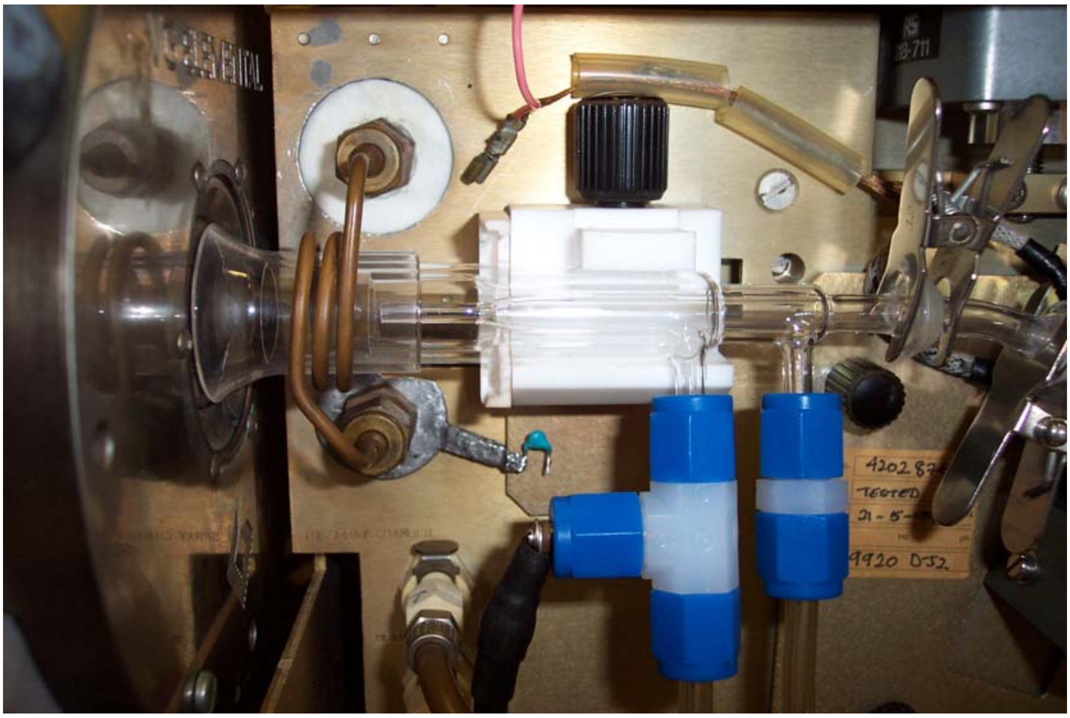

Figure 92. A Photograph of the First Torch Bonnet Design Placed Within the Instrument Torch Box.

Table 72. A Table of ICP-MS Instrument Parameters for Method 6 (Part 1): The Exclusion of Entrained Atmospheric Gases from the ICP.

Instrument Parameter	Parameter Value
Analyser Pressure	5.50×10^{-7} mBar
Expansion Pressure	2 mBar
Nebuliser Pressure	2.94 Bar
Plasma Forward Power	1350 W
Plasma Reflected Power	0 W
Plasma Gas: Cool Flow	12.8 l min^{-1}
Plasma Gas: Auxilliary Flow	0.80 l min^{-1}
Plasma Gas: Nebuliser Flow	1.15 l min^{-1}
Torch Position: Sampling Depth	345
Torch Position: Vertical	104
Torch Position: Horizontal	16
Extraction Lens Voltage	-522 V
D1 Lens Voltage	-23.5 V
L1 Lens Voltage	-9.6 V
L2 Lens Voltage	-175.0 V
L3 Lens Voltage	-128.9 V
Focus Lens Voltage	20.1 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	-1.97 V
Applied Hexapole Voltage: Collision Cell Mode	Not Applicable

Table 73. Data Generated from the Study of P and S Standard Solutions Spiked with 1 µg l^{-1} In by ICP-MS both with and without ICP Enclosure with the First Torch Bonnet Design.

	P and S Standard Conc^{n} (µg l^{-1})	$^{31}P^{+}$ (m/z = 31) Signal (cps)	$^{32}S^{+}$ (m/z = 32) Signal (cps)	$^{115}In^{+}$ (m/z = 115) Signal (cps)
Standard Conditions	2 % HNO_3 Blank	10263.4	0	146.334
	0.5	13735.3	0	1836.12
	1	27243.3	0	31280.2
	2	15328.6	0	36540.7
	5	30072.3	0	6577.85
	10	43342.7	0	44146.1
	20	49671.9	0	4844.82
	50	121208	0	7118.44
	75	174000	0	12929.2
Bonnet In Position	2 % HNO_3 Blank	2871.96	109817	61
	0.5	3100.34	107928	265.669
	1	4341.66	109147	2781.6
	2	3342.39	109722	3284.04
	5	4649.76	107612	1549.42
	10	5476.38	110669	3635.8
	20	6021.94	114390	480.675
	50	15076.3	115145	819.024
	75	20358.2	112493	1222.72

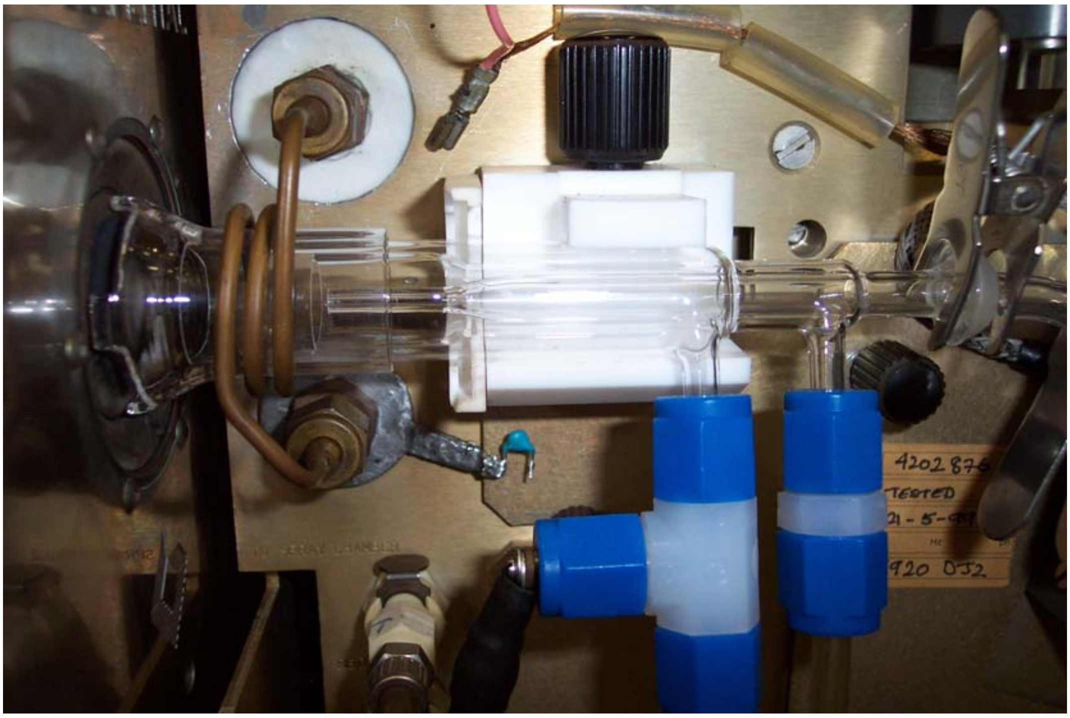

Figure 93. A Photograph of the Second Torch Bonnet Design Placed Within the Instrument Torch Box.

Table 74. A Table of ICP-MS Instrument Parameters for Method 6 (Part 2): The Exclusion of Entrained Atmospheric Gases from the ICP.

Instrument Parameter	Parameter Value
Analyser Pressure	5.40×10^{-7} mBar
Expansion Pressure	1.9 mBar
Nebuliser Pressure	2.76 Bar
Plasma Forward Power	1350 W
Plasma Reflected Power	0 W
Plasma Gas: Cool Flow	12.8 l min^{-1}
Plasma Gas: Auxilliary Flow	0.80 l min^{-1}
Plasma Gas: Nebuliser Flow	1.13 l min^{-1}
Torch Position: Sampling Depth	345
Torch Position: Vertical	80
Torch Position: Horizontal	13
Extraction Lens Voltage	-510 V
D1 Lens Voltage	-23.3 V
L1 Lens Voltage	-9.5 V
L2 Lens Voltage	-175.0 V
L3 Lens Voltage	-126.8 V
Focus Lens Voltage	+21.8 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	-1.97 V
Applied Hexapole Voltage: Collision Cell Mode	Not Applicable

Table 75. Data Generated from the Study of P and S Standard Solutions Spiked with 1 µg l^{-1} In by ICP-MS both with and without ICP Enclosure with the Second Torch Bonnet Design.

	P and S Standard Concentration (µg l^{-1})	$^{31}P^{+}$ (*m/z* = 31) Signal (cps)	$^{32}S^{+}$ (*m/z* = 32) Signal (cps)	$^{115}In^{+}$ (*m/z* = 115) Signal (cps)
Standard Conditions	2 % HNO_3 Blank	10263.4	0	146.334
	0.5	13735.3	0	1836.12
	1	27243.3	0	31280.2
	2	15328.6	0	36540.7
	5	30072.3	0	6577.85
	10	43342.7	0	44146.1
	20	49671.9	0	4844.82
	50	121208	0	7118.44
	75	174000	0	12929.2
With Bonnet	2 % HNO_3 Blank	12711	12364.1	72
	0.5	13158.4	15175.7	824.357
	1	20767.4	5936.12	13825.7
	2	14408.6	9907.18	15491.1
	5	21003.8	6267.01	2712.59
	10	26193.3	11272.6	18728.3
	20	31337.3	709.36	1737.11
	50	83925.1	0	2065.82
	75	88600	0	2271.51

Appendix 3

Additional Information Associated with Chapter 3: The Application of Methods Developed for the Determination of ^{31}P and ^{32}S and the Study of DNA and Related Material by ICP-MS

Table 76. A Table of ICP-MS Instrument Parameters for the Analysis of a 2000 µg l^{-1} DNA Solution Via Measurement of the ^{31}P Isotope Employing Method 2: The Determination of $^{31}P^{16}O^+$ and $^{32}S^{16}O^+$ Ions in a Collision Cell Incorporating O_2 Only Under IKEE Conditions.

Instrument Parameter	Parameter Value
Analyser Pressure	5.90 x 10^{-7} mBar
Expansion Pressure	1.9 mBar
Nebuliser Pressure	2.84 Bar
Plasma Forward Power	1350 W
Plasma Reflected Power	0 W
Plasma Gas: Cool Flow	12.8 l min^{-1}
Plasma Gas: Auxilliary Flow	0.85 l min^{-1}
Plasma Gas: Nebuliser Flow	1.17 l min^{-1}
Torch Position: Sampling Depth	345
Torch Position: Vertical	84
Torch Position: Horizontal	15
Extraction Lens Voltage	-484 V
D1 Lens Voltage	-23.3 V
L1 Lens Voltage	-7.5 V
L2 Lens Voltage	-180.0 V
L3 Lens Voltage	-124.0 V
Focus Lens Voltage	+20.5 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	Not Applicable
Applied Hexapole Voltage: Collision Cell Mode	+8 V

Table 77. A Table of ICP-MS Instrument Parameters for the Analysis of a 200 µg l^{-1} DNA Solution Via Measurement of the ^{31}P Isotope Employing Method 3: Selective Removal of Polyatomic Ions in a Collision Cell Incorporating a He Collision Gas Under KED Conditions.

Instrument Parameter	Parameter Value
Analyser Pressure	7.50 x 10^{-7} mBar
Expansion Pressure	2.1 mBar
Nebuliser Pressure	2.73 Bar
Plasma Forward Power	1350 W
Plasma Reflected Power	1.8 W
Plasma Gas: Cool Flow	12.7 l min^{-1}
Plasma Gas: Auxilliary Flow	0.8 l min^{-1}
Plasma Gas: Nebuliser Flow	1.08 l min^{-1}
Torch Position: Sampling Depth	380
Torch Position: Vertical	-115
Torch Position: Horizontal	252
Extraction Lens Voltage	-874 V
D1 Lens Voltage	-26.7 V
L1 Lens Voltage	-6.2 V
L2 Lens Voltage	-143 V
L3 Lens Voltage	-166.9 V
Focus Lens Voltage	22.6 V
Applied Quadrupole Voltage	0 V
Applied Hexapole Voltage: Standard Mode	Not Applicable
Applied Hexapole Voltage: Collision Cell Mode	-1 V

Table 78. A Table of ICP-MS Instrument Parameters for the Analysis of a 2000 µg l^{-1} DNA Solution Via Measurement of the ^{31}P Isotope Employing Method 4: The Determination of $^{31}P^{16}O^+$ and $^{32}S^{16}O^+$ Ions Formed Under 'Cool/Cold Plasma'.

Instrument Parameter	Parameter Value
Analyser Pressure	7.50 x 10^{-7} mBar
Expansion Pressure	2.1 mBar
Nebuliser Pressure	2.64 Bar
Plasma Forward Power	800 W
Plasma Reflected Power	1.8 W
Plasma Gas: Cool Flow	12.7 l min^{-1}
Plasma Gas: Auxilliary Flow	0.8 l min^{-1}
Plasma Gas: Nebuliser Flow	1.05 l min^{-1}
Torch Position: Sampling Depth	380
Torch Position: Vertical	-115
Torch Position: Horizontal	252
Extraction Lens Voltage	-874 V
D1 Lens Voltage	-26.7 V
L1 Lens Voltage	-6.2 V
L2 Lens Voltage	-143 V
L3 Lens Voltage	-166.9 V
Focus Lens Voltage	22.6 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	-1.97 V
Applied Hexapole Voltage: Collision Cell Mode	Not Applicable

Table 79. A Table of ICP-MS Instrument Parameters for the Analysis of a 200 μg l^{-1} DNA Solution Via the Measurement of the ^{31}P Isotope Employing Method 5: The Determination of $^{31}P^{16}O^{+}$ and $^{32}S^{16}O^{+}$ Ions Formed by 'Cool/Cold Plasma' Incorporating an Additional O_2 Nebuliser Flow.

Instrument Parameter	Parameter Value
Analyser Pressure	7.40 x 10^{-7} mBar
Expansion Pressure	2.1 mBar
Nebuliser Pressure	2.58 Bar
Plasma Forward Power	800 W
Plasma Reflected Power	2 W
Plasma Gas: Cool Flow	12.7 l min^{-1}
Plasma Gas: Auxilliary Flow	0.8 l min^{-1}
Plasma Gas: Nebuliser Flow	1.05 l min^{-1}
Torch Position: Sampling Depth	380
Torch Position: Vertical	-100
Torch Position: Horizontal	252
Extraction Lens Voltage	-935.5 V
D1 Lens Voltage	-27.5 V
L1 Lens Voltage	-8.8 V
L2 Lens Voltage	-140.9 V
L3 Lens Voltage	-167.5 V
Focus Lens Voltage	23.6 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	-1.97 V
Applied Hexapole Voltage: Collision Cell Mode	Not Applicable

Table 80. Data Generated During the Standard Additions Analysis of DNA and P Standard Solutions by Methods 2, 3, 4 and 5.

	Method 2	Method 3	Method 4	Method 5
P Standard Concentration ($\mu g\ l^{-1}$)	$^{31}P^{16}O^+$ $m/z = 47$ Signal (cps)	$^{31}P^+$ $m/z = 31$ Signal (cps)	$^{31}P^{16}O^+$ $m/z = 47$ Signal (cps)	$^{31}P^{16}O^+$ $m/z = 47$ Signal (cps)
2 % HNO_3 Blank	-	1757.44	390.339	365.671
0.5	-	1925.46	-	-
1	-	2707.92	-	418.339
2	-	2117.16	-	532.677
5	-	3183.36	-	622.347
10	-	3606.12	-	1308.73
20	-	4009.56	-	2259.18
50	-	9340.39	-	6291.72
75	-	12753.7	-	-
100	-	-	-	14490
125	-	-	14984.86	-
150	-	23666.3	-	17543.8
200	-	-	-	24288.3
250	-	39503.9	30805.52	30638.8
300	-	47533	-	36094.2
350	-	57163.1	-	42793.3
375	-	-	46704.92	-
500	-	-	63276.89	-
Control DNA	41949.84	2829.28	36360.46	1251.06
50 + DNA	-	12308.6	-	7821.47
100 + DNA	63014.34	17546.4	47233.41	13093.7
150 + DNA	-	27561.9	-	20800.8
200 + DNA	-	33097.3	64793.39	26297.5
250 + DNA	-	42472.7	-	32360.9
300 + DNA	107293.5	50396.5	77255.78	40795.8
350 + DNA	-	55721.9	-	44085.6
400 + DNA	131467.9	-	96009.51	-

Table 81. A Table of ICP-MS Instrument Parameters for the Analysis of DNA Samples, Separated on an Agarose Gel Plate, Via Measurement of the ^{31}P Isotope Employing Method 2: The Determination of $^{31}P^{16}O^{+}$ and $^{32}S^{16}O^{+}$ Ions in a Collision Cell Incorporating O_2 Only Under IKEE Conditions.

Instrument Parameter	Parameter Value
Analyser Pressure	7.30 x 10^{-7} mBar
Expansion Pressure	2 mBar
Nebuliser Pressure	2.5 Bar
Plasma Forward Power	1350 W
Plasma Reflected Power	1.8 W
Plasma Gas: Cool Flow	12.7 l min^{-1}
Plasma Gas: Auxilliary Flow	0.8 l min^{-1}
Plasma Gas: Nebuliser Flow	1.03 l min^{-1}
Torch Position: Sampling Depth	380
Torch Position: Vertical	-103
Torch Position: Horizontal	253
Extraction Lens Voltage	-928.5 V
D1 Lens Voltage	-26.3 V
L1 Lens Voltage	-9.5 V
L2 Lens Voltage	-139 V
L3 Lens Voltage	-169.8 V
Focus Lens Voltage	23.1 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	Not Applicable
Applied Hexapole Voltage: Collision Cell Mode	+8 V

Table 82. A Table of ICP-MS Instrument Parameters for the Analysis of DNA Replication by Polymerase Chain Reaction, Via Measurement of the ^{31}P Isotope Employing Method 2: The Determination of $^{31}P^{16}O^+$ and $^{32}S^{16}O^+$ Ions in a Collision Cell Incorporating O_2 Only Under IKEE Conditions.

Instrument Parameter	Parameter Value
Analyser Pressure	7.80 x 10^{-7} mBar
Expansion Pressure	2 mBar
Nebuliser Pressure	2.68 Bar
Plasma Forward Power	1350 W
Plasma Reflected Power	2 W
Plasma Gas: Cool Flow	12.7 l min^{-1}
Plasma Gas: Auxilliary Flow	0.8 l min^{-1}
Plasma Gas: Nebuliser Flow	1.1 l min^{-1}
Torch Position: Sampling Depth	380
Torch Position: Vertical	-107
Torch Position: Horizontal	253
Extraction Lens Voltage	-667 V
D1 Lens Voltage	-26.3 V
L1 Lens Voltage	-9.3 V
L2 Lens Voltage	-139 V
L3 Lens Voltage	-169.8 V
Focus Lens Voltage	23.1 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	Not Applicable
Applied Hexapole Voltage: Collision Cell Mode	+8 V

Table 83. Data Generated During the Analysis of Separated Amplified DNA Sequence Samples by ICP-MS Employing Method 2.

Number of PCR Thermocycles Passed Through	$^{31}P^{16}O^+$ (*m/z* = 47) Signal (cps)
0 (Control)	13904.1
4	12659.61
8	14803
12	15005.88
16	15041.25
20	14312.83
28	18983.27
32	20061.08
36	22244.31

Table 84. A Table of ICP-MS Instrument Parameters for the Analysis of Single Nucleotide Polymorphisms, Via Measurement of the ^{31}P Isotope Employing Method 2: The Determination of $^{31}P^{16}O^+$ and $^{32}S^{16}O^+$ Ions in a Collision Cell Incorporating O_2 Only Under IKEE Conditions.

Instrument Parameter	Parameter Value
Analyser Pressure	7.00 x 10^{-7} mBar
Expansion Pressure	2.3 mBar
Nebuliser Pressure	2.74 Bar
Plasma Forward Power	1350 W
Plasma Reflected Power	0 W
Plasma Gas: Cool Flow	12.8 l min^{-1}
Plasma Gas: Auxilliary Flow	0.85 l min^{-1}
Plasma Gas: Nebuliser Flow	1.11 l min^{-1}
Torch Position: Sampling Depth	345
Torch Position: Vertical	97
Torch Position: Horizontal	5
Extraction Lens Voltage	-571 V
D1 Lens Voltage	-27.3 V
L1 Lens Voltage	+1.3 V
L2 Lens Voltage	-164.0 V
L3 Lens Voltage	-110.5 V
Focus Lens Voltage	16.6 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	Not Applicable
Applied Hexapole Voltage: Collision Cell Mode	+8 V

Table 85. A Table of ICP-MS Instrument Parameters for the Analysis of Single Nucleotide Polymorphisms, Via Measurement of the ^{31}P Isotope, Employing Method 4: The Determination of $^{31}P^{16}O^+$ and $^{32}S^{16}O^+$ Ions Formed Under 'Cool/Cold Plasma'.

Instrument Parameter	Parameter Value
Analyser Pressure	5.90 x 10^{-7} mBar
Expansion Pressure	2.1 mBar
Nebuliser Pressure	2.6 Bar
Plasma Forward Power	800 W
Plasma Reflected Power	0 W
Plasma Gas: Cool Flow	12.9 l min^{-1}
Plasma Gas: Auxilliary Flow	0.87 l min^{-1}
Plasma Gas: Nebuliser Flow	1.07 l min^{-1}
Torch Position: Sampling Depth	344
Torch Position: Vertical	102
Torch Position: Horizontal	4
Extraction Lens Voltage	-409 V
D1 Lens Voltage	-24.6 V
L1 Lens Voltage	-10.5 V
L2 Lens Voltage	-175.5 V
L3 Lens Voltage	-129.8 V
Focus Lens Voltage	+22.1 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	-1.97 V
Applied Hexapole Voltage: Collision Cell Mode	Not Applicable

Appendix 4

Additional Information Associated with Chapter 4: The Measurement of Platinum Based Anti-Cancer Drugs and DNA by ICP-MS

Table 86. DNA/Cisplatin Initial Sample Preparation Details (Study 1).

Sample Code	Sample Treatment (Nucleotide/ Cisplatin)	Sample Treatment (Cisplatin/ Nucleotide)	DNA Solution Volume (µl)	Cisplatin Conc^n (µM)	Cisplatin Sample Volume (µl)	Phosphate Buffer Volume (µl)	Water Volume (µl)	Solution Volume Per Sample (µl)	DNA Conc^n (µg ml^{-1})
C101	Control	Control	2600	0	0	100	2300	296	676
C102	100	0.01	2600	333	300	100	2000	287	697
C103	500	0.002	2600	33.3	600	100	1700	317	630
C104	1000	0.001	2600	33.3	300	100	2000	549	364
C105	5000	0.0002	2600	3.33	600	100	1700	326	612.5
C106	10000	0.0001	2600	3.33	300	100	2000	319	626.5
C107	50000	0.00002	2600	0.333	600	100	1700	452	442
C108	100000	0.00001	2600	0.333	300	100	2000	458	436.5
C109	500000	0.000002	2600	0.033	600	100	1700	540	370.5
C110	1000000	0.000001	2600	0.033	300	100	2000	535	373.5

Table 87. Details of Pre-Analysis Sample Treatment for Study 1.

Sample N^{o}	Sample Code/ Label	Nuc/Cis	Cis/Nuc	Initial Mass DNA/Cis Sol^{n} (g)	Final Mass DNA/Cis/H_2O or P/Pt Sol^{n} (g)	Dilution Factor	Initial DNA Conc^{n} (µg ml^{-1})	Final DNA Conc^{n} (µg ml^{-1})
91	C101 + H_2O	Control	Control	0.0104	1.0084	96.96	676	6.97
92	C101 + 100 µg l^{-1} P/Pt	Control	Control	0.011	1.0039	91.26	676	7.41
93	C101 + 200 µg l^{-1} P/Pt	Control	Control	0.0107	1.0031	93.75	676	7.21
94	C101 + 300 µg l^{-1} P/Pt	Control	Control	0.0108	0.9966	92.28	676	7.33
95	C101 + 400 µg l^{-1} P/Pt	Control	Control	0.0105	1.0385	98.90	676	6.83
96	C101 + H_2O (2)	Control	Control	0.105	1.0046	95.68	676	7.07
97	C101 + 100 µg l^{-1} P/Pt (2)	Control	Control	0.01	1.0121	101.21	676	6.68
98	C101 + 200 µg l^{-1} P/Pt (2)	Control	Control	0.011	0.9999	90.9	676	7.44
99	C101 + 300 µg l^{-1} P/Pt (2)	Control	Control	0.0109	1.0134	92.97	676	7.27
100	C101 + 400 µg l^{-1} P/Pt (2)	Control	Control	0.0105	0.9974	94.99	676	7.12
81	C102 + H_2O	100	0.01	0.0103	1.0031	97.39	697	7.16
82	C102 + 100 µg l^{-1} P/Pt	100	0.01	0.0107	0.9931	92.81	697	7.51
83	C102 + 200 µg l^{-1} P/Pt	100	0.01	0.0109	1.0083	92.50	697	7.53
84	C102 + 300 µg l^{-1} P/Pt	100	0.01	0.0105	0.998	95.05	697	7.33
85	C102 + 400 µg l^{-1} P/Pt	100	0.01	0.0109	1.001	91.83	697	7.59
86	C102 + H_2O (2)	100	0.01	0.01	0.9952	99.52	697	7.00
87	C102 + 100 µg l^{-1} P/Pt (2)	100	0.01	0.0107	1.0013	93.58	697	7.45
88	C102 + 200 µg l^{-1} P/Pt (2)	100	0.01	0.011	1.013	92.09	697	7.57
89	C102 + 300 µg l^{-1} P/Pt (2)	100	0.01	0.0108	1.0096	93.48	697	7.46
90	C102 + 400 µg l^{-1} P/Pt (2)	100	0.01	0.0109	1.0005	91.79	697	7.59
71	C103 + H_2O	500	0.002	0.0105	0.996	94.86	630	6.64
72	C103 + 100 µg l^{-1} P/Pt	500	0.002	0.0103	0.9933	96.44	630	6.53
73	C103 + 200 µg l^{-1} P/Pt	500	0.002	0.0105	0.9936	94.63	630	6.66
74	C103 + 300 µg l^{-1} P/Pt	500	0.002	0.0109	1.0104	92.70	630	6.80
75	C103 + 400 µg l^{-1} P/Pt	500	0.002	0.0109	1.0069	92.38	630	6.82
76	C103 + H_2O (2)	500	0.002	0.0103	0.9983	96.92	630	6.50
77	C103 + 100 µg l^{-1} P/Pt (2)	500	0.002	0.0103	0.9997	97.06	630	6.49
78	C103 + 200 µg l^{-1} P/Pt (2)	500	0.002	0.0111	1.0042	90.47	630	6.96
79	C103 + 300 µg l^{-1} P/Pt (2)	500	0.002	0.011	1.0024	91.13	630	6.91
80	C103 + 400 µg l^{-1} P/Pt (2)	500	0.002	0.0109	1.0139	93.02	630	6.77

Table 87. Details of Pre-Analysis Sample Treatment for Study 1, Continued…..

Sample N^o	Sample Code/ Label	Nuc/Cis	Cis/Nuc	Initial Mass DNA/Cis Sol^n (g)	Final Mass DNA/Cis/H_2O or P/Pt Sol^n (g)	Dilution Factor	Initial DNA Conc^n (μg ml^{-1})	Final DNA Conc^n (μg ml^{-1})
61	C104 + H_2O	1000	0.001	0.0106	0.9964	94	364	3.87
62	C104 + 100 μg l^{-1} P/Pt	1000	0.001	0.0103	1.007	97.77	364	3.72
63	C104 + 200 μg l^{-1} P/Pt	1000	0.001	0.0108	1.0064	93.19	364	3.91
64	C104 + 300 μg l^{-1} P/Pt	1000	0.001	0.0103	1.0055	97.62	364	3.72
65	C104 + 400 μg l^{-1} P/Pt	1000	0.001	0.011	0.9918	90.16	364	4.04
66	C104 + H_2O (2)	1000	0.001	0.0104	0.9939	95.57	364	3.81
67	C104 + 100 μg l^{-1} P/Pt (2)	1000	0.001	0.011	0.9944	90.4	364	4.03
68	C104 + 200 μg l^{-1} P/Pt (2)	1000	0.001	0.0111	0.995	89.64	364	4.06
69	C104 + 300 μg l^{-1} P/Pt (2)	1000	0.001	0.0109	1.0081	92.49	364	3.94
70	C104 + 400 μg l^{-1} P/Pt (2)	1000	0.001	0.0108	0.9994	92.54	364	3.93
51	C105 + H_2O	5000	0.0002	0.0103	0.9936	96.47	612.5	6.35
52	C105 + 100 μg l^{-1} P/Pt	5000	0.0002	0.0103	0.9947	96.57	612.5	6.34
53	C105 + 200 μg l^{-1} P/Pt	5000	0.0002	0.0111	0.9979	89.90	612.5	6.81
54	C105 + 300 μg l^{-1} P/Pt	5000	0.0002	0.0108	0.9939	92.03	612.5	6.66
55	C105 + 400 μg l^{-1} P/Pt	5000	0.0002	0.0104	0.9989	96.05	612.5	6.38
56	C105 + H_2O (2)	5000	0.0002	0.0106	0.9969	94.05	612.5	6.51
57	C105 + 100 μg l^{-1} P/Pt (2)	5000	0.0002	0.0103	1.0016	97.24	612.5	6.30
58	C105 + 200 μg l^{-1} P/Pt (2)	5000	0.0002	0.0107	1.0064	94.06	612.5	6.51
59	C105 + 300 μg l^{-1} P/Pt (2)	5000	0.0002	0.0109	0.9946	91.25	612.5	6.71
60	C105 + 400 μg l^{-1} P/Pt (2)	5000	0.0002	0.0109	1.0008	91.82	612.5	6.67
41	C106 + H_2O	10000	0.0001	0.0105	0.9999	95.23	626.5	6.58
42	C106 + 100 μg l^{-1} P/Pt	10000	0.0001	0.0104	0.9946	95.63	626.5	6.55
43	C106 + 200 μg l^{-1} P/Pt	10000	0.0001	0.0109	1.0384	95.27	626.5	6.58
44	C106 + 300 μg l^{-1} P/Pt	10000	0.0001	0.0107	1.0018	93.63	626.5	6.69
45	C106 + 400 μg l^{-1} P/Pt	10000	0.0001	0.0104	1.0055	96.68	626.5	6.48
46	C106 + H_2O (2)	10000	0.0001	0.0104	1.0035	96.49	626.5	6.49
47	C106 + 100 μg l^{-1} P/Pt (2)	10000	0.0001	0.0105	0.9965	94.90	626.5	6.60
48	C106 + 200 μg l^{-1} P/Pt (2)	10000	0.0001	0.0095	1.0033	105.61	626.5	5.93
49	C106 + 300 μg l^{-1} P/Pt (2)	10000	0.0001	0.0111	0.998	89.91	626.5	6.97
50	C106 + 400 μg l^{-1} P/Pt (2)	10000	0.0001	0.0103	1.0121	98.26	626.5	6.38

Table 87. Details of Pre-Analysis Sample Treatment for Study 1, Continued…..

Sample N^o	Sample Code/ Label	Nuc/Cis	Cis/Nuc	Initial Mass DNA/Cis Sol^n (g)	Final Mass DNA/Cis/H_2O or P/Pt Sol^n (g)	Dilution Factor	Initial DNA Conc^n (μg ml^{-1})	Final DNA Conc^n (μg ml^{-1})
31	C107 + H_2O	50000	0.00002	0.0101	1.0113	100.13	442	4.41
32	C107 + 100 μg l^{-1} P/Pt	50000	0.00002	0.0093	0.9959	107.08	442	4.13
33	C107 + 200 μg l^{-1} P/Pt	50000	0.00002	0.0108	0.9966	92.28	442	4.79
34	C107 + 300 μg l^{-1} P/Pt	50000	0.00002	0.0103	1.0018	97.26	442	4.54
35	C107 + 400 μg l^{-1} P/Pt	50000	0.00002	0.0102	1.0117	99.19	442	4.46
36	C107 + H_2O (2)	50000	0.00002	0.0105	0.9964	94.90	442	4.66
37	C107 + 100 μg l^{-1} P/Pt (2)	50000	0.00002	0.0108	1.0039	92.95	442	4.76
38	C107 + 200 μg l^{-1} P/Pt (2)	50000	0.00002	0.0105	1.0108	96.27	442	4.59
39	C107 + 300 μg l^{-1} P/Pt (2)	50000	0.00002	0.0106	1.006	94.91	442	4.66
40	C107 + 400 μg l^{-1} P/Pt (2)	50000	0.00002	0.011	0.9925	90.23	442	4.90
21	C108 + H_2O	100000	0.00001	0.0105	1.0068	95.89	436.5	4.55
22	C108 + 100 μg l^{-1} P/Pt	100000	0.00001	0.011	1.0029	91.17	436.5	4.79
23	C108 + 200 μg l^{-1} P/Pt	100000	0.00001	0.0106	0.9963	93.99	436.5	4.64
24	C108 + 300 μg l^{-1} P/Pt	100000	0.00001	0.0105	1.0135	96.52	436.5	4.52
25	C108 + 400 μg l^{-1} P/Pt	100000	0.00001	0.0109	1.0072	92.40	436.5	4.72
26	C108 + H_2O (2)	100000	0.00001	0.0103	1.0086	97.92	436.5	4.46
27	C108 + 100 μg l^{-1} P/Pt (2)	100000	0.00001	0.0108	1.0183	94.29	436.5	4.63
28	C108 + 200 μg l^{-1} P/Pt (2)	100000	0.00001	0.0106	1.0087	95.16	436.5	4.59
29	C108 + 300 μg l^{-1} P/Pt (2)	100000	0.00001	0.0108	0.9993	92.53	436.5	4.72
30	C108 + 400 μg l^{-1} P/Pt (2)	100000	0.00001	0.011	1.0158	92.35	436.5	4.73
11	C109 + H_2O	500000	0.000002	0.0105	0.9914	94.42	370.5	3.92
12	C109 + 100 μg l^{-1} P/Pt	500000	0.000002	0.0107	1.007	94.11	370.5	3.94
13	C109 + 200 μg l^{-1} P/Pt	500000	0.000002	0.0106	0.9935	93.73	370.5	3.95
14	C109 + 300 μg l^{-1} P/Pt	500000	0.000002	0.0109	1.0058	92.28	370.5	4.02
15	C109 + 400 μg l^{-1} P/Pt	500000	0.000002	0.0092	1.0066	109.41	370.5	3.39
16	C109 + H_2O (2)	500000	0.000002	0.0105	0.9964	94.90	370.5	3.90
17	C109 + 100 μg l^{-1} P/Pt (2)	500000	0.000002	0.011	1.0021	91.1	370.5	4.07
18	C109 + 200 μg l^{-1} P/Pt (2)	500000	0.000002	0.0108	1.0002	92.61	370.5	4.00
19	C109 + 300 μg l^{-1} P/Pt (2)	500000	0.000002	0.0106	1.0086	95.15	370.5	3.89
20	C109 + 400 μg l^{-1} P/Pt (2)	500000	0.000002	0.0107	1.0034	93.78	370.5	3.95

Table 87. Details of Pre-Analysis Sample Treatment for Study 1, Continued…..

Sample N^o	Sample Code/ Label	Nuc/Cis	Cis/Nuc	Initial Mass DNA/Cis Sol^n (g)	Final Mass DNA/Cis/H_2O or P/Pt Sol^n (g)	Dilution Factor	Initial DNA Conc^n (µg ml^{-1})	Final DNA Conc^n (µg ml^{-1})
1	C110 + H_2O	1000000	0.000001	0.0105	1.0066	95.87	373.5	3.90
2	C110 + 100 µg l^{-1} P/Pt	1000000	0.000001	0.0103	0.9958	96.68	373.5	3.86
3	C110 + 200 µg l^{-1} P/Pt	1000000	0.000001	0.0106	1.014	9.5.66	373.5	3.90
4	C110 + 300 µg l^{-1} P/Pt	1000000	0.000001	0.0103	1.0078	97.84	373.5	3.82
5	C110 + 400 µg l^{-1} P/Pt	1000000	0.000001	0.0106	0.9974	94.09	373.5	3.97
6	C110 + H_2O (2)	1000000	0.000001	0.0108	1.0011	92.69	373.5	4.03
7	C110 + 100 µg l^{-1} P/Pt (2)	1000000	0.000001	0.01	1.0023	100.23	373.5	3.73
8	C110 + 200 µg l^{-1} P/Pt (2)	1000000	0.000001	0.0104	0.9978	95.94	373.5	3.89
9	C110 + 300 µg l^{-1} P/Pt (2)	1000000	0.000001	0.0107	0.993	92.80	373.5	4.02
10	C110 + 400 µg l^{-1} P/Pt (2)	1000000	0.000001	0.0106	1.0002	94.36	373.5	3.96

Table 88. A Table of ICP-MS Instrument Parameters for the Analysis of DNA and Cisplatin Interactions *In Vitro*, Via Measurement of the ^{31}P and $^{194,195}Pt$ Isotopes, Employing Method 2: The Determination of $^{31}P^{16}O^{+}$ and $^{32}S^{16}O^{+}$ Ions in a Collision Cell Incorporating O_2 Only Under IKEE Conditions (Study 1).

Instrument Parameter	Parameter Value
Analyser Pressure	8.00×10^{-7} mBar
Expansion Pressure	1.9 mBar
Nebuliser Pressure	2.63 Bar
Plasma Forward Power	1350 W
Plasma Reflected Power	1.8 W
Plasma Gas: Cool Flow	12.7 l min^{-1}
Plasma Gas: Auxilliary Flow	0.80 l min^{-1}
Plasma Gas: Nebuliser Flow	0.95 l min^{-1}
Torch Position: Sampling Depth	390
Torch Position: Vertical	-100
Torch Position: Horizontal	240
Extraction Lens Voltage	-732 V
D1 Lens Voltage	-26.3 V
L1 Lens Voltage	-9.5 V
L2 Lens Voltage	-139 V
L3 Lens Voltage	-169.8 V
Focus Lens Voltage	23.1 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	Not Applicable
Applied Hexapole Voltage: Collision Cell Mode	+8 V

Table 89. Data Accrued During the Analysis of DNA/Cisplatin Samples (Study 1).

			m/z Data (cps)								
Sample Code	**Sample Identity**	**Equivalent Graph Points**	**31 ($^{31}P^+$)**	**47 ($^{31}P^{16}O^+$)**	**115 ($^{115}In^+$)**	**190 ($^{190}Pt^+$)**	**192 ($^{192}Pt^+$)**	**194 ($^{194}Pt^+$)**	**195 ($^{195}Pt^+$)**	**196 ($^{196}Pt^+$)**	**198 ($^{198}Pt^+$)**
Ext Std	DI Blank	0	37951.68	3513.10	186.67	2.67	94.67	4006.91	4100.93	3007.32	1004.036
Ext Std	25 µg l^{-1} P/Pt	25	38454.37	4644.42	190.67	321.67	19054.7	782675.2	820406.1	622471	182445.9
Ext Std	50 µg l^{-1} P/Pt	50	37490.46	5466.71	167.33	643.01	39306	1609227	1681458	1282199	378622.6
Ext Std	75 µg l^{-1} P/Pt	75	37264.89	6865.98	190.00	1059.71	63038.11	2571695	2679746	2051752	610028.9
Ext Std	100 µg l^{-1} P/Pt	100	36477.52	8956.14	209.00	1459.74	88426.84	3542940	3674140	2798734	830845.2
C110	C110 + DI Blank	0	38286.57	15336.9	194.00	5	214.34	8829.73	9378.08	6989.71	2119.16
C110	C110 + 100 µg l^{-1} P/Pt	25	40813.9	17966.62	206.00	362.338	22033.98	904465.1	943616.1	718940.2	211568.9
C110	C110 + 200 µg l^{-1} P/Pt	50	42610.14	18911.84	202.00	792.69	45789.28	1874548	1953706	1484635	436054.5
C110	C110 + 300 µg l^{-1} P/Pt	75	43955.99	20610.53	224.34	1130.38	69576.36	2821179	2947919	2250927	669104.6
C110	C110 + 400 µg l^{-1} P/Pt	100	45275.01	21036.49	219.34	1546.42	93848.94	3772650	3921557	3008121	894168
C110 (2)	C110 + DI Blank	0	38731.78	14338.19	223.34	7.67	216.668	8046.614	8419.83	6336.75	1932.47
C110 (2)	C110 + 100 µg l^{-1} P/Pt	25	44723.91	17926.58	210.00	386.67	23403.5	963918.1	1005998	765455.3	225487.5
C110 (2)	C110 + 200 µg l^{-1} P/Pt	50	44305.71	19498.30	209.67	797.69	48298.85	1965335	2054380	1563924	460644.7
C110 (2)	C110 + 300 µg l^{-1} P/Pt	75	43824.46	21527.54	202.00	1215.72	72391.32	2907768	3012242	2285491	675277
C110 (2)	C110 + 400 µg l^{-1} P/Pt	100	45890.63	23111.36	219.67	1665.43	98326.61	3936995	4087959	3121895	932226.4
Ext Std (2)	DI Blank	0	35583.93	3767.50	209.00	7.33	253.67	11004.28	11572.08	8841.10	2660.917
Ext Std (2)	25 µg l^{-1} P/Pt	25	36108.92	5190.611	210.34	376.67	23074.62	950421.1	993183.5	751729.6	220228.6
Ext Std (2)	50 µg l^{-1} P/Pt	50	36462.16	6280.38	209.34	819.69	47657.37	1933181	2023289	1539286	453997.7
Ext Std (2)	75 µg l^{-1} P/Pt	75	41106.06	7135.78	200.34	1221.72	74036.02	2973973	3096331	2358925	700794.3
Ext Std (2)	100 µg l^{-1} P/Pt	100	39582.87	8670.97	226.668	1637.43	98408.49	3929927	4084124	3126729	935515.3
C109	C109 + DI Blank	0	43130.35	20743.38	202.67	8	295.00	12835.8	13369.63	10015.21	3080.67
C109	C109 + 100 µg l^{-1} P/Pt	25	48433.64	24619.53	199.00	370.67	22546.78	929414.2	968785.1	733841.4	214899.4
C109	C109 + 200 µg l^{-1} P/Pt	50	51773.67	27567.24	221.34	810.36	47754.02	1958188	2041847	1554358	457664.8
C109	C109 + 300 µg l^{-1} P/Pt	75	52934.57	30161.14	211.00	1226.05	73975.71	2969021	3095802	2363309	700507.8
C109	C109 + 400 µg l^{-1} P/Pt	100	53755.96	30782.13	225.67	1659.43	100032.3	3998187	4163553	3183455	953130.2
C109 (2)	C109 + DI Blank	0	50488.06	23152.41	199.67	9.67	301.67	12378.41	12809.45	9746.02	2959.98
C109 (2)	C109 + 100 µg l^{-1} P/Pt	25	54989.97	26319.22	217.67	405.01	24508.34	1001861	1047789	794786	233335.9
C109 (2)	C109 + 200 µg l^{-1} P/Pt	50	55009.39	28223.86	204.67	808.69	49068.46	2006288	2092909	1592648	470290.6
C109 (2)	C109 + 300 µg l^{-1} P/Pt	75	56298.08	29070.88	199.34	1217.72	72530.01	2942894	3075173	2345151	696175
C109 (2)	C109 + 400 µg l^{-1} P/Pt	100	55742.92	30592.72	194.67	1677.10	98860.22	3941672	4098717	3119136	931066.6

Table 89. Data Accrued During the Analysis of DNA/Cisplatin Samples (Study 1), Continued…..

			***m/z* Data (cps)**								
Sample Code	**Sample Identity**	**Equivalent Graph Points**	**31 ($^{31}P^+$)**	**47 ($^{31}P^{16}O^+$)**	**115 ($^{115}In^+$)**	**190 ($^{190}Pt^+$)**	**192 ($^{192}Pt^+$)**	**194 ($^{194}Pt^+$)**	**195 ($^{195}Pt^+$)**	**196 ($^{196}Pt^+$)**	**198 ($^{198}Pt^+$)**
Ext Std (3)	DI Blank	0	40486.63	3719.484	184.67	7.67	274.34	11208.76	11531.02	8842.757	2651.25
Ext Std (3)	25 µg l^{-1} P/Pt	25	40222.23	4971.20	188.34	382.67	23547.39	970637.2	1014309	772155.7	226486.2
Ext Std (3)	50 µg l^{-1} P/Pt	50	39724.49	6045.28	178.33	796.02	47519.57	1951153	2035188	1549465	457124.5
Ext Std (3)	75 µg l^{-1} P/Pt	75	39374.19	7513.64	182.00	1199.72	72607.38	2941892	3063213	2329564	690231
Ext Std (3)	100 µg l^{-1} P/Pt	100	41644.62	8492.52	195.00	1595.09	94873.67	3808457	3956280	3028655	903183
C108	C108 + DI Blank	0	50053.58	24528.71	190.34	7.67	282.00	11634.1	11970.72	9138.95	2727.26
C108	C108 + 100 µg l^{-1} P/Pt	25	54489.74	28411.90	180.67	365.67	22583.84	927300.9	971983.9	737923.5	216324.60
C108	C108 + 200 µg l^{-1} P/Pt	50	55981.15	31111.18	193.00	777.02	46213.30	1894571	1975837	1498003	442883.5
C108	C108 + 300 µg l^{-1} P/Pt	75	58463.1	32606.18	186.34	1234.72	72660.32	2946063	3066310	2344990	694433
C108	C108 + 400 µg l^{-1} P/Pt	100	59981.34	35157.22	196.34	1637.43	98848.15	3950494	4112874	3151309	941189.6
C108 (2)	C108 + DI Blank	0	56225.83	28575.22	164.00	6	333.34	13953.56	14493.77	10959.25	3286.38
C108 (2)	C108 + 100 µg l^{-1} P/Pt	25	59623.17	29235.89	179.00	410.34	24559.43	1004448	1048426	797392.60	234252.50
C108 (2)	C108 + 200 µg l^{-1} P/Pt	50	59238.6	32744.82	184.00	819.36	50119.10	2045035	2131319	1618157	475592.80
C108 (2)	C108 + 300 µg l^{-1} P/Pt	75	58937.4	33808.3	197.67	1174.38	71861.30	2908274	3027772	2312728	687736.90
C108 (2)	C108 + 400 µg l^{-1} P/Pt	100	61193.12	33130.38	199.67	1643.43	97559.66	3897923	4061113	3107665	928846.70
Ext Std (4)	DI Blank	0	38824.03	3838.52	164.33	9	281.00	12149.21	12609.61	9450.82	2941.97
Ext Std (4)	25 µg l^{-1} P/Pt	25	39893.63	4913.51	167.00	371.67	21893.10	895786	934997.6	708096.90	208135.10
Ext Std (4)	50 µg l^{-1} P/Pt	50	40602.96	6037.61	181.67	740.35	45027.18	1842146	1925005	1466132	431934.40
Ext Std (4)	75 µg l^{-1} P/Pt	75	40864.05	7194.48	179.67	1140.71	68662.30	2777901	2898657	2205942	654517.40
Ext Std (4)	100 µg l^{-1} P/Pt	100	46032.38	8437.49	181.33	1655.43	98274.20	3912435	4070109	3098378	925483.90
C107	C107 + DI Blank	0	53023.94	24500.33	166.67	8.33	311.00	12418.45	12890.19	9819.41	2942.97
C107	C107 + 100 µg l^{-1} P/Pt	25	52266.82	24802.85	177.33	360.34	22022.63	902721.9	938677.4	712880	208705.90
C107	C107 + 200 µg l^{-1} P/Pt	50	57026.6	27601.31	180.67	757.69	46068.17	1871723	1957420	1492820	439951.30
C107	C107 + 300 µg l^{-1} P/Pt	75	58613.71	29203.15	171.67	1162.38	70127.39	2837965	2960719	2258932	668944
C107	C107 + 400 µg l^{-1} P/Pt	100	61500.5	31511.05	171.33	1630.76	97939.59	3893352	4053862	3089992	924662.30
C107 (2)	C107 + DI Blank	0	58096.56	25612.61	165.33	7.33	186.67	7758.11	8199.03	6180.01	1885.13
C107 (2)	C107 + 100 µg l^{-1} P/Pt	25	61112.79	26670.21	186.00	367.01	22701.36	933453	976432.6	743335.2	217676.70
C107 (2)	C107 + 200 µg l^{-1} P/Pt	50	61789.72	27149.79	178.67	754.69	45839.79	1876458	1958450	1484747	437225.40
C107 (2)	C107 + 300 µg l^{-1} P/Pt	75	58999.72	29994.13	157.00	1165.71	69953.86	2835451	2952800	2253810	666582.70
C107 (2)	C107 + 400 µg l^{-1} P/Pt	100	60331.93	30604.42	182.34	1653.10	97291.21	3894480	4053092	3094893	923759.80

Table 89. Data Accrued During the Analysis of DNA/Cisplatin Samples (Study 1), Continued…..

			m/z Data (cps)								
Sample Code	**Sample Identity**	**Equivalent Graph Points**	**31 ($^{31}P^+$)**	**47 ($^{31}P^{16}O^+$)**	**115 ($^{115}In^+$)**	**190 ($^{190}Pt^+$)**	**192 ($^{192}Pt^+$)**	**194 ($^{194}Pt^+$)**	**195 ($^{195}Pt^+$)**	**196 ($^{196}Pt^+$)**	**198 ($^{198}Pt^+$)**
Ext Std (5)	DI Blank	0	42918.04	3721.49	158.00	7	266.00	11435.6	12078.14	9094.24	2711.93
Ext Std (5)	25 µg l^{-1} P/Pt	25	43840.19	4653.43	171.00	346.67	20927.99	869718.4	911019.40	690553.40	202448.4
Ext Std (5)	50 µg l^{-1} P/Pt	50	44538.67	6285.72	163.67	750.35	44172.20	1797959	1872702	1427671	421254.40
Ext Std (5)	75 µg l^{-1} P/Pt	75	45080.72	7392.92	163.33	1141.38	66555.69	2695190	2820930	2147995	635607.80
Ext Std (5)	100 µg l^{-1} P/Pt	100	47686.47	8513.87	176.67	1532.42	93241.99	3735474	3866183	2960002	880279.30
C106	C106 + DI Blank	0	58834.39	32805.63	164.00	8.67	424.34	16814	17526.51	13431.70	4090.92
C106	C106 + 100 µg l^{-1} P/Pt	25	61987.53	33275.73	176.00	366.67	20746.73	848615.40	885830.6	671832	196896.50
C106	C106 + 200 µg l^{-1} P/Pt	50	64213.34	34554.41	156.33	749.02	43996.98	1796471	1861218	1412484	413567.30
C106	C106 + 300 µg l^{-1} P/Pt	75	76508	37041.63	158.00	1180.38	72772.89	2923602	3042460	2320549	687040.30
C106	C106 + 400 µg l^{-1} P/Pt	100	77248.97	41741.61	170.00	1606.09	94848.5	3794016	3938124	2998155	891339.30
C106 (2)	C106 + DI Blank	0	77683.66	33901.52	161.00	9.67	323.34	12771.41	13456.03	10242.70	3126.35
C106 (2)	C106 + 100 µg l^{-1} P/Pt	25	81464.31	33818.32	174.00	348.67	19839.10	824218	864939.30	659783.90	193836.90
C106 (2)	C106 + 200 µg l^{-1} P/Pt	50	93768.41	39410.31	153.00	774.69	46977.46	1906907	1984480	1514594	448217.70
C106 (2)	C106 + 300 µg l^{-1} P/Pt	75	95191.1	40369.30	160.67	1182.05	70584.62	2855561	2969345	2275292	675157.50
C106 (2)	C106 + 400 µg l^{-1} P/Pt	100	105358.10	60022.17	163.33	1635.09	97003.63	3869362	4011301	3068784	916109.50
Ext Std (6)	DI Blank	0	75772.42	3764.83	159.33	12.67	374.338	15886.57	16786.96	12642.31	3808.51
Ext Std (6)	25 µg l^{-1} P/Pt	25	79198.61	4929.19	139.00	347.39	20309.09	837190.80	876421.30	666913.70	196390.80
Ext Std (6)	50 µg l^{-1} P/Pt	50	81394.27	6332.07	147.00	712.68	43178.83	1765577	1841307	1406055	414371.90
Ext Std (6)	75 µg l^{-1} P/Pt	75	80590.09	7611.70	146.67	1124.38	66019.54	2682720	2796848	2133523	632771.90
Ext Std (6)	100 µg l^{-1} P/Pt	100	79195.59	8912.11	173.67	1521.75	90077.10	3613638	3763501	2878277	858151
C105	C105 + DI Blank	0	96294.47	33663.62	159.33	7	257.67	10056.88	10656.31	7958.89	2408.54
C105	C105 + 100 µg l^{-1} P/Pt	25	99710.72	34788.99	140.33	342.00	21560.27	878952.9	918493.60	699598.50	206197.90
C105	C105 + 200 µg l^{-1} P/Pt	50	98591.38	37646.88	161.00	740.69	44036.10	1799532	1879898	1429439	421421.90
C105	C105 + 300 µg l^{-1} P/Pt	75	99078.73	39465.46	173.67	1131.05	66369.85	2678891	2784224	2120836	628701.60
C105	C105 + 400 µg l^{-1} P/Pt	100	100778.20	42452.65	159.33	1475.74	90349.20	3608033	3750309	2858281	849241
C105 (2)	C105 + DI Blank	0	91201.21	29454.35	148.00	10.67	450.01	18731.35	19539.45	14818.72	4477.37
C105 (2)	C105 + 100 µg l^{-1} P/Pt	25	95900.51	35208	193.67	345.00	20978.74	861881.10	898384.10	683646.10	199705.90
C105 (2)	C105 + 200 µg l^{-1} P/Pt	50	95561.99	36335.49	167.00	740.69	42629.51	1753177	1833886	1394692	411865.70
C105 (2)	C105 + 300 µg l^{-1} P/Pt	75	95388.09	39255.55	150.67	1100.04	66385.24	2681232	2790318	2128507	631448.40
C105 (2)	C105 + 400 µg l^{-1} P/Pt	100	96177.35	39200.71	156.33	1485.41	90148.64	3597803	3747391	2853372	847639.30

Table 89. Data Accrued During the Analysis of DNA/Cisplatin Samples (Study 1), Continued…..

			m/z Data (cps)								
Sample Code	**Sample Identity**	**Equivalent Graph Points**	**31 ($^{31}P^+$)**	**47 ($^{31}P^{16}O^+$)**	**115 ($^{115}In^+$)**	**190 ($^{190}Pt^+$)**	**192 ($^{192}Pt^+$)**	**194 ($^{194}Pt^+$)**	**195 ($^{195}Pt^+$)**	**196 ($^{196}Pt^+$)**	**198 ($^{198}Pt^+$)**
Ext Std (7)	DI Blank	0	72339.04	3800.84	148.33	10.33	454.34	18666.95	19646.63	14683.28	4376.35
Ext Std (7)	25 µg l^{-1} P/Pt	25	70255.67	5042.56	138.33	329.00	20001	824212.30	866018.60	656484.70	191955.60
Ext Std (7)	50 µg l^{-1} P/Pt	50	69553.59	6086.63	130.33	690.02	41169.92	1689660	1767762	1342696	395388.90
Ext Std (7)	75 µg l^{-1} P/Pt	75	68311.61	7632.04	148.00	1076.37	63658.53	2568776	2669742	2028138	599935.90
Ext Std (7)	100 µg l^{-1} P/Pt	100	64180.51	8839.07	148.00	1432.41	87954.27	3508806	3643163	2780255	824651.30
C104	C104 + DI Blank	0	73835	31695.50	136.67	12	516.68	21465.92	22511.53	16969.81	5015.554
C104	C104 + 100 µg l^{-1} P/Pt	25	80232.70	38536.27	145.33	333.67	19983.63	821893	857167.50	647059.50	188560.3
C104	C104 + 200 µg l^{-1} P/Pt	50	84807.01	43758.27	161.00	733.02	42720.45	1759021	1839243	1396325	411703
C104	C104 + 300 µg l^{-1} P/Pt	75	85622.89	43144.40	133.33	1164.38	68592.30	2762252	2879691	2194451	650694.90
C104	C104 + 400 µg l^{-1} P/Pt	100	81980.56	43541.65	142.67	1483.41	89976.86	3591836	3711526	2829379	845215.10
C104 (2)	C104 + DI Blank	0	69125.59	34228.63	142.33	11	424.01	17154.38	17897.96	13615.53	4110.60
C104 (2)	C104 + 100 µg l^{-1} P/Pt	25	71487.51	38383.89	125.67	306.34	19037.35	773491.90	808832.80	611838.30	178989.20
C104 (2)	C104 + 200 µg l^{-1} P/Pt	50	72111.92	45970.56	145.00	722.35	42610.45	1731905	1796810	1356660	397570.90
C104 (2)	C104 + 300 µg l^{-1} P/Pt	75	75934.33	46179.58	148.67	1059.37	65174.35	2629106	2722094	2076298	612489.10
C104 (2)	C104 + 400 µg l^{-1} P/Pt	100	76979.19	46868.11	139.33	1452.07	86337.12	3466726	3624927	2767523	825715.90
Ext Std (8)	DI Blank	0	50983.48	3240.38	139.00	7.33	442.34	18301.12	19066.81	14592.18	4364.67
Ext Std (8)	25 µg l^{-1} P/Pt	25	48694.86	4817.82	116	329.00	19476.94	800017.50	834507.10	631348.60	185678
Ext Std (8)	50 µg l^{-1} P/Pt	50	48600.24	5981.59	126.33	668.02	39430.35	1606867	1675778	1275840	376411.10
Ext Std (8)	75 µg l^{-1} P/Pt	75	47730.61	7188.81	132.33	1013.37	59616.81	2420396	2538907	1943506	576473.30
Ext Std (8)	100 µg l^{-1} P/Pt	100	48948.08	7952.22	137.33	1326.06	80174.75	3214270	3356667	2561256	762563.80
C101	C101 + DI Blank	0	54689.55	31332.01	123.33	12.67	459.01	18612.56	19537.82	14775.70	4410.02
C101	C101 + 100 µg l^{-1} P/Pt	25	63370.10	36791.05	130.67	289.67	17660.25	728942.40	762628.60	577502	168952.20
C101	C101 + 200 µg l^{-1} P/Pt	50	64698.02	45877.91	139.33	661.68	40763.74	1669509	1744986	1327966	388956.30
C101	C101 + 300 µg l^{-1} P/Pt	75	62936.05	45433.19	145.33	1023.04	60350.21	2451039	2560289	1966778	584049.70
C101	C101 + 400 µg l^{-1} P/Pt	100	65479.31	46671.13	136.67	1332.40	80235.71	3219529	3356575	2558592	758853.20
C101 (2)	C101 + DI Blank	0	62969.93	40122.94	141.00	9	233.00	9391.43	9845.40	7438.27	2286.18
C101 (2)	C101 + 100 µg l^{-1} P/Pt	25	58551.26	40630.06	121.33	290.00	17803.09	731318.60	762939.20	579433.90	169454
C101 (2)	C101 + 200 µg l^{-1} P/Pt	50	63943.85	42857.53	125.00	664.35	39658.65	1616673	1690610	1286264	376883.40

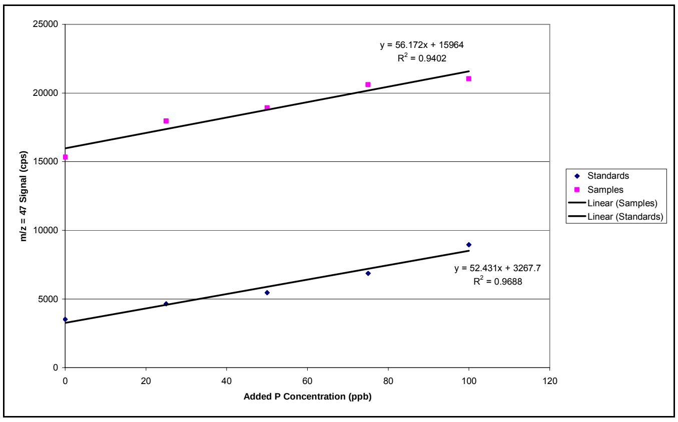

Figure 94. A Graph Comparing Added P Concentration (µg l^{-1}) with *m/z* = 47 Signal (cps) for Samples 1-5 (C110) and External Standards.

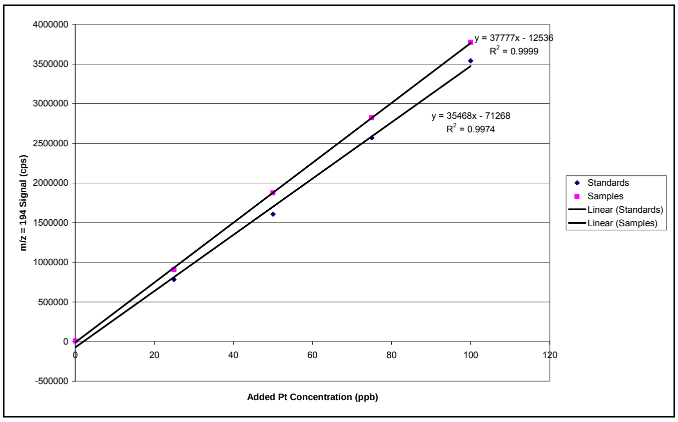

Figure 95. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 194 Signal (cps) for Samples 1-5 (C110) and External Standards.

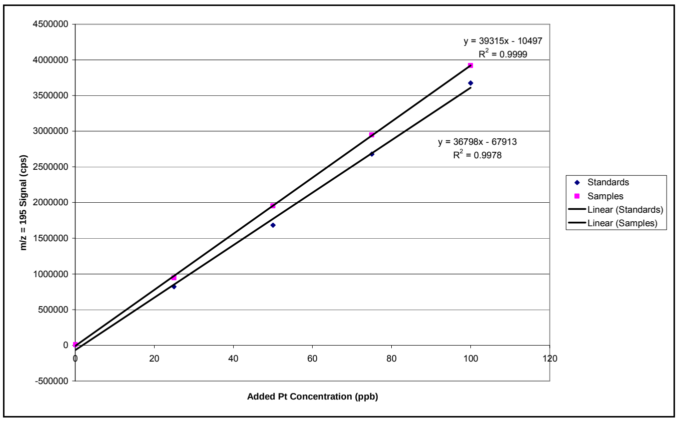

Figure 96. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 195 Signal (cps) for Samples 1-5 (C110) and External Standards.

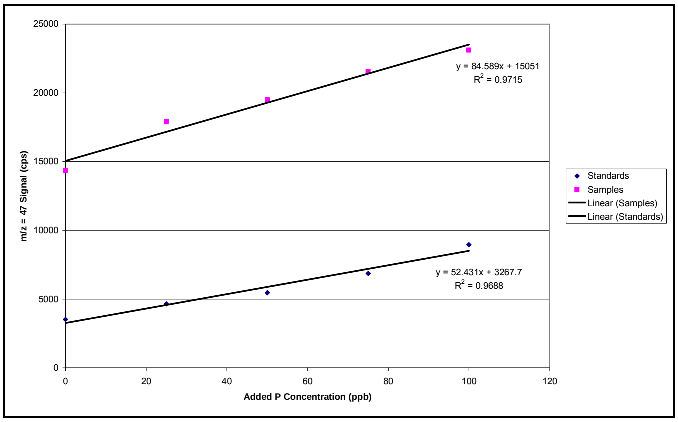

Figure 97. A Graph Comparing Added P Concentration (µg l^{-1}) with *m/z* = 47 Signal (cps) for Samples 6-10 (C110 Duplicate) and External Standards.

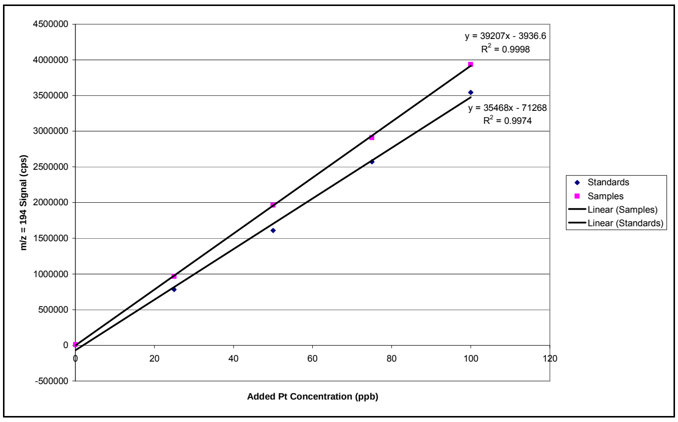

Figure 98. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 194 Signal (cps) for Samples 6-10 (C110 Duplicate) and External Standards.

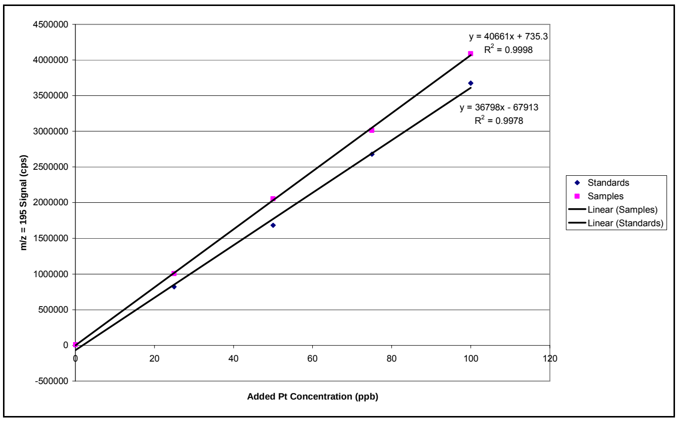

Figure 99. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 195 Signal (cps) for Samples 6-10 (C110 Duplicate) and External Standards.

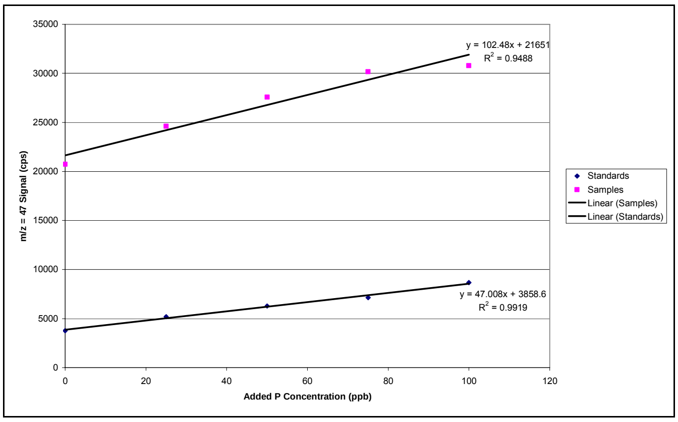

Figure 100. A Graph Comparing Added P Concentration (µg l^{-1}) with *m/z* = 47 Signal (cps) for Samples 11-15 (C109) and External Standards.

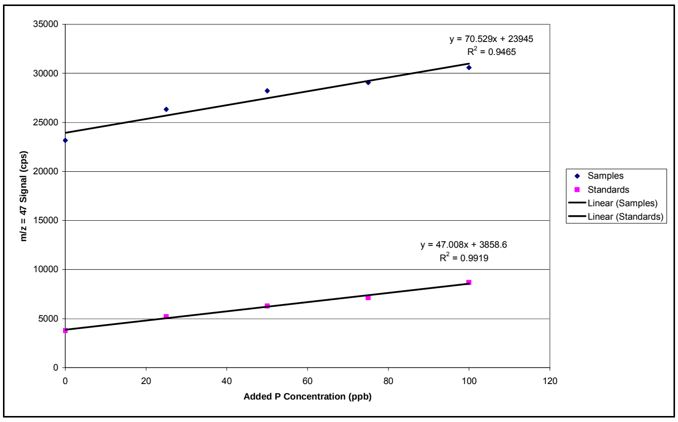

Figure 103. A Graph Comparing Added P Concentration (µg l^{-1}) with *m/z* = 47 Signal (cps) for Samples 16-20 (C109 Duplicate) and External Standards.

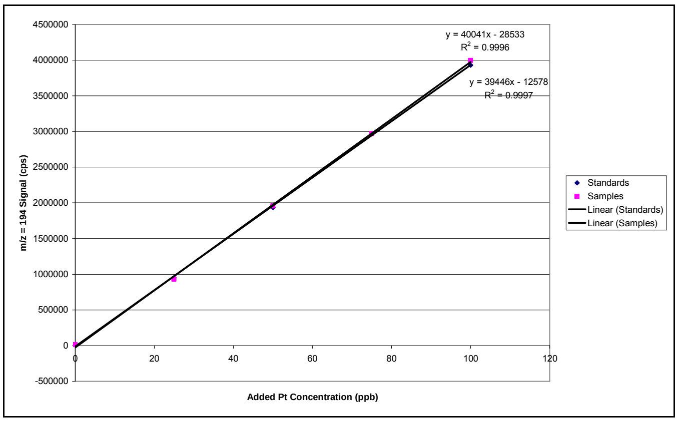

Figure 101. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 194 Signal (cps) for Samples 11-15 (C109) and External Standards.

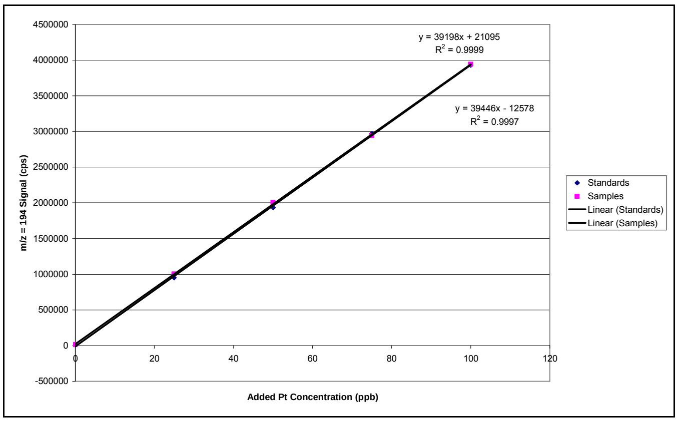

Figure 104. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 194 Signal (cps) for Samples 16-20 (C109 Duplicate) and External Standards.

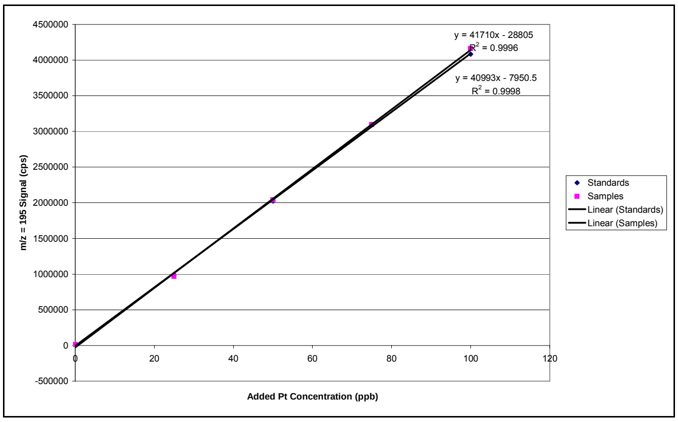

Figure 102. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 195 Signal (cps) for Samples 11-15 (C109) and External Standards.

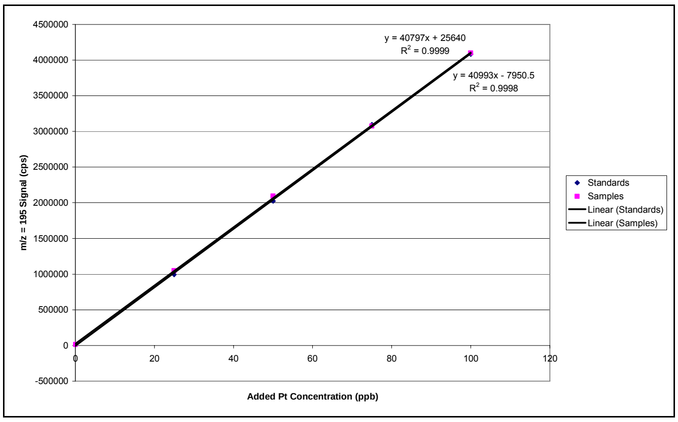

Figure 105. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 195 Signal (cps) for Samples 16-20 (C109 Duplicate) and External Standards.

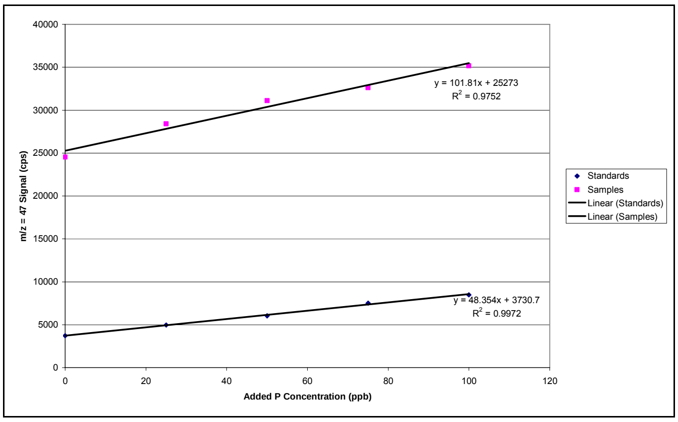

Figure 106. A Graph Comparing Added P Concentration (µg l^{-1}) with *m/z* = 47 Signal (cps) for Samples 21-25 (C108) and External Standards.

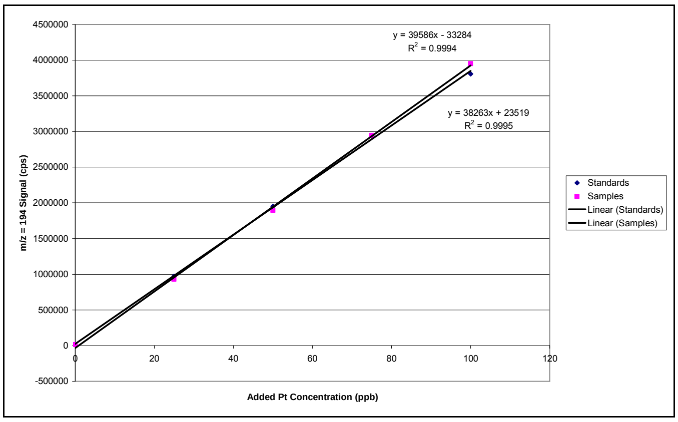

Figure 107. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 194 Signal (cps) for Samples 21-25 (C108) and External Standards.

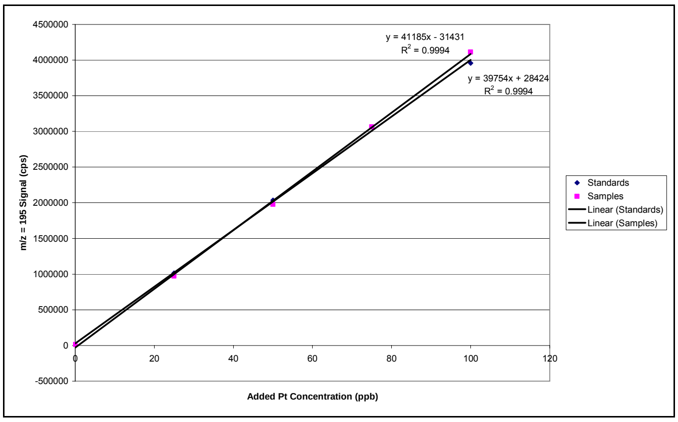

Figure 108. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 195 Signal (cps) for Samples 21-25 (C108) and External Standards.

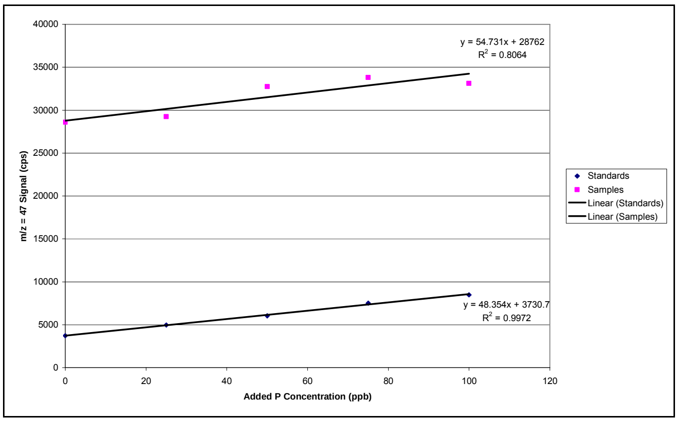

Figure 109. A Graph Comparing Added P Concentration (µg l^{-1}) with *m/z* = 47 Signal (cps) for Samples 26-30 (C108 Duplicate) and External Standards.

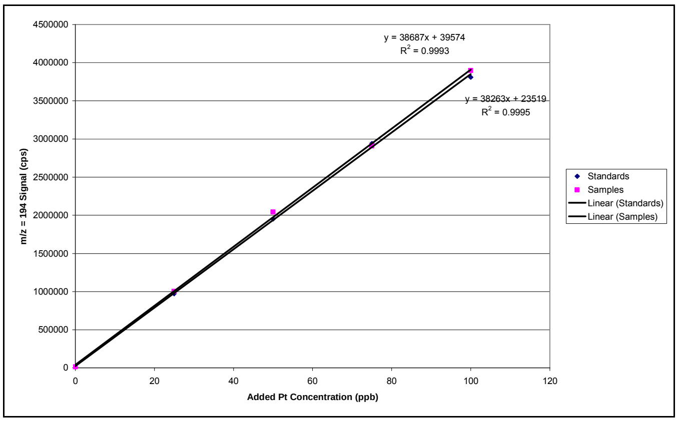

Figure 110. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 194 Signal (cps) for Samples 26-30 (C108 Duplicate) and External Standards.

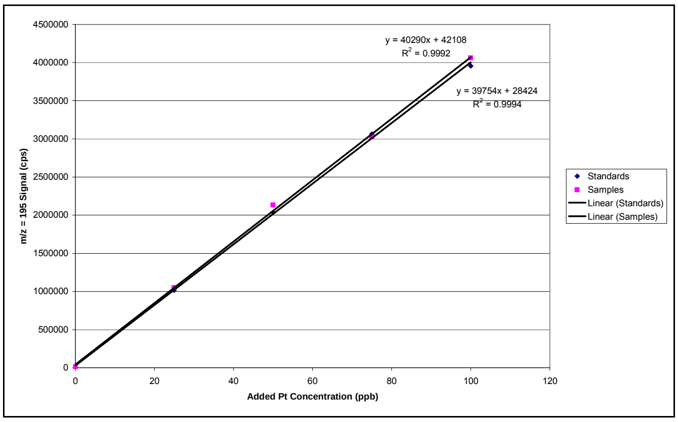

Figure 111. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 195 Signal (cps) for Samples 26-30 (C108 Duplicate) and External Standards.

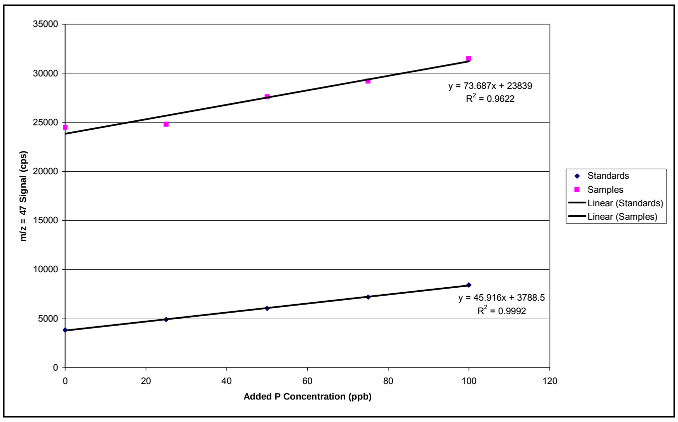

Figure 112. A Graph Comparing Added P Concentration (µg l^{-1}) with *m/z* = 47 Signal (cps) for Samples 31-35 (C107) and External Standards.

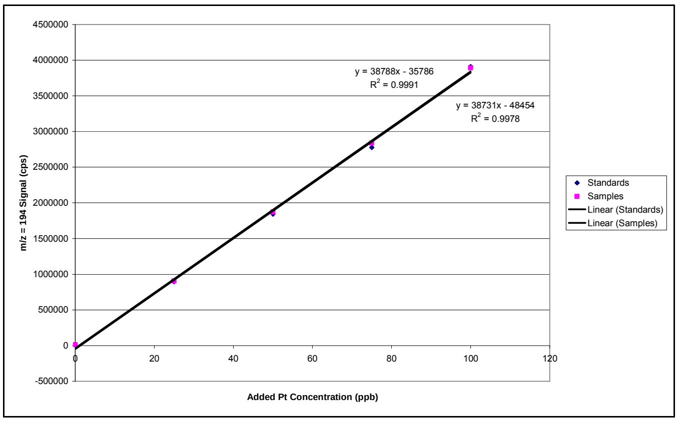

Figure 113. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 194 Signal (cps) for Samples 31-35 (C107) and External Standards.

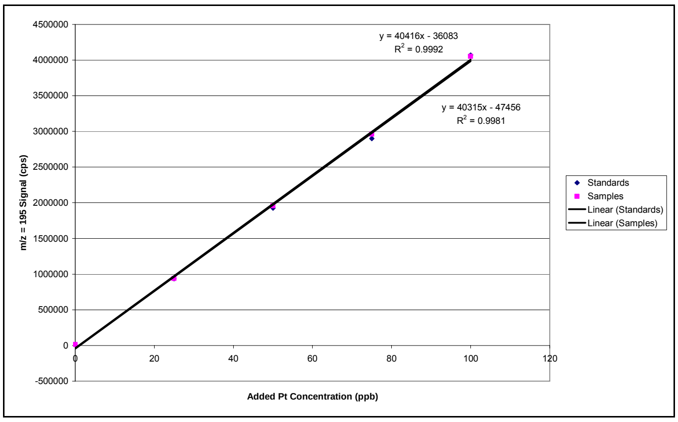

Figure 114. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 195 Signal (cps) for Samples 31-35 (C107) and External Standards.

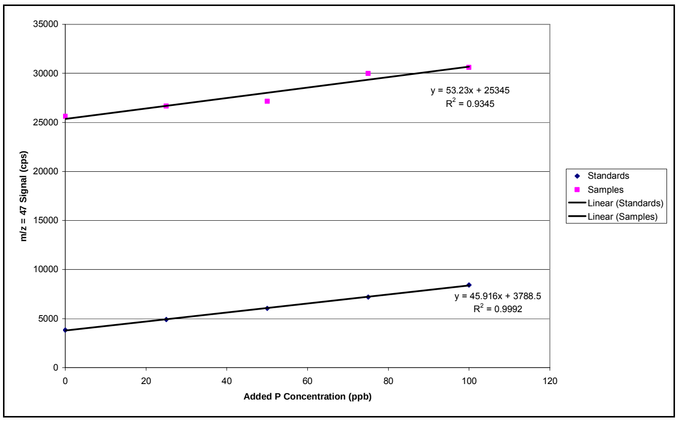

Figure 115. A Graph Comparing Added P Concentration (µg l^{-1}) with *m/z* = 47 Signal (cps) for Samples 36-40 (C107 Duplicate) and External Standards.

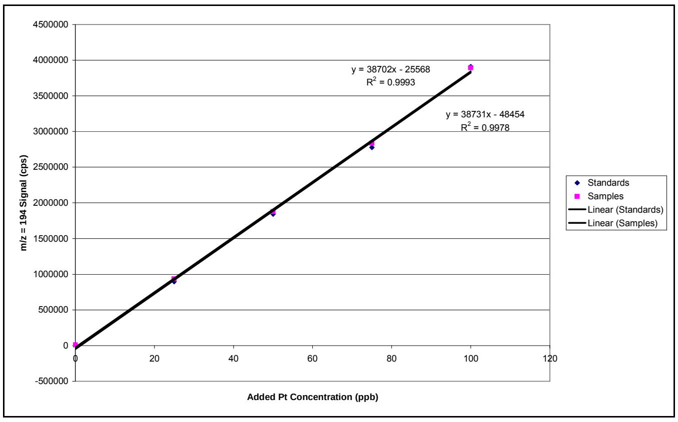

Figure 116. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 194 Signal (cps) for Samples 36-40 (C107 Duplicate) and External Standards.

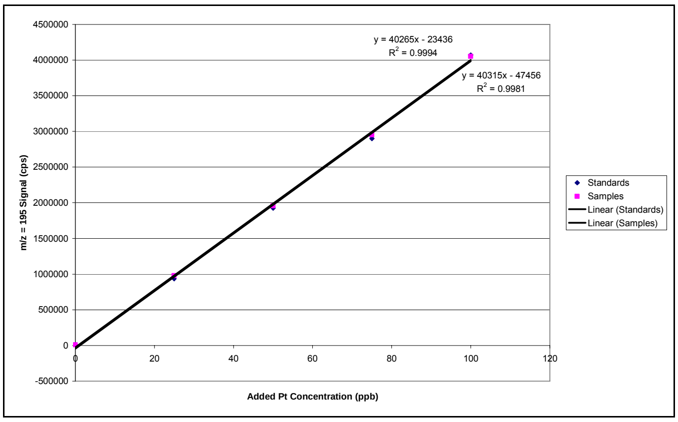

Figure 117. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 195 Signal (cps) for Samples 36-40 (C107 Duplicate) and External Standards.

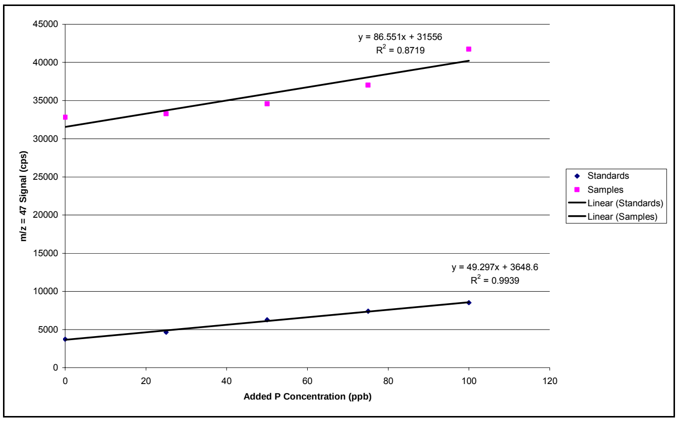

Figure 118. A Graph Comparing Added P Concentration (µg l^{-1}) with *m/z* = 47 Signal (cps) for Samples 41-45 (C106) and External Standards.

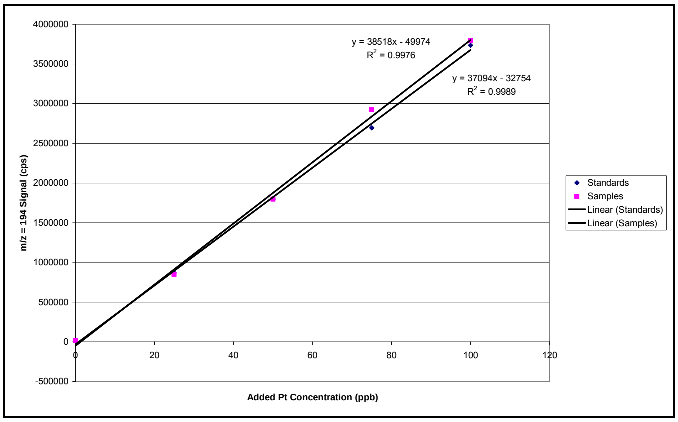

Figure 119. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 194 Signal (cps) for Samples 41-45 (C106) and External Standards.

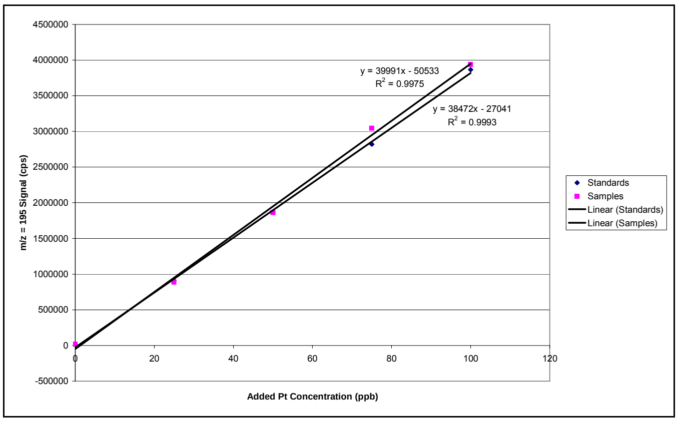

Figure 120. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 195 Signal (cps) for Samples 41-45 (C106) and External Standards.

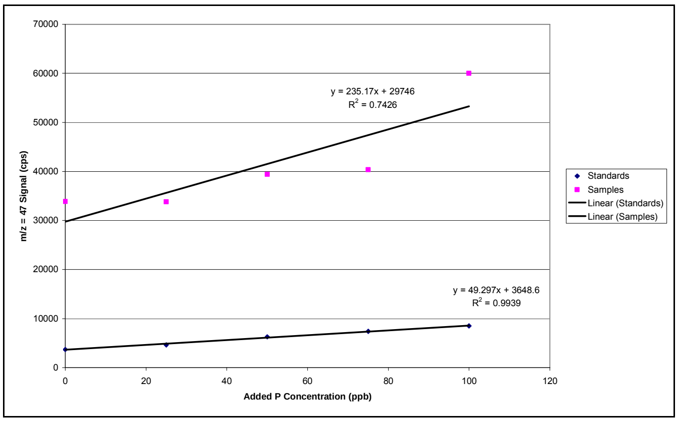

Figure 121. A Graph Comparing Added P Concentration (µg l^{-1}) with *m/z* = 47 Signal (cps) for Samples 46-50 (C106 Duplicate) and External Standards.

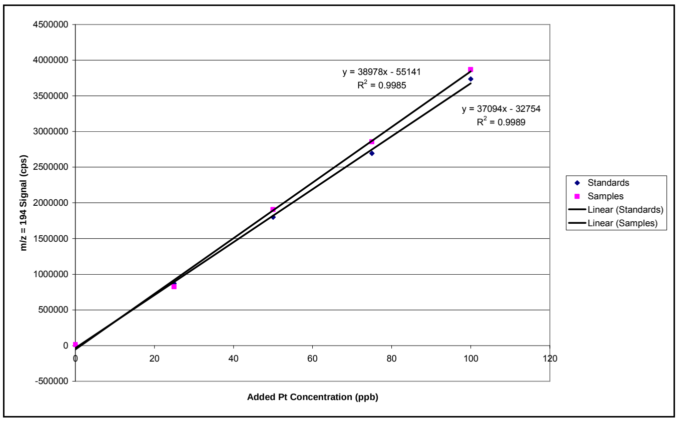

Figure 122. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 194 Signal (cps) for Samples 46-50 (C106 Duplicate) and External Standards.

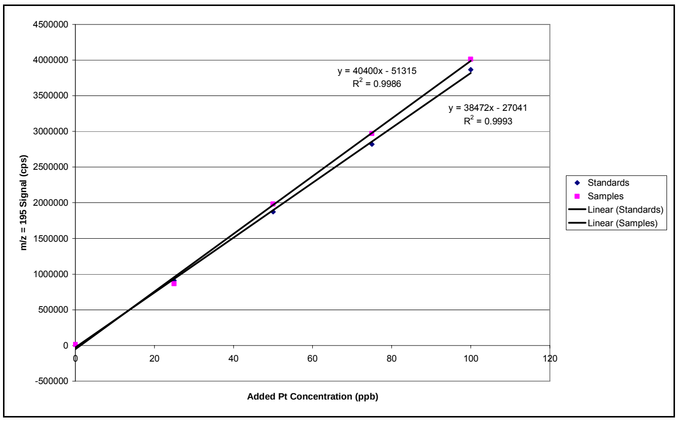

Figure 123. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 195 Signal (cps) for Samples 46-50 (C106 Duplicate) and External Standards.

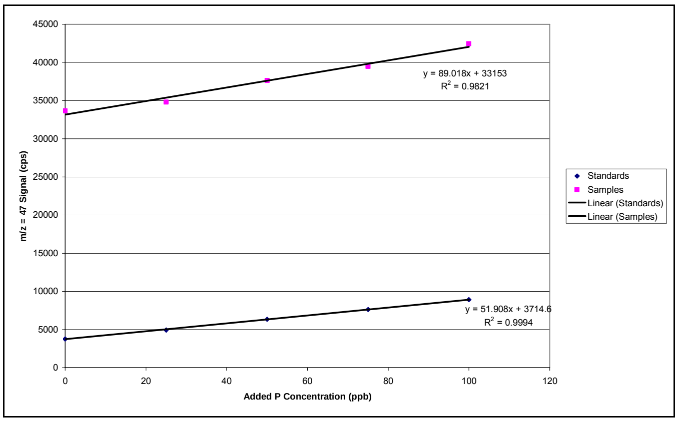

Figure 124. A Graph Comparing Added P Concentration (µg l^{-1}) with *m/z* = 47 Signal (cps) for Samples 51-55 (C105) and External Standards.

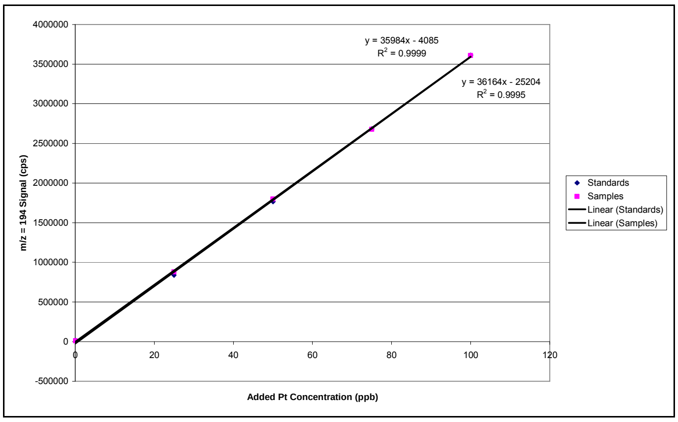

Figure 125. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 194 Signal (cps) for Samples 51-55 (C105) and External Standards.

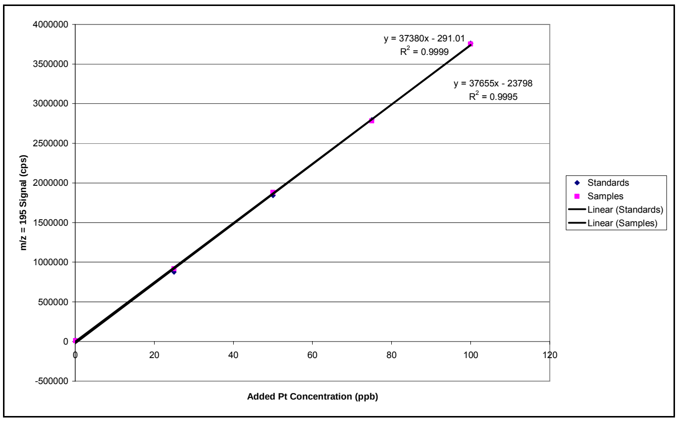

Figure 126. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 195 Signal (cps) for Samples 51-55 (C105) and External Standards.

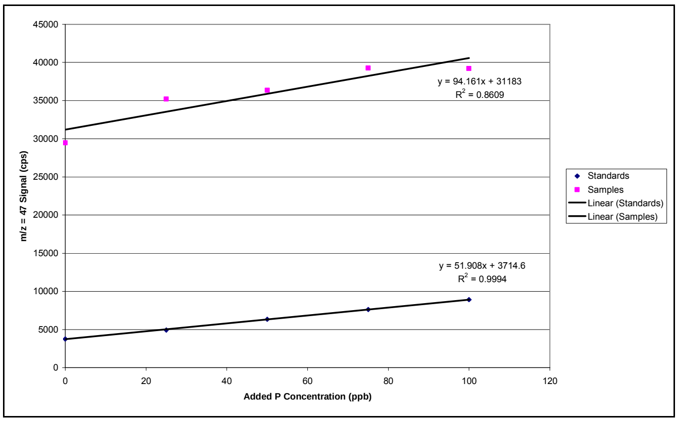

Figure 127. A Graph Comparing Added P Concentration (µg l^{-1}) with *m/z* = 47 Signal (cps) for Samples 56-60 (C105 Duplicate) and External Standards.

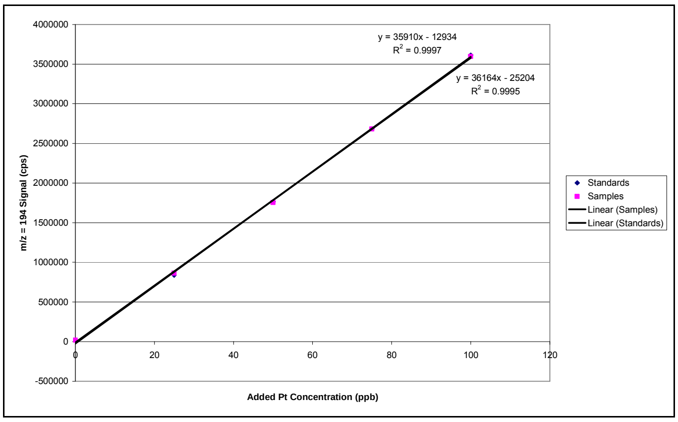

Figure 128. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 194 Signal (cps) for Samples 56-60 (C105 Duplicate) and External Standards.

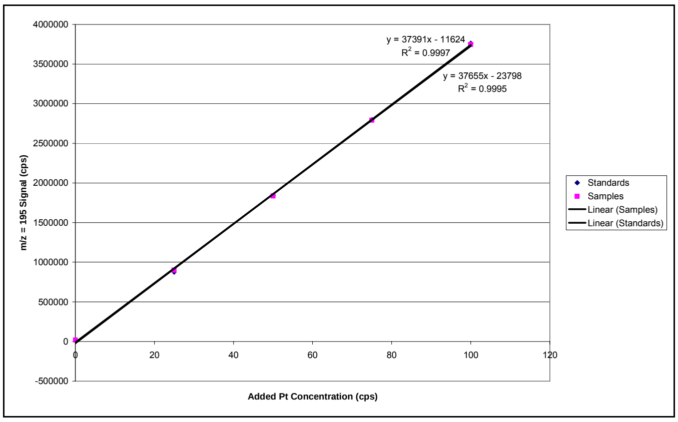

Figure 129. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 195 Signal (cps) for Samples 56-60 (C105 Duplicate) and External Standards.

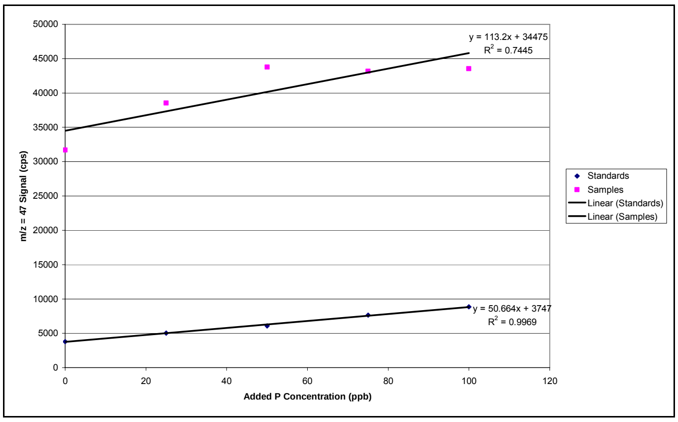

Figure 130. A Graph Comparing Added P Concentration (µg l^{-1}) with *m/z* = 47 Signal (cps) for Samples 61-65 (C104) and External Standards.

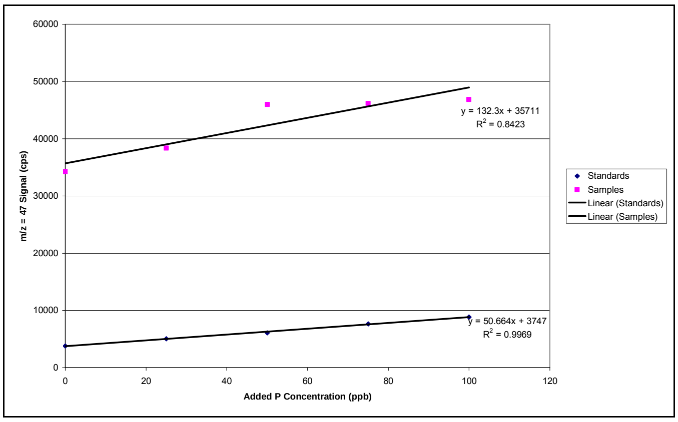

Figure 133. A Graph Comparing Added P Concentration (µg l^{-1}) with *m/z* = 47 Signal (cps) for Samples 66-70 (C104 Duplicate) and External Standards.

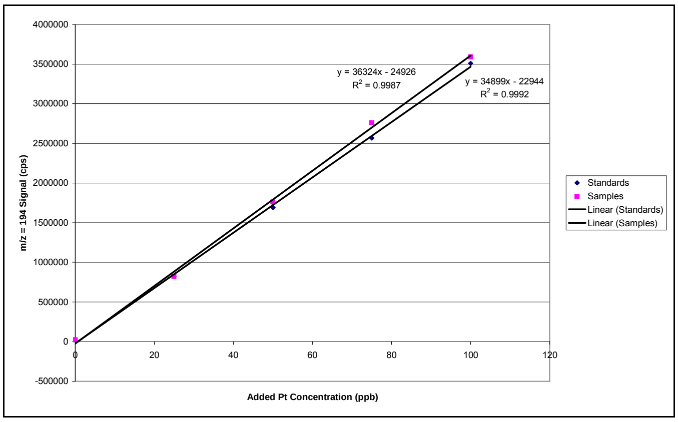

Figure 131. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 194 Signal (cps) for Samples 61-65 (C104) and External Standards.

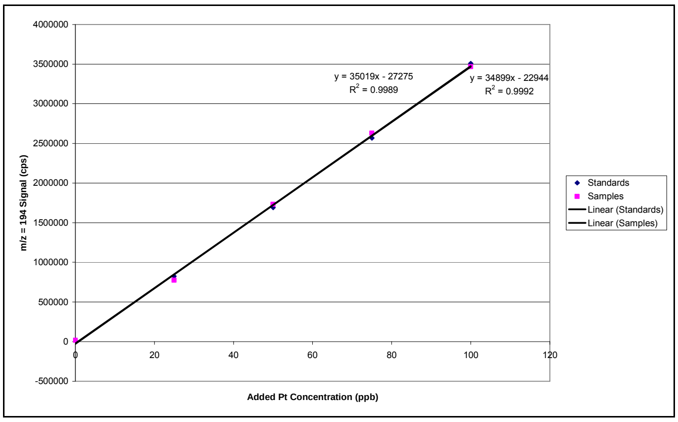

Figure 134. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 194 Signal (cps) for Samples 66-70 (C104 Duplicate) and External Standards.

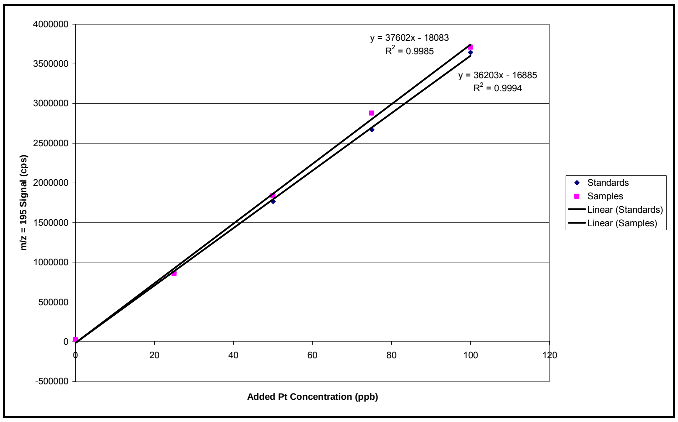

Figure 132. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 195 Signal (cps) for Samples 61-65 (C104) and External Standards.

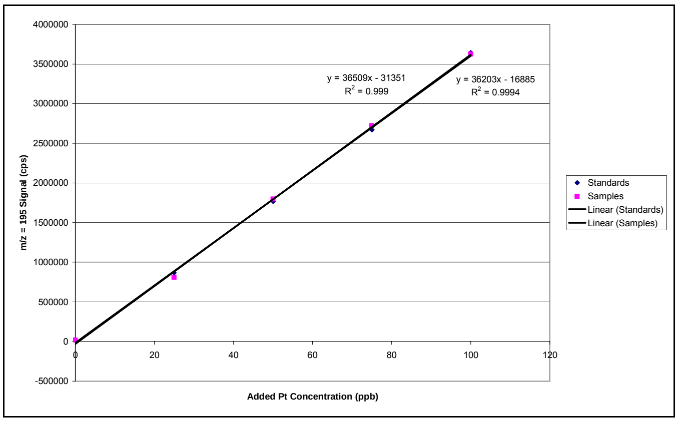

Figure 135. A Graph Comparing Added Pt Concentration (µg l^{-1}) with *m/z* = 195 Signal (cps) for Samples 66-70 (C104 Duplicate) and External Standards.

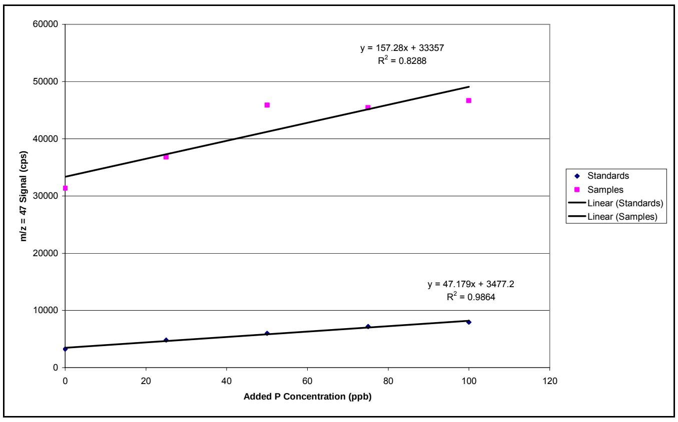

Figure 136. A Graph Comparing Added P Concentration ($\mu g\ l^{-1}$) with *m/z* = 47 Signal (cps) for Samples 91-95 (C101) and External Standards.

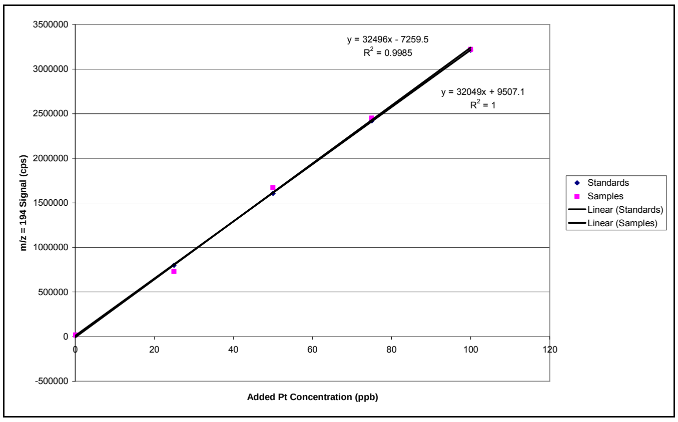

Figure 137. A Graph Comparing Added Pt Concentration ($\mu g\ l^{-1}$) with *m/z* = 194 Signal (cps) for Samples 91-95 (C101) and External Standards.

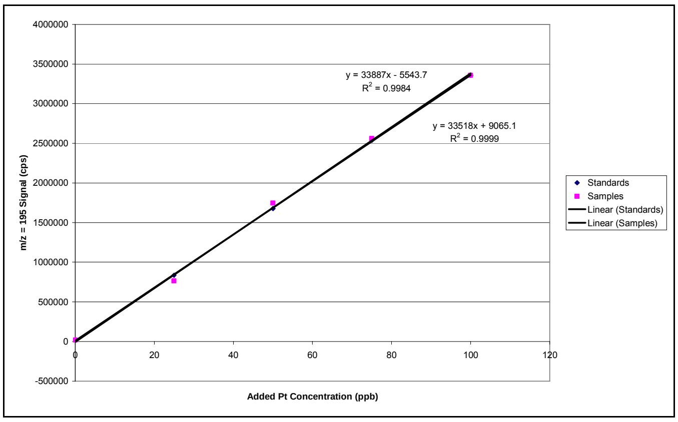

Figure 138. A Graph Comparing Added Pt Concentration ($\mu g\ l^{-1}$) with *m/z* = 195 Signal (cps) for Samples 91-95 (C101) and External Standards.

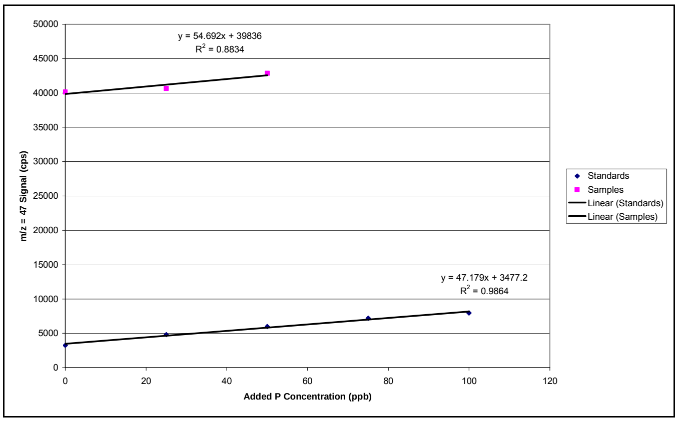

Figure 139. A Graph Comparing Added P Concentration ($\mu g\ l^{-1}$) with *m/z* = 47 Signal (cps) for Samples 96-98 (C101 Duplicate) and External Standards.

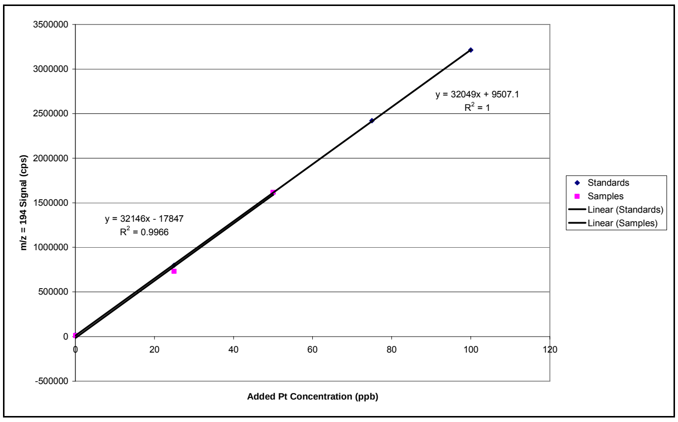

Figure 140. A Graph Comparing Added Pt Concentration ($\mu g\ l^{-1}$) with *m/z* = 194 Signal (cps) for Samples 96-98 (C101 Duplicate) and External Standards.

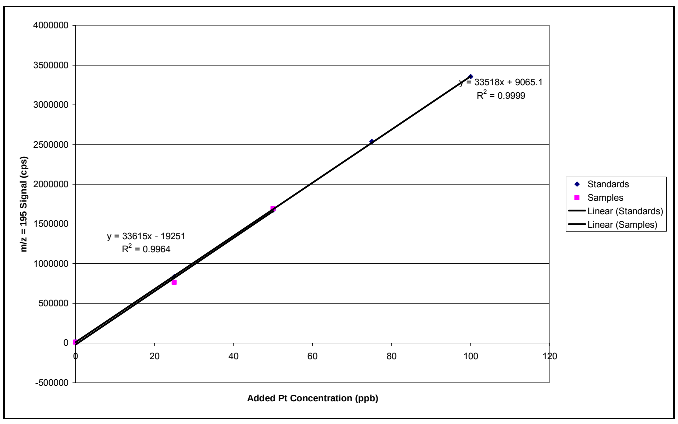

Figure 141. A Graph Comparing Added Pt Concentration ($\mu g\ l^{-1}$) with *m/z* = 195 Signal (cps) for Samples 96-98 (C101 Duplicate) and External Standards.

Table 90. Recovered, Cisplatin Exposed, DNA UV Spectroscopy Data (Study 2).

Sample Identity (DNA Nucleotides Per Cisplatin)	Sample Replicate Number	UV Spectroscopy Data (260 nm)	UV Spectroscopy Data (260/280 nm)	DNA Conc^{n} (mg ml^{-1})	Volume Per 1 mg of DNA (ml)
Control	1	0.402	1.404		
	2	0.401	1.398		
	3	0.385	1.401		
	Mean	**0.396**		**0.792**	**1.26**
10 000	1	0.483	1.445		
	2	0.486	1.434		
	3	0.401	1.412		
	Mean	**0.457**		**0.9133**	**1.09**
50 000	1	0.458	1.451		
	2	0.603	1.463		
	3	0.828	1.473		
	Mean	**0.630**		**1.2593**	**0.79**
100 000	1	0.416	1.438		
	2	0.790	1.480		
	3	0.758	1.462		
	Mean	**0.655**		**1.3093**	**0.76**
500 000	1	0.698	1.481		
	2	0.849	1.493		
	3	0.807	1.463		
	Mean	**0.785**		**1.5693**	**0.64**
1 000 000	1	0.499	1.457		
	2	0.470	1.440		
	3	0.596	1.438		
	Mean	**0.522**		**1.0433**	**0.96**
5 000 000	1	0.493	1.416		
	2	0.504	1.419		
	3	0.532	1.423		
	Mean	**0.510**		**1.0193**	**0.98**
10 000 000	1	0.442	1.421		
	2	0.360	1.447		
	3	0.464	1.420		
	Mean	**0.422**		**0.8440**	**1.18**

Table 90. Recovered, Cisplatin Exposed, DNA UV Spectroscopy Data (Study 2) Continued…..

Sample Identity (DNA Nucleotides Per Cisplatin)	Sample Replicate Number	UV Spectroscopy Data (260 nm)	UV Spectroscopy Data (260/280 nm)	DNA Conc^{n} (mg ml^{-1})	Volume Per 1 mg of DNA (ml)
50 000 000	1	0.427	1.482		
	2	0.729	1.450		
	3	0.506	1.428		
	Mean	**0.554**		**1.1080**	**0.90**
100 000 000	1	0.418	1.422		
	2	0.435	1.433		
	3	0.481	1.442		
	Mean	**0.445**		**0.8893**	**1.12**
500 000 000	1	0.489	1.444		
	2	0.349	1.414		
	3	0.526	1.426		
	Mean	**0.455**		**0.9093**	**1.10**
1 000 000 000	1	0.472	1.427		
	2	0.472	1.431		
	3	0.492	1.416		
	Mean	**0.479**		**0.9513**	**1.04**

Table 91. Incubation Pre-Treatment Data for DNA/Drug Samples Analysed During Study 2.

Sample Identity (DNA Nucleotides Per Drug Molecule)	Mass of DNA/Drug (g)	Mass of 25% NH_3 (g)	Total Mass of Incubation Solution (g)
Blank (Cisplatin)	0.5059	0.5016	1.0075
Control (Cisplatin)	0.4914	0.5026	0.9940
10 000 (Cisplatin)	0.5021	0.5013	1.0034
50 000 (Cisplatin)	0.5033	0.5063	1.0096
100 000 (Cisplatin)	0.5033	0.4991	1.0024
500 000 (Cisplatin)	0.5029	0.5041	1.0070
1 000 000 (Cisplatin)	0.4977	0.5032	1.0009
5 000 000 (Cisplatin)	0.5016	0.5036	1.0052
10 000 000 (Cisplatin)	0.5026	0.5014	1.0040
50 000 000 (Cisplatin)	0.5029	0.5024	1.0053
100 000 000 (Cisplatin)	0.5033	0.5039	1.0072
500 000 000 (Cisplatin)	0.5015	0.5032	1.0047
1 000 000 000 (Cisplatin)	0.5027	0.5029	1.0056

Table 92. Centrifugation Pre-Treatment Data for DNA/Drug Samples Analysed During Study 2.

Tube N°	Sample Identity (DNA Nucleotides Per Drug Molecule)	Mass of DNA/Drug Pre-Centrifuge (g)	Mass of DNA/Drug Recovered Post-Centrifuge (g)	Sample Loss (g)
1	**Blank (Cisplatin)**	0.5656	0.5504	0.0152
2	**Control (Cisplatin)**	0.4342	0.3877	0.0465
3	**10 000 (Cisplatin)**	0.5127	0.4800	0.0327
4	**50 000 (Cisplatin)**	0.5001	0.4785	0.0216
5	**100 000 (Cisplatin)**	0.5574	0.5241	0.0333
6	**500 000 (Cisplatin)**	0.4243	0.4010	0.0233
7	**1 000 000 (Cisplatin)**	0.5374	0.4684	0.0690
8	**5 000 000 (Cisplatin)**	0.5641	0.5206	0.0435
9	**10 000 000 (Cisplatin)**	0.5324	0.5081	0.0243
10	**50 000 000 (Cisplatin)**	0.5264	0.4970	0.0294
11	**100 000 000 (Cisplatin)**	0.5573	0.5333	0.0240
12	**500 000 000 (Cisplatin)**	0.5099	0.4806	0.0293
13	**1 000 000 000 (Cisplatin)**	0.4681	0.4231	0.0450

Table 93. Final Pre-Concentration Data for DNA/Cisplatin and DNA/Oxaliplatin Samples Analysed During Study 2.

Tube N°	Sample Label (No of Nucleotides Per Drug Molecule)	Initial Mass of DNA/Drug Sample (g)	Final Mass of DNA/Drug Sample (g)	Pre-Conc^{n}/ Correction Factor
1	**Blank (Cisplatin)**	0.5059	0.5504	0.919
2	**Control (Cisplatin)**	0.4914	0.3877	1.267
3	**10 000 (Cisplatin)**	0.5021	0.4800	1.046
4	**50 000 (Cisplatin)**	0.5033	0.4785	1.052
5	**100 000 (Cisplatin)**	0.5033	0.5241	0.960
6	**500 000 (Cisplatin)**	0.5029	0.4010	1.254
7	**1 000 000 (Cisplatin)**	0.4977	0.4684	1.063
8	**5 000 000 (Cisplatin)**	0.5016	0.5206	0.964
9	**10 000 000 (Cisplatin)**	0.5026	0.5081	0.989
10	**50 000 000 (Cisplatin)**	0.5029	0.4970	1.012
11	**100 000 000 (Cisplatin**	0.5033	0.5333	0.944
12	**500 000 000 (Cisplatin)**	0.5015	0.4806	1.043
13	**1 000 000 000 (Cisplatin)**	0.5027	0.4231	1.188

Table 94. A Table of ICP-MS Instrument Parameters for the Analysis of DNA and Cisplatin Interactions *In Vitro*, Via Measurement of the $^{190,192,194,195,196,198}Pt$ Isotopes, Employing Standard Conditions (Study 2).

Instrument Parameter	Parameter Value
Analyser Pressure	8.20 x 10^{-7} mBar
Expansion Pressure	2.2 mBar
Nebuliser Pressure	2.72 Bar
Plasma Forward Power	1350 W
Plasma Reflected Power	1.9 W
Plasma Gas: Cool Flow	12.7 l min^{-1}
Plasma Gas: Auxilliary Flow	0.80 l min^{-1}
Plasma Gas: Nebuliser Flow	1.03 l min^{-1}
Torch Position: Sampling Depth	375
Torch Position: Vertical	-108
Torch Position: Horizontal	236
Extraction Lens Voltage	-868 V
D1 Lens Voltage	-21.4 V
L1 Lens Voltage	-8.9 V
L2 Lens Voltage	-142.2 V
L3 Lens Voltage	-165.5 V
Focus Lens Voltage	22.0 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	-1.97 V
Applied Hexapole Voltage: Collision Cell Mode	Not Applicable

Table 95. Mean Raw Data Accrued Following Analysis of the DNA/Cisplatin Samples During Study 2.

	m/z Data (cps)							
Sample Identity (DNA Nucleotides Per Cisplatin)	**31**	**47**	**190 (0.01 %)**	**192 (0.79 %)**	**194 (32.90 %)**	**195 (33.80 %)**	**196 (25.30 %)**	**198 (7.20 %)**
Blank	443338	6925	9	74	2714	2875	2112	1351
Control	677153	21186	31	93	1553	1569	1185	711
10 000	0 ↑	21933	83	3061	121578	127249	95220	27962
50 000	98399	21455	37	640	24292	25393	19148	5958
100 000	3553906	12112	23	232	8129	8482	6377	2135
500 000	2134201	21909	42	178	4845	5073	3725	1765
1 000 000	4796471	22629	33	120	3274	3370	2531	1441
5 000 000	0 ↑	40425	35	136	3335	3481	2589	1419
10 000 000	450232	19228	41	154	4252	4430	3354	1736
50 000 000	3806581	20881	37	125	3133	3300	2453	1064
100 000 000	4703021	20966	50	131	2346	2452	1851	948
500 000 000	3439953	15240	29	109	2485	2586	1960	823
1 000 000 000	4170455	20796	35	105	2741	2866	2179	1017

Table 96. Corrected Data Accrued Following Analysis of the DNA/Cisplatin Samples During Study 2.

	m/z Data (cps)							
Sample Identity (DNA Nucleotides Per Cisplatin)	**31**	**47**	**190 (0.01 %)**	**192 (0.79 %)**	**194 (32.90 %)**	**195 (33.80 %)**	**196 (25.30 %)**	**198 (7.20 %)**
Blank	407428	6364	8	68	2494	2642	1941	1242
Control	857952	26843	39	118	1967	1988	1501	901
10 000	0 ↑	22942	87	3202	127170	133102	99601	29248
50 000	103516	22571	39	673	25555	26713	20144	6268
100 000	3411750	11628	22	222	7804	8143	6122	2049
500 000	2676287	27474	52	223	6076	6362	4671	2214
1 000 000	5098649	24054	35	128	3481	3582	2690	1532
5 000 000	0 ↑	38969	33	131	3215	3356	2496	1368
10 000 000	445279	19017	41	152	4206	4381	3317	1717
50 000 000	3852260	21131	37	127	3171	3340	2483	1077
100 000 000	4439651	19792	47	123	2214	2315	1748	895
500 000 000	3587871	15896	31	114	2592	2697	2044	858
1 000 000 000	4954500	24706	41	125	3257	3405	2588	1208

↑ = Instrument Ion Counts Off Scale.

Table 97. Mean Data for a Series of Pt Standard Solutions Analysed with the DNA/Cisplatin Samples During Study 2.

	m/z Data (cps)					
Pt Standard Conc^{n} (μg l^{-1})	**190 (0.01 %)**	**192 (0.79 %)**	**194 (32.90 %)**	**195 (33.80 %)**	**196 (25.30 %)**	**198 (7.20 %)**
1	9	437	16890	17490	13271	4006
2.5	15	955	39081	40644	30454	9011
5	52	2800	112360	117736	88321	25932
7.5	67	3588	147465	152966	115213	33654
10	99	5771	233907	245392	184240	54150
12.5	99	6229	253893	264718	198983	58115

Table 98. Recovered, Cisplatin Exposed, DNA UV Spectroscopy Data (Study 3).

Sample Identity (DNA Nucleotides Per Cisplatin)	Sample Replicate Number	UV Spectroscopy Data (260 nm)	UV Spectroscopy Data (260/280 nm)	DNA Conc^{n} (mg ml^{-1})	Volume Per 1 mg of DNA (ml)
Control	1	0.540	1.489		
	2	0.566	1.489		
	3	0.577	1.498		
	Mean	**0.561**		**1.1220**	**0.89**
50	1	0.482	1.443		
	2	0.449	1.435		
	3	0.461	1.427		
	Mean	**0.464**		**0.9280**	**1.08**
100	1	0.520	1.472		
	2	0.513	1.459		
	3	0.514	1.464		
	Mean	**0.516**		**1.0313**	**0.97**
500	1	0.559	1.482		
	2	0.520	1.472		
	3	0.558	1.483		
	Mean	**0.546**		**1.0913**	**0.92**
1 000	1	0.553	1.461		
	2	0.615	1.468		
	3	0.533	1.453		
	Mean	**0.567**		**1.1340**	**0.88**
5 000	1	0.601	1.471		
	2	0.551	1.481		
	3	0.572	1.476		
	Mean	**0.575**		**1.1493**	**0.87**
10 000	1	0.628	1.475		
	2	0.543	1.476		
	3	0.555	1.473		
	Mean	**0.575**		**1.1507**	**0.87**
50 000	1	0.573	1.471		
	2	0.602	1.475		
	3	0.637	1.476		
	Mean	**0.604**		**1.2080**	**0.83**

Table 98. Recovered, Cisplatin Exposed, DNA UV Spectroscopy Data (Study 3) Continued…..

Sample Identity (DNA Nucleotides Per Cisplatin)	Sample Replicate Number	UV Spectroscopy Data (260 nm)	UV Spectroscopy Data (260/280 nm)	DNA Conc^{n} (mg ml^{-1})	Volume Per 1 mg of DNA (ml)
100 000	1	0.530	1.456		
	2	0.496	1.452		
	3	0.540	1.459		
	Mean	**0.522**		**1.0440**	**0.96**
500 000	1	0.555	1.445		
	2	0.573	1.447		
	3	0.517	1.451		
	Mean	**0.548**		**1.0967**	**0.91**
1 000 000	1	0.469	1.441		
	2	0.513	1.572		
	3	0.543	1.467		
	Mean	**0.508**		**1.0167**	**0.98**

Table 99. Recovered, Oxaliplatin Exposed, DNA UV Spectroscopy Data (Study 3).

Sample Identity (DNA Nucleotides Per Cisplatin)	Sample Replicate Number	UV Spectroscopy Data (260 nm)	UV Spectroscopy Data (260/280 nm)	DNA Conc^n (mg ml^{-1})	Volume Per 1 mg of DNA (ml)
Control	1	0.575	1.495		
	2	0.579	1.490		
	3	0.529	1.481		
	Mean	**0.561**		**1.1220**	**0.89**
50	1	0.582	1.459		
	2	0.565	1.468		
	3	0.558	1.466		
	Mean	**0.568**		**1.1367**	**0.88**
100	1	0.505	1.449		
	2	0.470	1.454		
	3	0.558	1.458		
	Mean	**0.511**		**1.0220**	**0.98**
500	1	0.534	1.458		
	2	0.536	1.468		
	3	0.552	1.459		
	Mean	**0.541**		**1.0813**	**0.92**
1 000	1	0.550	1.450		
	2	0.563	1.459		
	3	0.547	1.462		
	Mean	**0.553**		**1.1067**	**0.90**
5 000	1	0.607	1.448		
	2	0.566	1.443		
	3	0.608	1.450		
	Mean	**0.594**		**1.1873**	**0.84**
10 000	1	0.541	1.440		
	2	0.519	1.446		
	3	0.538	1.444		
	Mean	**0.533**		**1.0653**	**0.94**
50 000	1	0.585	1.464		
	2	0.554	1.448		
	3	0.572	1.454		
	Mean	**0.570**		**1.1407**	**0.88**

Table 99. Recovered, Oxaliplatin Exposed, DNA UV Spectroscopy Data (Study 3) Continued…..

Sample Identity (DNA Nucleotides Per Cisplatin)	Sample Replicate Number	UV Spectroscopy Data (260 nm)	UV Spectroscopy Data (260/280 nm)	DNA Conc^{n} (mg ml^{-1})	Volume Per 1 mg of DNA (ml)
100 000	1	0.563	1.458		
	2	0.562	1.460		
	3	0.566	1.455		
	Mean	**0.564**		**1.1273**	**0.89**
500 000	1	0.498	1.461		
	2	0.571	1.454		
	3	0.538	1.448		
	Mean	**0.536**		**1.0713**	**0.93**
1 000 000	1	0.545	1.502		
	2	0.532	1.482		
	3	0.448	1.482		
	Mean	**0.508**		**1.0167**	**0.98**

Table 100. Recovered, Cisplatin Exposed, DNA UV Spectroscopy Data (Study 4).

Sample Identity (DNA Nucleotides Per Cisplatin)	Sample Replicate Number	UV Spectroscopy Data (260 nm)	UV Spectroscopy Data (260/280 nm)	DNA Conc^{n} (μg ml^{-1})	DNA Conc^{n} (mg ml^{-1})
Control	1	0.473	1.419		
	2	0.483	1.431		
	3	0.482	1.434		
	Mean	**0.479**		**958.7**	**0.9587**
Control 2	1	0.482	1.427		
	2	0.490	1.435		
	3	0.513	1.417		
	Mean	**0.495**		**990.0**	**0.9900**
100	1	0.471	1.421		
	2	0.514	1.398		
	3	0.525	1.398		
	Mean	**0.503**		**1006.7**	**1.0067**
150 A	1	0.573	1.437		
	2	0.598	1.432		
	3	0.600	1.438		
	Mean	**0.590**		**1180.7**	**1.1807**
150 B	1	0.488	1.411		
	2	0.493	1.431		
	3	0.506	1.422		
	Mean	**0.496**		**991.3**	**0.9913**
300 A	1	0.473	1.424		
	2	0.468	1.424		
	3	0.453	1.417		
	Mean	**0.465**		**1086.7**	**1.0867**
300 B	1	0.491	1.422		
	2	0.502	1.411		
	3	0.485	1.412		
	Mean	**0.493**		**985.3**	**0.9853**

Table 100. Recovered, Cisplatin Exposed, DNA UV Spectroscopy Data (Study 4) Continued…..

Sample Identity (DNA Nucleotides Per Cisplatin)	Sample Replicate Number	UV Spectroscopy Data (260 nm)	UV Spectroscopy Data (260/280 nm)	DNA Conc^n (mg ml^{-1})	Volume Per 1 mg of DNA (ml)
500	1	0.456	1.412		
	2	0.494	1.411		
	3	0.514	1.414		
	Mean	**0.488**		**976.0**	**0.9760**
1 000	1	0.535	1.441		
	2	0.474	1.479		
	3	0.434	1.454		
	4	0.463	1.458		
	Mean	**0.477**		**953.0**	**0.9530**
5 000	1	0.518	1.426		
	2	0.516	1.423		
	3	0.536	1.429		
	Mean	**0.523**		**1046.7**	**1.0467**
10 000	1	0.477	1.428		
	2	0.498	1.443		
	3	0.508	1.423		
	Mean	**0.494**		**988.7**	**0.9887**
50 000	1	0.487	1.438		
	2	0.489	1.430		
	3	0.508	1.432		
	Mean	**0.495**		**989.3**	**0.9893**
100 000	1	0.495	1.414		
	2	0.505	1.419		
	3	0.500	1.414		
	Mean	**0.500**		**1000.0**	**1.0000**
250 000 A	1	0.522	1.427		
	2	0.544	1.438		
	3	0.568	1.446		
	Mean	**0.545**		**1089.3**	**1.0893**

Table 100. Recovered, Cisplatin Exposed, DNA UV Spectroscopy Data (Study 4) Continued…..

Sample Identity (DNA Nucleotides Per Cisplatin)	Sample Replicate Number	UV Spectroscopy Data (260 nm)	UV Spectroscopy Data (260/280 nm)	DNA Conc^n (mg ml^{-1})	Volume Per 1 mg of DNA (ml)
250 000 B	1	0.504	1.438		
	2	0.485	1.437		
	3	0.477	1.431		
	Mean	**0.489**		**977.3**	**0.9773**
250 000 C	1	0.528	1.443		
	2	0.514	1.434		
	3	0.535	1.441		
	Mean	**0.526**		**1051.3**	**1.0513**
500 000	1	0.466	1.403		
	2	0.485	1.404		
	3	0.501	1.403		
	Mean	**0.484**		**968.0**	**0.9680**

Table 101. Recovered, Oxaliplatin Exposed, DNA UV Spectroscopy Data (Study 4).

Sample Identity (DNA Nucleotides Per Cisplatin)	Sample Replicate Number	UV Spectroscopy Data (260 nm)	UV Spectroscopy Data (260/280 nm)	DNA Conc^n (mg ml^{-1})	Volume Per 1 mg of DNA (ml)
Control	1	0.491	1.444		
	2	0.513	1.429		
	3	0.507	1.441		
	Mean	**0.504**		**1007.3**	**1.0073**
Control 2	1	0.565	1.477		
	2	0.498	1.441		
	3	0.516	1.442		
	Mean	**0.526**		**1052.7**	**1.0527**
100	1	0.464	1.411		
	2	0.524	1.419		
	3	0.507	1.438		
	Mean	**0.498**		**996.7**	**0.9967**
150 A	1	0.579	1.424		
	2	0.601	1.420		
	3	0.595	1.415		
	Mean	**0.592**		**1183.3**	**1.1833**
150 B	1	0.466	1.423		
	2	0.460	1.424		
	3	0.466	1.422		
	Mean	**0.464**		**940.7**	**0.9407**
300 A	1	0.566	1.428		
	2	0.562	1.423		
	3	0.578	1.415		
	Mean	**0.569**		**1137.3**	**1.1373**
300 B	1	0.528	1.426		
	2	0.555	1.406		
	3	0.586	1.418		
	Mean	**0.556**		**1112.7**	**1.1127**

Table 101. Recovered, Oxaliplatin Exposed, DNA UV Spectroscopy Data (Study 4) Continued…..

Sample Identity (DNA Nucleotides Per Cisplatin)	Sample Replicate Number	UV Spectroscopy Data (260 nm)	UV Spectroscopy Data (260/280 nm)	DNA Conc^{n} (mg ml^{-1})	Volume Per 1 mg of DNA (ml)
500	1	0.488	1.426		
	2	0.532	1.441		
	3	0.521	1.461		
	Mean	**0.514**		**1027.3**	**1.0273**
1 000	1	0.461	1.408		
	2	0.481	1.422		
	3	0.530	1.434		
	Mean	**0.491**		**981.3**	**0.9813**
5 000	1	0.521	1.417		
	2	0.496	1.430		
	3	0.514	1.423		
	Mean	**0.510**		**1020.7**	**1.0207**
10 000	1	0.440	1.414		
	2	0.483	1.410		
	3	0.480	1.423		
	Mean	**0.468**		**935.3**	**0.9353**
50 000	1	0.477	1.411		
	2	0.471	1.412		
	3	0.470	1.417		
	Mean	**0.473**		**945.3**	**0.9453**
100 000	1	0.517	1.422		
	2	0.523	1.424		
	3	0.537	1.427		
	Mean	**0.526**		**1051.3**	**1.0513**
250 000 A	1	0.501	1.439		
	2	0.513	1.437		
	3	0.549	1.443		
	Mean	**0.521**		**1042.0**	**1.0420**

Table 101. Recovered, Oxaliplatin Exposed, DNA UV Spectroscopy Data (Study 4) Continued…..

Sample Identity (DNA Nucleotides Per Cisplatin)	Sample Replicate Number	UV Spectroscopy Data (260 nm)	UV Spectroscopy Data (260/280 nm)	DNA Conc^{n} (mg ml^{-1})	Volume Per 1 mg of DNA (ml)
250 000 B	1	0.526	1.430		
	2	0.542	1.450		
	3	0.536	1.442		
	Mean	**0.535**		**1069.3**	**1.0693**
250 000 C	1	0.567	1.501		
	2	0.565	1.453		
	3	0.571	1.443		
	Mean	**0.568**		**1135.3**	**1.1353**
500 000	1	0.431	1.409		
	2	0.498	1.421		
	3	0.496	1.417		
	Mean	**0.475**		**950.0**	**0.9500**

Table 102. Incubation Pre-Treatment Data for DNA/Drug Samples Analysed During Study 3.

Sample Identity (DNA Nucleotides Per Drug Molecule)	Mass of DNA/Drug Sample (g)	Mass of 25% NH_3 (g)	Total Mass of Incubation Solution (g)
Blank (Cisplatin)	1.0063	0.9029	1.9092
Control (Cisplatin)	0.9023	0.8605	1.7628
50 (Cisplatin)	0.9172	0.8659	1.7831
100 (Cisplatin)	0.9140	0.8591	1.7731
500 (Cisplatin)	1.0094	0.8788	1.8882
1 000 (Cisplatin)	0.8994	0.8873	1.7867
5 000 (Cisplatin)	0.9025	0.8924	1.7949
10 000 (Cisplatin)	0.9211	0.8840	1.8051
50 000 (Cisplatin)	0.9046	0.8751	1.7797
100 000 (Cisplatin)	0.8997	0.8743	1.7740
500 000 (Cisplatin)	0.8982	0.8696	1.7678
1 000 000 (Cisplatin)	0.8952	0.8792	1.7744
Blank (Oxaliplatin)	1.0201	0.8932	1.9133
Control (Oxaliplatin)	0.9526	0.8797	1.8323
50 (Oxaliplatin)	0.9132	0.8877	1.8009
100 (Oxaliplatin)	0.8951	0.8942	1.7893
500 (Oxaliplatin)	0.8903	0.8903	1.7806
1 000 (Oxaliplatin)	0.8445	0.8905	1.7350
5 000 (Oxaliplatin)	0.8512	0.8947	1.7459
10 000 (Oxaliplatin)	0.9004	0.8929	1.7933
50 000 (Oxaliplatin)	0.8700	0.8445	1.7145
100 000 (Oxaliplatin)	0.9362	0.9003	1.8365
500 000 (Oxaliplatin)	0.9199	0.8834	1.8033
1 000 000 (Oxaliplatin)	0.9455	0.9016	1.8471

Table 103. Centrifugation Pre-Treatment Data for DNA/Drug Samples Analysed During Study 3.

Tube N°	Sample Label (No of Nucleotides Per Drug Molecule)	Mass of DNA/Drug Sample Pre-Centrifuge (g)	Mass of DNA/Drug Sample Recovered Post-Centrifuge (g)	Sample Loss (g)
1	**Blank (Cisplatin)**	0.5297	0.5005	0.0292
2	**Control (Cisplatin)**	0.4501	0.3793	0.0708
3	**50 (Cisplatin)**	0.4158	0.3693	0.0465
4	**100 (Cisplatin)**	0.4515	0.3894	0.0621
5	**500 (Cisplatin)**	0.4374	0.3776	0.0598
6	**1 000 (Cisplatin)**	0.4674	0.3887	0.0787
7	**5 000 (Cisplatin)**	0.3531	0.3077	0.0454
8	**10 000 (Cisplatin)**	0.4232	0.3936	0.0296
9	**50 000 (Cisplatin)**	0.5579	0.4955	0.0624
10	**100 000 (Cisplatin)**	0.3991	0.3451	0.0540
11	**500 000 (Cisplatin)**	0.4750	0.4187	0.0563
12	**1 000 000 (Cisplatin)**	0.4731	0.3976	0.0755
13	**Blank (Oxaliplatin)**	0.5041	0.4894	0.0147
14	**Control (Oxaliplatin)**	0.4043	0.3444	0.0599
15	**50 (Oxaliplatin)**	0.5115	0.4215	0.0900
16	**100 (Oxaliplatin)**	0.5110	0.4169	0.0941
17	**500 (Oxaliplatin)**	0.4296	0.3772	0.0524
18	**1 000 (Oxaliplatin)**	0.4626	0.3906	0.0720
19	**5 000 (Oxaliplatin)**	0.4314	0.3550	0.0764
20	**10 000 (Oxaliplatin)**	0.4439	0.3810	0.0629
21	**50 000 (Oxaliplatin)**	0.4448	0.3673	0.0775
22	**100 000 (Oxaliplatin)**	0.4829	0.3991	0.0838
23	**500 000 (Oxaliplatin)**	0.4436	0.3601	0.0835
24	**1 000 000 (Oxaliplatin)**	0.3726	0.3237	0.0489

Table 104. Incubation Pre-Treatment Data for DNA/Cisplatin Samples Analysed During Study 4.

Sample Identity (DNA Nucleotides Per Drug Molecule)	Mass of DNA/Drug Sample (g)	Mass of 25% NH_3 (g)	Total Mass of Incubation Solution (g)
Blank (Cisplatin)	0.9859	0.9952	1.9811
Blank 2 (Cisplatin	1.0025	1.0226	2.0251
Control (Cisplatin)	0.8752	1.0147	1.8899
Control 2 (Cisplatin)	0.8610	1.0088	1.8698
100 (Cisplatin)	0.8869	1.0045	1.8914
150 A (Cisplatin)	0.9214	1.0121	1.9335
150 B (Cisplatin)	0.9198	0.9898	1.9096
300 A (Cisplatin)	0.8926	1.0061	1.8987
300 B (Cisplatin)	0.8656	1.0000	1.8656
500 (Cisplatin)	0.8981	0.9969	1.8950
1 000 (Cisplatin)	0.8829	1.0051	1.8880
5 000 (Cisplatin)	0.9290	0.9881	1.9171
10 000 (Cisplatin)	0.9085	1.0058	1.9143
50 000 (Cisplatin)	0.7811	1.0029	1.7840
100 000 (Cisplatin)	0.8923	1.0044	1.8967
250 000 A (Cisplatin)	0.8994	1.0063	1.9057
250 000 B (Cisplatin)	0.8745	0.9971	1.8716
250 000 C (Cisplatin)	0.8998	0.9893	1.8891
500 000 (Cisplatin)	0.8778	1.0038	1.8816

Table 105. Incubation Pre-Treatment Data for DNA/Oxaliplatin Samples Analysed During Study 4.

Sample Identity (DNA Nucleotides Per Drug Molecule)	Mass of DNA/Drug Sample (g)	Mass of 25% NH_3 (g)	Total Mass of Incubation Solution (g)
Blank (Oxaliplatin)	1.0152	0.9919	2.0071
Blank 2 (Oxaliplatin)	1.0280	0.9753	2.0033
Control (Oxaliplatin)	0.8899	1.0302	1.9201
Control 2 (Oxaliplatin)	0.8586	1.0060	1.8646
100 (Oxaliplatin)	0.8998	0.9948	1.8946
150 A (Oxaliplatin)	0.9135	1.0039	1.9174
150 B (Oxaliplatin)	0.8943	0.9969	1.8912
300 A (Oxaliplatin)	0.8815	0.9968	1.8783
300 B (Oxaliplatin)	0.9326	1.0169	1.9495
500 (Oxaliplatin)	0.9121	1.0053	1.9174
1 000 (Oxaliplatin)	0.9081	0.9948	1.9029
5 000 (Oxaliplatin)	0.8681	0.9965	1.8646
10 000 (Oxaliplatin)	0.8674	1.0078	1.8752
50 000 (Oxaliplatin)	0.9192	1.0364	1.9556
100 000 (Oxaliplatin)	0.8755	1.0080	1.8835
250 000 A (Oxaliplatin)	0.8758	0.9991	1.8749
250 000 B (Oxaliplatin)	0.9064	1.0176	1.9240
250 000 C (Oxaliplatin)	0.9097	1.0063	1.9160
500 000 (Oxaliplatin)	0.9190	0.9936	1.9126

Table 106. Centrifugation Pre-Treatment Data for DNA/Cisplatin Samples Analysed During Study 4.

Tube N°	Sample Label (No of Nucleotides Per Drug Molecule)	Mass of DNA/Drug Sample Pre-Centrifuge (g)	Mass of DNA/Drug Sample Recovered Post-Centrifuge (g)	Sample Loss (g)
A	**Blank (Cisplatin)**	0.5077	0.4736	0.0341
C	**Blank 2 (Cisplatin)**	0.4792	0.4322	0.0470
1	**Control (Cisplatin)**	0.5337	0.4739	0.0598
27	**Control 2 (Cisplatin)**	0.4725	0.4053	0.0652
2	**100 (Cisplatin)**	0.4835	0.4081	0.0754
3	**150 A (Cisplatin)**	0.4495	0.3850	0.0645
4	**150 B (Cisplatin)**	0.4972	0.4266	0.0706
5	**300 A (Cisplatin)**	0.5006	0.4273	0.0733
6	**300 B (Cisplatin)**	0.5039	0.4476	0.0563
7	**500 (Cisplatin)**	0.4465	0.3779	0.0686
8	**1 000 (Cisplatin)**	0.4975	0.4427	0.0548
9	**5 000 (Cisplatin)**	0.5675	0.5030	0.0645
10	**10 000 (Cisplatin)**	0.5536	0.4680	0.0856
11	**50 000 (Cisplatin)**	0.4844	0.4282	0.0562
12	**100 000 (Cisplatin)**	0.4937	0.4465	0.0472
28	**250 000 A (Cisplatin)**	0.4808	0.4144	0.0664
29	**250 000 B (Cisplatin)**	0.4752	0.4120	0.0632
30	**250 000 C (Cisplatin)**	0.5137	0.4422	0.0715
13	**500 000 (Cisplatin)**	0.5414	0.4918	0.0496

Table 107. Centrifugation Pre-Treatment Data for DNA/Oxaliplatin Samples Analysed During Study 4.

Tube N°	Sample Label (No of Nucleotides Per Drug Molecule)	Mass of DNA/Drug Sample Pre-Centrifuge (g)	Mass of DNA/Drug Sample Recovered Post-Centrifuge (g)	Sample Loss (g)
B	**Blank (Oxaliplatin)**	0.5761	0.5341	0.0420
D	**Blank 2 (Oxaliplatin)**	0.5668	0.5398	0.0270
14	**Control (Oxaliplatin)**	0.6064	0.5041	0.1023
31	**Control 2 (Oxaliplatin)**	0.5563	0.4992	0.0571
15	**100 (Oxaliplatin)**	0.5936	0.5074	0.0862
16	**150 A (Oxaliplatin)**	0.5396	0.4606	0.0790
17	**150 B (Oxaliplatin)**	0.5544	0.4607	0.0937
18	**300 A (Oxaliplatin)**	0.4642	0.3910	0.0732
19	**300 B (Oxaliplatin)**	0.6063	0.5092	0.0971
20	**500 (Oxaliplatin)**	0.4824	0.4066	0.0758
21	**1 000 (Oxaliplatin)**	0.4582	0.3962	0.0620
22	**5 000 (Oxaliplatin)**	0.5279	0.4637	0.0642
23	**10 000 (Oxaliplatin)**	0.5681	0.4865	0.0816
24	**50 000 (Oxaliplatin)**	0.4173	0.3624	0.0549
25	**100 000 (Oxaliplatin)**	0.6108	0.5373	0.0735
32	**250 000 A (Oxaliplatin)**	0.5215	0.4292	0.0923
33	**250 000 B (Oxaliplatin)**	0.5099	0.4299	0.0800
34	**250 000 C (Oxaliplatin)**	0.6685	0.5565	0.1120
26	**500 000 (Oxaliplatin)**	0.5413	0.4691	0.0722

Table 108. Final Pre-Concentration Data for DNA/Cisplatin and DNA/Oxaliplatin Samples Analysed During Study 3.

Tube N°	Sample Identity (DNA Nucleotides Per Drug Molecule)	Initial Mass of DNA/Drug Sample (g)	Final Mass of DNA/Drug Sample (g)	Pre-Conc^{n}/ Correction Factor
1	**Blank (Cisplatin)**	1.0063	0.5005	2.011
2	**Control (Cisplatin)**	0.9023	0.3793	2.379
3	**50 (Cisplatin)**	0.9172	0.3693	2.484
4	**100 (Cisplatin)**	0.9140	0.3894	2.347
5	**500 (Cisplatin)**	1.0094	0.3776	2.673
6	**1 000 (Cisplatin)**	0.8994	0.3887	2.314
7	**5 000 (Cisplatin)**	0.9025	0.3077	2.933
8	**10 000 (Cisplatin)**	0.9211	0.3936	2.340
9	**50 000 (Cisplatin)**	0.9046	0.4955	1.826
10	**100 000 (Cisplatin)**	0.8997	0.3451	2.607
11	**500 000 (Cisplatin**	0.8982	0.4187	2.145
12	**1 000 000 (Cisplatin)**	0.8952	0.3976	2.252
13	**Blank (Oxaliplatin)**	1.0201	0.4894	2.084
14	**Control (Oxalilatin)**	0.9526	0.3444	2.766
15	**50 (Oxaliplatin)**	0.9132	0.4215	2.167
16	**100 (Oxaliplatin)**	0.8951	0.4169	2.147
17	**500 (Oxaliplatin)**	0.8903	0.3772	2.360
18	**1 000 (Oxaliplatin)**	0.8445	0.3906	2.162
19	**5 000 (Oxaliplatin)**	0.8512	0.3550	2.398
20	**10 000 (Oxaliplatin)**	0.9004	0.3810	2.363
21	**50 000 (Oxaliplatin)**	0.8700	0.3673	2.369
22	**100 000 (Oxaliplatin)**	0.9362	0.3991	2.346
23	**500 000 (Oxaliplatin)**	0.9199	0.3601	2.555
24	**1 000 000 (Oxaliplatin)**	0.9455	0.3237	2.921

Table 109. Final Pre-Concentration Data for DNA/Cisplatin Samples Analysed During Study 4.

Tube N°	Sample Identity (DNA Nucleotides Per Drug Molecule)	Initial Mass of DNA/Drug Sample (g)	Final Mass of DNA/Drug Sample (g)	Pre-Conc^{n}/ Correction Factor
A	Blank (Cisplatin)	0.9859	0.4736	2.082
C	Blank 2 (Cisplatin)	1.0025	0.4322	2.320
1	Control (Cisplatin)	0.8752	0.4739	1.847
27	Control 2 (Cisplatin)	0.8610	0.4053	2.124
2	100 (Cisplatin)	0.8869	0.4081	2.173
3	150 A (Cisplatin)	0.9214	0.3850	2.393
4	150 B (Cisplatin)	0.9198	0.4266	2.156
5	300 A (Cisplatin)	0.8926	0.4273	2.089
6	300 B (Cisplatin)	0.8656	0.4476	1.934
7	500 (Cisplatin)	0.8981	0.3779	2.377
8	1 000 (Cisplatin)	0.8829	0.4427	1.994
9	5 000 (Cisplatin)	0.9290	0.5030	1.847
10	10 000 (Cisplatin)	0.9085	0.4680	1.941
11	50 000 (Cisplatin)	0.7811	0.4282	1.824
12	100 000 (Cisplatin)	0.8923	0.4465	1.998
28	250 000 A (Cisplatin)	0.8994	0.4144	2.170
29	250 000 B (Cisplatin)	0.8745	0.4120	2.123
30	250 000 C (Cisplatin)	0.8998	0.4422	2.035
13	500 000 (Cisplatin)	0.8778	0.4918	1.785

Table 110. Final Pre-Concentration Data for DNA/Oxaliplatin Samples Analysed During Study 4.

Tube N°	Sample Identity (DNA Nucleotides Per Drug Molecule)	Initial Mass of DNA/Drug Sample (g)	Final Mass of DNA/Drug Sample (g)	Pre-Conc^{n}/ Correction Factor
B	Blank (Oxaliplatin)	1.0152	0.5341	1.901
D	Blank 2 (Oxaliplatin)	1.0280	0.5398	1.904
14	Control (Oxaliplatin)	0.8899	0.5041	1.765
31	Control 2 (Oxaliplatin)	0.8586	0.4992	1.720
15	100 (Oxaliplatin)	0.8998	0.5074	1.773
16	150 A (Oxaliplatin)	0.9135	0.4606	1.983
17	150 B (Oxaliplatin)	0.8943	0.4607	1.941
18	300 A (Oxaliplatin)	0.8815	0.3910	2.254
19	300 B (Oxaliplatin)	0.9326	0.5092	1.832
20	500 (Oxaliplatin)	0.9121	0.4066	2.243
21	1 000 (Oxaliplatin)	0.9081	0.3962	2.292
22	5 000 (Oxaliplatin)	0.8681	0.4637	1.872
23	10 000 (Oxaliplatin)	0.8674	0.4865	1.783
24	50 000 (Oxaliplatin)	0.9192	0.3624	2.536
25	100 000 (Oxaliplatin)	0.8755	0.5373	1.629
32	250 000 A (Oxaliplatin)	0.8758	0.4292	2.041
33	250 000 B (Oxaliplatin)	0.9064	0.4299	2.108
34	250 000 C (Oxaliplatin)	0.9097	0.5565	1.635
26	500 000 (Oxaliplatin)	0.9190	0.4691	1.959

Table 111. A Table of ICP-MS Instrument Parameters for the Analysis of DNA, Cisplatin and Oxaliplatin Interactions *In Vitro*, Via Measurement of the $^{190,192,194,195,196,198}Pt$ Isotopes, Employing Standard Conditions (Study 3).

Instrument Parameter	Parameter Value
Analyser Pressure	8.20 x 10^{-7} mBar
Expansion Pressure	2.2 mBar
Nebuliser Pressure	2.64 Bar
Plasma Forward Power	1350 W
Plasma Reflected Power	1.4 W
Plasma Gas: Cool Flow	12.8 l min^{-1}
Plasma Gas: Auxilliary Flow	0.8 l min^{-1}
Plasma Gas: Nebuliser Flow	1.08 l min^{-1}
Torch Position: Sampling Depth	380
Torch Position: Vertical	-112
Torch Position: Horizontal	252
Extraction Lens Voltage	-749 V
D1 Lens Voltage	-27.6 V
L1 Lens Voltage	-17.8 V
L2 Lens Voltage	-159.1 V
L3 Lens Voltage	-179.8 V
Focus Lens Voltage	23.1 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	-1.97 V
Applied Hexapole Voltage: Collision Cell Mode	Not Applicable

Table 112. Mean Raw Data Accrued Following Analysis of the DNA/Cisplatin Samples During Study 3.

		m/z Data (cps)							
Tube N°	**Sample Identity (DNA Nucleotides Per Cisplatin)**	**31**	**47**	**190 (0.01 %)**	**192 (0.79 %)**	**194 (32.90 %)**	**195 (33.80 %)**	**196 (25.30 %)**	**198 (7.20 %)**
1	Blank	136343	3425.41	14.667	98	3088.67	3207.03	2446.54	1283.72
2	Control	4631662	23289.3	22.667	319.004	11971.3	12380.4	9312.7	3460.42
3	50	1654758	25333.8	10560.2	664236	0 ↑	0 ↑	0 ↑	589985
4	100	4973853	20286.4	1532.08	91986.4	3595176	3717447	2860180	845943
5	500	4900446	21834.3	348.338	19274.7	791467	826863	617668	180361
6	1 000	4428025	19805.7	342.337	19105.4	776240	809806	607696	176479
7	5 000	4086960	19745	104.667	4298.72	172551	179709	134563	39301.1
8	10 000	2644712	13357.6	76.667	3372.07	139510	145344	108815	31918.4
9	50 000	4146256	18372.8	14	633.681	25420.9	26358.3	19628.1	5984.59
10	100 000	4956858	21759.6	13.667	388.005	16046.1	16687.8	12359.7	3862.86
11	500 000	4223564	18015.4	14.333	289.67	11319.5	11869.3	8776.03	2805.61
12	1 000 000	4327565	18188.6	22.667	987.701	39794.7	41526.9	31008	9178.95

Table 113. Corrected Data Accrued Following Analysis of the DNA/Cisplatin Samples During Study 3.

		m/z Data (cps)							
Tube N°	**Sample Identity (DNA Nucleotides Per Cisplatin)**	**31**	**47**	**190 (0.01 %)**	**192 (0.79 %)**	**194 (32.90 %)**	**195 (33.80 %)**	**196 (25.30 %)**	**198 (7.20 %)**
1	Blank	135597	3406.67	14.587	97.46	3071.78	3189.49	2433.16	1276.70
2	Control	3893789	19579.1	19.056	268.183	10064.1	10408.1	7829.1	2909.14
3	50	1332333	20397.6	8502.6	534812	0 ↑	0 ↑	0 ↑	475028
4	100	4238477	17287.1	1305.56	78386.4	3063635	3167829	2437307	720872
5	500	3666626	16336.9	260.634	14421.8	592193	618678	462153	134950
6	1 000	3827161	17118.2	295.883	16512.9	670908	699919	525234	152532
7	5 000	2786880	13464	71.372	2931.28	117662	122543	91757.9	26799.2
8	10 000	2260438	11416.8	65.527	2882.11	119239	124226	93004.3	27280.7
9	50 000	4541354	20123.5	15.334	694.065	27843.3	28870.0	21498.5	6554.86
10	100 000	3802729	16693.2	10.485	297.664	12310.0	12802.3	9481.93	2963.45
11	500 000	3938055	16797.6	13.364	270.088	10554.3	11066.9	8182.78	2615.95
12	1 000 000	3843308	16153.3	20.131	877.177	35341.7	36880.0	27538.2	8151.82

↑ = Instrument Ion Counts Off Scale.

Table 114. Mean Raw Data Accrued Following Analysis of the DNA/Oxaliplatin Samples During Study 3.

		m/z Data (cps)							
Tube N°	Sample Identity (DNA Nucleotides Per Oxaliplatin)	31	47	190 (0.01 %)	192 (0.79 %)	194 (32.90 %)	195 (33.80 %)	196 (25.30 %)	198 (7.20 %)
13	Blank	2126726	9031.52	10	107.667	4207.95	4379.34	3304.72	1446.74
14	Control	2709612	16291.8	29.333	484.342	18888.5	19505	14781.5	4814.5
15	50	2927921	15232.8	3683.14	228754	0 ↑	0 ↑	0 ↑	2095281
16	100	3582346	16587.3	2100.82	129398	4649577	4151720	4073803	1247886
17	500	4114684	20426.3	539.01	29914	1240910	1298408	987394	289244
18	1 000	4092811	19834.1	464.674	15922.5	650194	681751	516828	151012
19	5 000	3086642	17173	109.334	4129.93	169275	177818	134057	39837.5
20	10 000	2270789	12686.3	62.333	2852.95	117123	122764	92370.4	27693.5
21	50 000	2516861	12955.6	53.333	1845.45	73238.4	77149.4	58124.4	17887.2
22	100 000	3663909	17174	21	590.346	23755.7	24657.6	18696.6	5903.89
23	500 000	4859592	21716.2	20.667	554.011	21640.7	22543.1	17030.2	5429.37
24	1 000 000	4467196	22391.1	89	648.682	23226	24109.9	18187.9	5832.89

Table 115. Corrected Data Accrued Following Analysis of the DNA/Oxaliplatin Samples During Study 3.

		m/z Data (cps)							
Tube N°	Sample Identity (DNA Nucleotides Per Oxaliplatin)	31	47	190 (0.01 %)	192 (0.79 %)	194 (32.90 %)	195 (33.80 %)	196 (25.30 %)	198 (7.20 %)
13	Blank	2041004	8667.49	9.597	103.327	4038.34	4202.82	3171.52	1388.43
14	Control	1959228	11780.0	21.210	350.211	6828.81	14103.4	10688.0	3481.20
15	50	2702281	14058.9	3399.30	211125	0 ↑	0 ↑	0 ↑	1933808
16	100	3337071	15451.6	1956.98	120538	4331231	3867462	3794879	1162446
17	500	3487020	17310.4	456.79	25350.8	1051619	1100346	836775	245122
18	1 000	3786134	18347.9	429.856	14729.4	601475	630667	478102	139697
19	5 000	2574347	14322.8	91.188	3444.48	141180	148305	111807	33225.6
20	10 000	1921954	10737.5	52.758	2414.68	99130.8	103905	78180.6	23439.3
21	50 000	2124830	10937.6	45.026	1558.00	61830.6	65132.5	49070.8	15101.1
22	100 000	3123537	14641.1	17.903	503.279	20252.1	21021.0	15939.1	5033.15
23	500 000	3803986	16999.0	16.178	433.668	16939.9	17646.3	13330.9	4250.00
24	1 000 000	3058676	15331.1	60.938	444.151	15902.8	16508.0	12453.2	3993.76

↑ = Instrument Ion Counts Off Scale

Table 116. Mean Data for a Series of Pt Standard Solutions Analysed with the DNA/Cisplatin and DNA/Oxaliplatin Samples During Study 3.

	m/z Data (cps)					
Pt Standard Conc^{n} (μg l^{-1})	**190 (0.01 %)**	**192 (0.79 %)**	**194 (32.90 %)**	**195 (33.80 %)**	**196 (25.30 %)**	**198 (7.20 %)**
0.5	5.333	246.669	10163.6	10493.5	7929.53	2673.25
1	7	379.005	15289.2	15621.9	11974.7	3742.16
2.5	25	1587.42	64299.1	67026.6	50758.4	15188.1
5	66	4271.97	178289	186772	140995	41601.2
7.5	86	5101.91	209830	218699	164696	49041
12.5	131.001	7471.62	308924	325835	245360	72096.2
25	244.669	15641.9	657230	686519	518986	153178

Table 117. A Table of ICP-MS Instrument Parameters for the Analysis of DNA and Cisplatin Interactions *In Vitro*, Via Measurement of the $^{190,192,194,195,196,198}Pt$ Isotopes, Employing Standard Conditions (Study 4).

Instrument Parameter	Parameter Value
Analyser Pressure	8.60×10^{-7} mBar
Expansion Pressure	2.2 mBar
Nebuliser Pressure	2.68 Bar
Plasma Forward Power	1350 W
Plasma Reflected Power	1.8 W
Plasma Gas: Cool Flow	11.5 l min^{-1}
Plasma Gas: Auxilliary Flow	1.05 l min^{-1}
Plasma Gas: Nebuliser Flow	1.15 l min^{-1}
Torch Position: Sampling Depth	385
Torch Position: Vertical	-106
Torch Position: Horizontal	245
Extraction Lens Voltage	-749 V
D1 Lens Voltage	-27.6 V
L1 Lens Voltage	-17.8 V
L2 Lens Voltage	-159 V
L3 Lens Voltage	-179.8 V
Focus Lens Voltage	23.1 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	-1.97 V
Applied Hexapole Voltage: Collision Cell Mode	Not Applicable

Table 118. A Table of ICP-MS Instrument Parameters for the Analysis of DNA and Oxaliplatin Interactions *In Vitro*, Via Measurement of the $^{190,192,194,195,196,198}Pt$ Isotopes, Employing Standard Conditions (Study 4).

Instrument Parameter	Parameter Value
Analyser Pressure	8.80×10^{-7} mBar
Expansion Pressure	2.1 mBar
Nebuliser Pressure	2.35 Bar
Plasma Forward Power	1350 W
Plasma Reflected Power	1.8 W
Plasma Gas: Cool Flow	12.8 l min^{-1}
Plasma Gas: Auxilliary Flow	0.8 l min^{-1}
Plasma Gas: Nebuliser Flow	1.04 l min^{-1}
Torch Position: Sampling Depth	370
Torch Position: Vertical	-90
Torch Position: Horizontal	260
Extraction Lens Voltage	-738.5 V
D1 Lens Voltage	-28.3 V
L1 Lens Voltage	-13.3 V
L2 Lens Voltage	-160 V
L3 Lens Voltage	-184.4 V
Focus Lens Voltage	22.6 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	-1.97 V
Applied Hexapole Voltage: Collision Cell Mode	Not Applicable

Table 119. Mean Raw Data Accrued Following Analysis of the DNA/Cisplatin Samples During Study 4.

		m/z Data (cps)							
Tube N°	**Sample Identity (DNA Nucleotides Per Cisplatin)**	**31**	**47**	**190 (0.01 %)**	**192 (0.79 %)**	**194 (32.90 %)**	**195 (33.80 %)**	**196 (25.30 %)**	**198 (7.20 %)**
A	Blank	162965	2903.63	3.667	47	1798.78	1886.46	1424.41	1164.05
C	Blank 2	128574	2624.91	3.333	16	689.683	710.684	565.011	779.355
1	Control	2235841	8618.93	4.667	34.667	1456.74	1489.41	1106.71	996.701
27	Control 2	3517907	11420.9	1.333	22.333	1026.04	1063.37	848.692	923.03
2	100	3428286	12140.2	1004.04	62486.5	2636171	2711665	2033366	596799
3	150 A	3566183	11808.6	646.348	42545.7	1799055	1856830	1389508	406622
4	150 B	3332093	10951.9	560.011	35808.5	1515064	1563821	1169176	340299
5	300 A	3015173	9985.49	251.669	15851.5	656034	676539	511237	150408
6	300 B	2911006	9869.08	237.335	15387.3	642334	663096	498295	146943
7	500	2811064	9338.75	142.334	8178.06	344046	354538	267091	78771.3
8	1 000	3139359	10610.6	92.334	5216.95	219596	226091	170105	50738.3
9	5 000	1853044	6577.52	13.333	774.354	31999.5	33087.6	24892.3	7889.51
10	10 000	3114083	10339.1	10.333	544.344	22516.1	23446.6	17584.8	5840.53
11	50 000	1974530	7649.05	5.667	141.334	6130.65	6321.4	4828.82	2041.48
12	100 000	2611374	8962.48	3.333	118	4791.81	4891.51	3704.81	1723.77
28	250 000 A	3639514	11331.5	3	45.667	1467.08	1500.08	1125.38	951.032
29	250 000 B	3510475	11057.9	3.667	36.333	1522.08	1548.75	1164.05	1042.37
30	250 000 C	3094140	9803.7	2	41.667	1341.4	1406.74	1074.37	1008.04
13	500 000	2369724	8487.52	2.333	62.667	2749.6	2790.61	2124.83	1182.72

Table 120. Corrected Data Accrued Following Analysis of the DNA/Cisplatin Samples During Study 4.

		m/z Data (cps)							
Tube N°	**Sample Identity (DNA Nucleotides Per Cisplatin)**	**31**	**47**	**190 (0.01 %)**	**192 (0.79 %)**	**194 (32.90 %)**	**195 (33.80 %)**	**196 (25.30 %)**	**198 (7.20 %)**
A	Blank	156546	2789.27	3.523	45.149	1727.93	1812.16	1368.31	1118.20
C	Blank 2	110840	2262.85	2.873	13.793	594.554	612.659	487.078	671.858
1	Control	2421051	9332.90	5.054	37.539	1577.41	1612.79	1198.39	1079.26
27	Control 2	3312530	10754.1	1.255	21.029	966.139	1001.29	799.145	869.143
2	100	3155348	11173.7	924.105	57511.7	2426296	2495780	1871483	549286
3	150 A	2980512	9869.29	540.199	35558.5	1503598	1551885	1161310	339843
4	150 B	3090995	10159.5	519.491	33217.5	1405440	1450669	1084579	315676
5	300 A	2886714	9560.07	240.947	15176.2	628084	647716	489456	144000
6	300 B	3010347	10205.9	245.434	15912.4	664254	685725	515300	151958
7	500	2365220	7857.59	119.759	6880.99	289479	298307	224729	66277.9
8	1 000	3148805	10642.5	92.612	5232.65	220257	226771	170617	50891.0
9	5 000	2006545	7122.38	14.437	838.499	34650.2	35828.5	26954.3	8543.05
10	10 000	3208741	10653.4	10.647	560.890	23200.5	24159.3	18119.3	6018.06
11	50 000	2165055	8387.12	6.214	154.971	6722.20	6931.36	5294.76	2238.46
12	100 000	2613988	8971.45	3.336	118.118	4796.61	4896.41	3708.52	1725.50
28	250 000 A	3354391	10443.8	2.765	42.089	1352.15	1382.56	1037.22	876.527
29	250 000 B	3307089	10417.2	3.455	34.228	1433.90	1459.02	1096.61	981.978
30	250 000 C	3040924	9635.09	1.966	40.950	1318.33	1382.55	1055.89	990.703
13	500 000	2655153	9509.83	2.614	70.215	3080.78	3126.73	2380.76	1325.18

Table 121. Mean Raw Data Accrued Following Analysis of the DNA/Oxaliplatin Samples During Study 4.

		***m/z* Data (cps)**							
Tube N°	**Sample Identity (DNA Nucleotides Per Oxaliplatin)**	**31**	**47**	**190 (0.01 %)**	**192 (0.79 %)**	**194 (32.90 %)**	**195 (33.80 %)**	**196 (25.30 %)**	**198 (7.20 %)**
B	Blank	107252	2110.49	3	102	4420.02	4566.40	3353.4	1555.09
D	Blank 2	67983.7	2513.89	2.667	63	2297.52	2316.52	1737.44	1166.38
14	Control	2359239	12263.3	3.333	95.667	3649.47	3850.85	2859.62	1408.07
31	Control 2	2101106	12260.0	4.667	26.333	1146.71	1148.38	908.029	861.359
15	100	1542164	9533.85	508.009	31386.4	1312733	1359279	1024617	299495
16	150 A	2194602	11802.2	514.009	30769.4	1297837	1351571	1017639	297289
17	150 B	2959018	17380.9	855.692	54970.3	2291061	2380699	1789691	521975
18	300 A	3177520	17691.9	301.337	17574.3	731998	757033	571301	166541
19	300 B	1980005	12038.4	214.002	13568.4	567899	586866	443894	129392
20	500	1678072	10311.1	126.334	7856.84	328901	341675	257117	76106.3
21	1 000	1908091	11248.5	73	4094.94	168747	174486	131285	39193.6
22	5 000	1446140	9734.65	18	888.361	36763.6	38216.1	28736.9	9019.85
23	10 000	1209165	8375.46	7	479.341	19606.8	20248.7	15458.7	5093.91
24	50 000	2255322	12808.0	8.667	220.335	9009.83	9224.99	6992.24	2702.28
25	100 000	1462898	9671.94	8	167.668	6868.99	7078.42	5311.33	2128.83
32	250 000 A	1708280	10537.2	4	67	2913.96	3028.32	2252.84	1283.06
33	250 000 B	2988778	16790.9	2.5	78	3505.43	3606.96	2645.25	1360.57
34	250 000 C	2060143	11775.5	3.333	80.667	3480.09	3561.44	2744.93	1349.73
26	500 000	2650945	15136.4	5.667	46.667	1926.46	1929.13	1489.74	1020.37

Table 122. Corrected Data Accrued Following Analysis of the DNA/Oxaliplatin Samples During Study 4.

		m/z Data (cps)							
Tube N°	**Sample Identity (DNA Nucleotides Per Oxaliplatin)**	**31**	**47**	**190 (0.01 %)**	**192 (0.79 %)**	**194 (32.90 %)**	**195 (33.80 %)**	**196 (25.30 %)**	**198 (7.20 %)**
B	Blank	112837	2220.40	3.156	107.312	4650.21	4804.21	3528.04	1636.08
D	Blank 2	71411.4	2640.64	2.801	66.176	2413.36	2433.32	1825.04	1225.19
14	Control	2673359	13896.1	3.777	108.405	4135.38	4363.57	3240.36	1595.55
31	Control 2	2443147	14255.8	5.427	30.620	1333.38	1335.33	1055.85	1001.58
15	100	1739610	10754.5	573.050	35404.9	1480804	1533310	1155800	337840
16	150 A	2213416	11903.4	518.416	31033.2	1308963	1363158	1026363	299838
17	150 B	3048962	17909.2	881.702	56641.2	2360702	2453064	1844092	537841
18	300 A	2819450	15698.2	267.380	15593.9	649510	671724	506922	147774
19	300 B	2161578	13142.4	233.627	14812.7	619977	640683	484600	141258
20	500	1496275	9194.03	112.647	7005.65	293269	304659	229262	67861.2
21	1 000	1665001	9815.45	63.700	3573.25	147249	152257	114559	34200.3
22	5 000	1545021	10400.3	19.231	949.104	39277.4	40829.2	30701.8	9636.59
23	10 000	1356326	9394.80	7.852	537.679	21993.0	22713.1	17340.1	5713.86
24	50 000	1778645	10100.9	6.835	173.766	7105.54	7275.23	5514.38	2131.14
25	100 000	1796069	11874.7	9.822	205.854	8433.38	8690.51	6520.97	2613.66
32	250 000 A	1673964	10325.5	3.920	65.654	2855.42	2967.49	2207.58	1257.29
33	250 000 B	2835653	15930.6	2.372	74.004	3325.83	3422.16	2509.72	1290.86
34	250 000 C	2520053	14404.3	4.077	98.675	4256.99	4356.50	3357.71	1651.05
26	500 000	2706427	15453.2	5.786	47.644	1966.78	1969.50	1520.92	1041.73

Table 123. Mean Data for a Series of Pt Standard Solutions Analysed with the DNA/Cisplatin Samples During Study 4.

	***m/z* Data (cps)**					
Pt Standard Conc^n (µg l^{-1})	**190 (0.01 %)**	**192 (0.79 %)**	**194 (32.90 %)**	**195 (33.80 %)**	**196 (25.30 %)**	**198 (7.20 %)**
0	0.333	4	108.334	130.667	108	838.358
0.5	3.333	93	3915.2	4048.57	3193.36	1774.78
1	5.667	261.336	11351.2	11648.1	8769.69	3417.08
2.5	6.333	440.674	18013	18281.4	13991.5	4938.85
5	12.667	538.01	21766.2	22267.7	16804.5	5805.51
7.5	13	850.359	34999.5	35631.8	27000.8	8767.36
10	32	1537.42	63480.5	65299	48776.5	15118.3
12.5	35.667	1589.76	65868.9	67261.4	50556.4	15894.9
15	36	2303.19	95320.1	98007.9	73952.4	22557.5
20	43.333	2726.93	114479	118095	88385.9	27193.5

Table 124. Mean Data for a Series of Pt Standard Solutions Analysed with the DNA/Oxaliplatin Samples During Study 4.

	***m/z* Data (cps)**					
Pt Standard Conc^n (µg l^{-1})	**190 (0.01 %)**	**192 (0.79 %)**	**194 (32.90 %)**	**195 (33.80 %)**	**196 (25.30 %)**	**198 (7.20 %)**
0	1	6	156.001	149.001	123.001	503.676
0.5	2.333	81	3503.76	3668.47	2809.28	1241.39
1	8.333	221.668	9832.72	10151.9	7669.39	2672.92
2.5	10	373.338	15362.6	15749.3	12047.1	3932.54
5	7.333	521.676	20466.3	21115.9	16129.1	5120.25
7.5	9.333	741.353	31178	31936.3	24125.7	7562
10	16.667	1263.39	50064.6	51710.1	38729.4	12017.1
12.5	24.667	1325.06	55393.2	57692.9	43476.7	13194.1
15	28.667	1654.76	69617.9	72251.6	54517.8	16481.2

Table 125. Sample Preparation Details for the Analysis of Cisplatin Study 4 Centrifuge Filter Leachates.

Vial Label	Sample Label (Number of DNA Nucleotides Per Cisplatin Molecule	Mass of Sample Tube (g)	Mass of Sample Tube + Filter Material (g)	Mass of Sample Tube + Filter Material + Deionised Water (g)	Mass of Leachate Solution (g)
A	Blank	1.0920	1.2062	2.2039	0.9977
1	Control	1.0627	1.1483	2.1498	1.0015
C	Blank 2	1.1086	1.3141	2.3152	1.0011
27	Control 2	1.0748	1.1790	2.1699	0.9909
E	Centrifuge Tube Blank	1.0775	1.2685	2.2609	0.9924
2	100	1.0747	1.2111	2.2192	1.0081
3	150 (A)	1.1093	1.2822	2.2814	0.9992
4	150 (B)	1.0616	1.2350	2.2400	1.0050
5	300 (A)	1.0745	1.2175	2.2136	0.9961
6	300 (B)	1.0900	1.2276	2.2468	1.0192
7	500	1.0744	1.2068	2.2050	0.9982
8	1 000	1.0773	1.2102	2.2065	0.9963
9	5 000	1.0901	1.2249	2.2207	0.9958
10	10 000	1.0623	1.2500	2.2514	1.0014
11	50 000	1.0925	1.2201	2.1991	0.9790
12	100 000	1.0620	1.2004	2.2096	1.0092
28	250 000 (A)	1.1107	1.2549	2.2535	0.9986
29	250 000 (B)	1.0533	1.2462	2.2442	0.9980
30	250 000 (C)	1.0767	1.2723	2.2745	1.0022
13	500 000	1.0621	1.1919	2.1899	0.9980

Table 126. Sample Preparation Details for the Analysis of Oxaliplatin Study 4 Centrifuge Filter Leachates.

Vial Label	Sample Label (Number of DNA Nucleotides Per Oxaliplatin Molecule	Mass of Sample Tube (g)	Mass of Sample Tube + Filter Material (g)	Mass of Sample Tube + Filter Material + Deionised Water (g)	Mass of Leachate Solution (g)
B	Blank	1.0907	1.2359	2.2342	0.9983
14	Control	1.0769	1.2661	2.2669	1.0008
D	Blank 2	1.1090	1.2957	2.2945	0.9988
31	Control 2	1.0923	1.2859	2.2894	1.0035
F	Centrifuge Tube Blank	1.0744	1.2444	2.2428	0.9984
15	100	1.0541	1.2451	2.2414	0.9963
16	150 (A)	1.0622	1.2218	2.2275	1.0057
17	150 (B)	1.0514	1.2303	2.2335	1.0032
18	300 (A)	1.0530	1.2368	2.2348	0.9980
19	300 (B)	1.0535	1.2280	2.2260	0.9980
20	500	1.0772	1.2534	2.2476	0.9942
21	1 000	1.0749	1.2442	2.2464	1.0022
22	5 000	1.0530	1.2319	2.2278	0.9959
23	10 000	1.1093	1.2948	2.2932	0.9984
24	50 000	1.1097	1.2727	2.2805	1.0078
25	100 000	1.1090	1.2738	2.2737	0.9999
32	250 000 (A)	1.0764	1.2686	2.2661	0.9975
33	250 000 (B)	1.1092	1.2872	2.2810	0.9938
34	250 000 (C)	1.0901	1.2876	2.2800	0.9924
26	500 000	1.0774	1.2310	2.2334	1.0024

Table 127. A Table of ICP-MS Instrument Parameters for the Analysis of DNA/Cisplatin and DNA/Oxaliplatin Centrifuge Filter Leachate Solutions, Via Measurement of the $^{190,192,194,195,196,198}Pt$ Isotopes, Employing Standard Conditions.

Instrument Parameter	Parameter Value
Analyser Pressure	8.20 x 10^{-7} mBar
Expansion Pressure	2.1 mBar
Nebuliser Pressure	2.31 Bar
Plasma Forward Power	1350 W
Plasma Reflected Power	2.6 W
Plasma Gas: Cool Flow	12.4 l min^{-1}
Plasma Gas: Auxilliary Flow	0.77 l min^{-1}
Plasma Gas: Nebuliser Flow	1.03 l min^{-1}
Torch Position: Sampling Depth	370
Torch Position: Vertical	-90
Torch Position: Horizontal	260
Extraction Lens Voltage	-719 V
D1 Lens Voltage	-28.3 V
L1 Lens Voltage	-13.3 V
L2 Lens Voltage	-160 V
L3 Lens Voltage	-184.4 V
Focus Lens Voltage	22.6 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	-1.97 V
Applied Hexapole Voltage: Collision Cell Mode	Not Applicable

Table 128. Mean Data for a Series of Pt Standard Solutions Analysed with Centrifuge Tube Leachate Solutions of the DNA/Cisplatin and DNA/Oxaliplatin Samples of Study 4.

	m/z Data (cps)					
Pt Standard Conc^n (µg l^{-1})	**190 (0.01 %)**	**192 (0.79 %)**	**194 (32.90 %)**	**195 (33.80 %)**	**196 (25.30 %)**	**198 (7.20 %)**
DI Water Blank	1.667	1	39.333	38	40.667	858.359
0.5	3.667	118	4634.42	4771.46	3675.14	1798.45
1	8.667	301.003	11762.5	12131.5	9161.27	3368.06
2.5	8.333	377.338	16811.9	17427.3	13303.5	4469.03
5	10.333	508.676	20720.4	21754.6	16302.6	5273.64
7.5	12.667	761.02	32577.8	33839.7	25560.8	8069.28
10	26.667	1286.73	52960.7	54423.2	41612.2	12866.8
12.5	23.333	1375.4	55903.2	58055.1	43878.6	13499.4
15	28	1727.77	72957.9	76455.1	57812.1	17434.6

Table 129. Mean Raw Data Accrued Following Analysis of the Centrifuge Filter Leachate Solutions of the DNA/Cisplatin Samples of Study 4.

		***m/z* Data (cps)**							
Tube N°	**Sample Identity (DNA Nucleotides Per Cisplatin)**	**31**	**47**	**190 (0.01 %)**	**192 (0.79 %)**	**194 (32.90 %)**	**195 (33.80 %)**	**196 (25.30 %)**	**198 (7.20 %)**
A	DI Water Blank	147617	3320.72	4.667	33.667	1381.75	1401.75	1097.05	1032.04
C	DI Water Blank 2	292391	4292.66	5	81.667	3395.4	3635.13	2696.92	1721.77
1	DNA Control	0 ↑	395881	4	30	1044.37	1092.04	827.691	1292.06
27	DNA Control 2	199471	183826	7	254.336	10345.3	10728.6	8061.06	3336.07
E	Centrifuge Tube Blank	1195598	7610.12	1.333	76.667	2874.63	2938.31	2247.52	1533.75
2	100	0 ↑	460944	30260.7	1968402	0 ↑	0 ↑	0 ↑	0 ↑
3	150 A	0 ↑	391887	16991.1	1087028	0 ↑	0 ↑	0 ↑	0 ↑
4	150 B	0 ↑	395149	23957.4	1545930	0 ↑	0 ↑	0 ↑	0 ↑
5	300 A	0 ↑	297931	10729.4	681371	0 ↑	0 ↑	0 ↑	0 ↑
6	300 B	16011.2	304072	12574.3	791416	17719.6	19246.5	16049	32843.9
7	500	168158	77367.3	2173.25	136309	124655	130030	100410	1274361
8	1 000	758044	59177.7	1171.07	73127.4	1589780	1642322	1253834	682591
9	5 000	861579	65757.1	918.374	56882.9	2377473	2454754	1848343	543964
10	10 000	182276	40442.7	120.001	7962.36	330400	342148	258913	76681.1
11	50 000	651396	10773.2	14.333	825.384	34249.5	35765.1	26680.1	8988.83
12	100 000	0 ↑	496962	49.333	3282.71	137609	143211	107730	34711.5
28	250 000 A	269807	442354	14.333	626.014	25943.2	27270.5	20552.1	7000.11
29	250 000 B	0 ↑	222254	19.667	823.357	34118.4	35399.1	26933.7	8909.44
30	250 000 C	0 ↑	220618	28	1288.73	52180.1	54415.4	40664.5	12992.2
13	500 000	0 ↑	242815	36.667	1551.75	63100.1	66192.3	49796.3	15722.3

↑ = Instrument Ion Counts Off Scale.

Table 130. Mean Raw Data Accrued Following Analysis of the Centrifuge Filter Leachate Solutions of the DNA/Oxaliplatin Samples of Study 4.

		m/z Data (cps)							
Tube N°	**Sample Identity (DNA Nucleotides Per Oxaliplatin)**	**31**	**47**	**190 (0.01 %)**	**192 (0.79 %)**	**194 (32.90 %)**	**195 (33.80 %)**	**196 (25.30 %)**	**198 (7.20 %)**
B	DI Water Blank	1043302	9406.44	17.333	467.008	18428.2	19316.4	14511.7	5029.22
D	DI Water Blank 2	1972408	13266.5	10.333	304.337	11979	12332	9376.74	3645.13
14	DNA Control	0 ↑	96475.2	5.667	330.672	13650.1	14037.6	10590.2	3770.41
31	DNA Control 2	235728	101896	22.667	1169.39	47801	49745.3	37552.6	11881.8
F	Centrifuge Tube Blank	365152	5265.98	4.333	108	4159.61	4265.64	3223.7	1745.11
15	100	0 ↑	154593	1390.73	87045.1	3615010	3745551	2809882	826338
16	150 A	0 ↑	98432.9	527.343	33226.3	1386709	1443720	1085168	317514
17	150 B	0 ↑	102140	851.692	52668.9	2161156	2245846	1694665	496126
18	300 A	0 ↑	225107	662.015	40711.6	1691122	1753061	1324531	386347
19	300 B	0 ↑	137596	744.353	46038.4	1917443	1986603	1493643	437483
20	500	0 ↑	100544	403.672	23496.6	978569	1011957	763037	224083
21	1 000	49512.7	39680.4	98.667	5998.14	248188	258510	193920	58692.9
22	5 000	113156	24521.6	12.667	799.035	33638	34774.7	26054.3	9026.05
23	10 000	0 ↑	196915	21	1101.04	44926.2	46492.2	35263.8	11386.2
24	50 000	0 ↑	169024	22	988.701	40891.2	42296.6	31919	10179
25	100 000	0 ↑	134423	4.333	160.334	6527.49	6835.97	5137.92	2528.56
32	250 000 A	192074	139687	43.667	2300.52	94991.6	98746.6	74605.1	22929.7
33	250 000 B	235938	194233	8.333	321.671	13467.9	13971.1	10572.7	4565.82
34	250 000 C	0 ↑	157457	13.667	439.007	19201.2	19655.2	15086	5622.11
26	500 000	0 ↑	201593	17.333	415.006	16565.9	17046.2	12762.4	5249.3

↑ = Instrument Ion Counts Off Scale.

Table 131. Recovered, Cisplatin Exposed, DNA UV Spectroscopy Data (Study 5).

Sample Identity (DNA Nucleotides Per Cisplatin)	Sample Replicate Number	UV Spectroscopy Data (260 nm)	UV Spectroscopy Data (260/280 nm)	DNA Conc^{n} (µg ml^{-1})	DNA Conc^{n} (mg ml^{-1})	Volume Per 1 mg of DNA (ml)	H_2O Adjustment Volume per ml (µl)
Control	1	0.700	1.424				
	2	0.647	1.421				
	3	0.678	1.425				
	Mean	**0.675**		**1350.0**	**1.3500**	**751.85**	**263.15**
100	1	0.665	1.435				
	2	0.633	1.425				
	3	0.667	1.436				
	Mean	**0.655**		**1310.0**	**1.3100**	**774.81**	**240.19**
500	1	0.675	1.442				
	2	0.650	1.424				
	3	0.754	1.434				
	Mean	**0.693**		**1386.0**	**1.3860**	**732.32**	**282.68**
1 000	1	0.682	1.425				
	2	0.714	1.420				
	3	0.721	1.426				
	Mean	**0.706**		**1411.3**	**1.4113**	**719.18**	**295.82**
5 000	1	0.710	1.440				
	2	0.700	1.432				
	3	0.695	1.436				
	Mean	**0.702**		**1403.3**	**1.4033**	**723.28**	**291.72**
10 000	1	0.706	1.433				
	2	0.694	1.420				
	3	0.681	1.436				
	Mean	**0.694**		**1387.3**	**1.3873**	**731.62**	**283.38**
50 000	1	0.721	1.431				
	2	0.730	1.432				
	3	0.675	1.412				
	Mean	**0.709**		**1417.3**	**1.4173**	**716.13**	**298.87**

Table 131. Recovered, Cisplatin Exposed, DNA UV Spectroscopy Data (Study 5) Continued…..

Sample Identity (DNA Nucleotides Per Cisplatin)	Sample Replicate Number	UV Spectroscopy Data (260 nm)	UV Spectroscopy Data (260/280 nm)	DNA Conc^n (µg ml^{-1})	DNA Conc^n (mg ml^{-1})	Volume Per 1 mg of DNA (ml)	H_2O Adjustment Volume per ml (µl)
100 000	1	0.832	1.441				
	2	0.782	1.432				
	3	0.600	1.413				
	Mean	**0.738**		**1476.0**	**1.4760**	**687.67**	**327.33**
250 000	1	0.754	1.446				
	2	0.827	1.464				
	3	0.776	1.451				
	Mean	**0.786**		**1571.3**	**1.5713**	**645.95**	**369.05**
500 000	1	0.767	1.412				
	2	0.778	1.419				
	3	0.811	1.419				
	Mean	**0.785**		**1570.7**	**1.5707**	**646.22**	**368.78**

Table 132. Recovered, Oxaliplatin Exposed, DNA UV Spectroscopy Data (Study 5).

Sample Identity (DNA Nucleotides Per Cisplatin)	Sample Replicate Number	UV Spectroscopy Data (260 nm)	UV Spectroscopy Data (260/280 nm)	DNA Conc^{n} (µg ml^{-1})	DNA Conc^{n} (mg ml^{-1})	Volume Per 1 mg of DNA (ml)	H_2O Adjustment Volume per ml (µl)
Control	1	0.815	1.485				
	2	0.758	1.439				
	3	0.815	1.434				
	Mean	**0.796**		**1592.0**	**1.5920**	**637.56**	**377.44**
100	1	0.793	1.433				
	2	0.783	1.453				
	3	0.789	1.477				
	Mean	**0.788**		**1576.7**	**1.5767**	**643.76**	**371.24**
500	1	0.727	1.430				
	2	0.799	1.437				
	3	0.796	1.436				
	Mean	**0.774**		**1548.0**	**1.5480**	**665.68**	**359.32**
1 000	1	0.760	1.437				
	2	0.798					
	3	0.832	1.444				
	Mean	**0.797**		**1593.3**	**1.5933**	**637.03**	**377.97**
5 000	1	0.807	1.428				
	2	0.804	1.420				
	3	0.819	1.426				
	Mean	**0.810**		**1620.0**	**1.6200**	**626.54**	**388.46**
10 000	1	0.743	1.439				
	2	0.738	1.441				
	3	0.756	1.429				
	Mean	**0.746**		**1491.3**	**1.4913**	**680.60**	**334.40**
50 000	1	0.785	1.430				
	2	0.742	1.429				
	3	0.828	1.446				
	Mean	**0.785**		**1570.0**	**1.5700**	**646.50**	**368.50**

Table 132. Recovered, Oxaliplatin Exposed, DNA UV Spectroscopy Data (Study 5) Continued…..

Sample Identity (DNA Nucleotides Per Cisplatin)	Sample Replicate Number	UV Spectroscopy Data (260 nm)	UV Spectroscopy Data (260/280 nm)	DNA Conc^n (μg ml^{-1})	DNA Conc^n (mg ml^{-1})	Volume Per 1 mg of DNA (ml)	H_2O Adjustment Volume per ml (μl)
100 000	1	0.917	1.461				
	2	0.817	1.440				
	3	0.855	1.432				
	Mean	**0.863**		**1726.0**	**1.7260**	**588.06**	**426.94**
250 000	1	0.702	1.449				
	2	0.630	1.442				
	3	0.862	1.457				
	Mean	**0.731**		**1462.7**	**1.4627**	**693.94**	**321.06**
500 000	1	0.786	1.438				
	2	0.817	1.439				
	3	0.632	1.419				
	Mean	**0.745**		**1490.0**	**1.4900**	**681.21**	**333.79**

Table 133. A Table of ICP-MS Instrument Parameters for the Analysis of DNA/Cisplatin and DNA/Oxaliplatin Interactions *In Vitro*, Via Measurement of the $^{190,192,194,195,196,198}Pt$ Isotopes, Employing Standard Conditions (Study 5).

Instrument Parameter	Parameter Value
Analyser Pressure	8.70 x 10^{-7} mBar
Expansion Pressure	2.3 mBar
Nebuliser Pressure	2.66 Bar
Plasma Forward Power	1350 W
Plasma Reflected Power	1.4 W
Plasma Gas: Cool Flow	12.4 l min^{-1}
Plasma Gas: Auxilliary Flow	0.69 l min^{-1}
Plasma Gas: Nebuliser Flow	1.13 l min^{-1}
Torch Position: Sampling Depth	352
Torch Position: Vertical	30
Torch Position: Horizontal	76
Extraction Lens Voltage	-750 V
D1 Lens Voltage	-29.1 V
L1 Lens Voltage	-11.8 V
L2 Lens Voltage	-163.1 V
L3 Lens Voltage	-187.8 V
Focus Lens Voltage	22.6 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	-1.97 V
Applied Hexapole Voltage: Collision Cell Mode	Not Applicable

Table 134. Mean Data for a Series of DNA Based Pt Standard Solutions Analysed with the Untreated DNA/Cisplatin and DNA/Oxaliplatin Samples During Study 5.

	***m/z* Data (cps)**					
Pt Standard Conc^{n} (ng l^{-1})	**190 (0.01 %)**	**192 (0.79 %)**	**194 (32.90 %)**	**195 (33.80 %)**	**196 (25.30 %)**	**198 (7.20 %)**
Control	0.667	13.667	564.345	536.677	425.34	819.023
100	1	82.667	3270.71	3310.72	2562.9	1468.08
250	2.333	148.668	6016.07	6182.14	4613.15	2086.49
500	8.333	367.005	15437	16007.3	12004.4	4276.31
1 000	28.333	1767.44	71744.6	74453.1	56269.1	16992.8
2 500	35.667	2225.84	92791.5	95766.3	71962.8	21718.9
7 500	125.334	7892.18	321736	333523	252586	74351.3
10 000	163.334	9742.34	395853	410973	309245	90401.4
50 000	1226.39	73814.3	3065493	3161461	2376897	685223

Table 135. Mean Raw Data Accrued Following Analysis of the Untreated DNA/Cisplatin Sample Solutions Analysed During Study 5.

	m/z Data (cps)							
Sample Identity (DNA Nucleotides Per Cisplatin)	**31**	**47**	**190 (0.01 %)**	**192 (0.79 %)**	**194 (32.90 %)**	**195 (33.80 %)**	**196 (25.30 %)**	**198 (7.20 %)**
Deionised Water Blank	60746.7	93.334	0.667	3.333	141.001	157.001	122.667	577.678
Control	0 ↑	94043.7	4.333	11	295.67	297.67	239.669	1115.71
500 000	0 ↑	138478	4.333	242.335	10975.2	11304.8	8579.24	3509.43
250 000	0 ↑	116288	5.333	406.672	17035.8	17787.4	13461	4980.54
100 000	0 ↑	108964	15	1103.38	44915.8	46091.9	34728.8	11118.7
50 000	0 ↑	98881.2	46.333	2225.17	91931.4	95442.2	72064.9	22225.3
10 000	0 ↑	108690	201.335	11883.3	488285	506702	379271	111554
5 000	0 ↑	94619.9	337.004	20641.7	864789	905806	680373	198486
1 000	1548976	30565.7	401.673	25527.7	1058457	1097030	827267	242680
500	2522442	9747.33	212.335	13011.3	543279	564077	423422	124586
100	2432841	9473.48	1026.04	63678.7	2685407	2788651	2100566	611678

Table 136. Mean Raw Data Accrued Following Analysis of the Untreated DNA/Oxaliplatin Sample Solutions Analysed During Study 5.

	m/z Data (cps)							
Sample Identity (DNA Nucleotides Per Oxaliplatin)	**31**	**47**	**190 (0.01 %)**	**192 (0.79 %)**	**194 (32.90 %)**	**195 (33.80 %)**	**196 (25.30 %)**	**198 (7.20 %)**
Deionised Water Blank	60746.7	93.334	0.667	3.333	141.001	157.001	122.667	577.678
Control	0 ↑	106368	1.333	5.333	270.003	290.336	197.668	1078.37
500 000	0 ↑	128328	1.333	64	2083.15	2160.83	1656.76	1490.41
250 000	0 ↑	110419	3	89.667	4335.33	4575.73	3391.74	2096.15
100 000	0 ↑	101259	2.667	178.334	7834.82	8213.03	6047.61	2865.62
50 000	0 ↑	111340	4.667	398.339	16262.9	16965.7	12749	4854.83
10 000	0 ↑	110933	25	1603.09	68308.6	70903.2	53733.9	16801.9
5 000	0 ↑	103201	47.333	2941.3	122725	127394	95779.5	28941
1 000	10914.8	69230.7	155.334	10411.2	427880	442770	330158	97195.6
500	0 ↑	143491	646.348	39799.4	1655373	1708544	1291805	375642
100	1927341	8049.93	91	5865.54	244942	254474	191171	56524.9

↑ = Instrument Ion Counts Off Scale.

Appendix 5

Additional Chapter

Chapter 7: The Analysis of Silver Isotopes in Impregnated Polymers by ICP-MS

7.1. Implantable Medical Devices

There are a large number of implantable devices, in use within modern medicine, that exhibit a wide range of applications. Each of these devices are either capable of providing some kind of medical benefit to a patient or are employed in the introduction of medications to the body or monitoring of parameters. Examples of such implantable devices include pacemakers (for stimulating the contraction of the heart), drains and nasogastric tubing (for the removal of excess fluids), urinary and central venous catheters, breast implants and joint replacements.[197-200] Some devices are kept in the body over extended periods of time whilst others are introduced only temporarily.[200]

Although these implantable devices exhibit great benefits they are all capable of causing problems. In basic terms the use of these devices involves the introduction of a foreign material to the body. Such an introduction can bring about issues of infection that can threaten health, therefore the type of material used in their production and their sterility are vital.[200-202] An implanted device can act as a site for the colonisation of micro-organisms or the formation of bio-films, it is this growth that can lead to infection. Although infection brought about by such a situation can be overcome, by removal of the device and treatment with antibiotics, it can be a serious problem for the patient. For example, typically produced from silicone rubber, a voice prosthesis can be introduced to the body for the purpose of voice rehabilitation.[203] However, the formation of a bio-film on the oesophageal side limits the use to three to four months meaning that the patient has to endure replacement prostheses.

Central venous catheters (CVC's) are among the most commonly used implantable devices, being used for the purpose of infusion therapies and hemodynamic monitoring, however a widely recognised complication of their use is sepsis.[198, 204] Therefore the time period over which CVC's can be used is limited. The recognition that serious complications arising from the use of CVC's must be reduced has led to the development of catheter materials coated or impregnated with antibiotic or antimicrobial agents.[198, 201, 205]

7.2. The Use of Silver Species as Anti-Microbial Agents

Certain silver (Ag) salts are known to exhibit the ability to prevent infection by destroying or limiting the growth of micro-organisms on foreign surfaces and on the skin. Free Ag ions are cytotoxic to bacteria (active via the displacement of essential metal ions such as Ca^{2+} or Zn^{+} or by binding to bacterial DNA), forming silver-protein complexes that concentrate in the cytoplasmic membrane.[206, 207] Silver nitrate solution is routinely instilled into the eyes of newborns to prevent gonococcal infections and silver sulfadiazine cream (1 %) is effective in the prevention of infection in severely burned patients.[208]

As mentioned in section 7.1, as a means of limiting the issue of infection following the insertion of a CVC into the body, catheter materials have been developed that are coated or impregnated with antimicrobial agents. The use of silver based agents for coating or impregnation are of particular interest. Previously silver alloy and chlorhexidine-silver sulfadiazine coated urinary catheters have been studied and proved as a successful approach to the reduction of catheter associated urinary tract infections.[207] Such a silver associated catheter material needs to provide a minimum Ag concentration of 0.5 $\mu g\ ml^{-1}$ to 10 $\mu g\ ml^{-1}$ to inhibit the growth of staphylococci.[207] Nanoparticulate silver based compounds have also been widely used as coatings on wound dressings and surgical masks in order to minimise the transmission of infectious agents.[209]

7.3. Aims of Research

Researchers of both the Biomaterials-Related Infection Group of the School of Medical and Surgical Sciences and the Polymer Group of the School of Mechanical, Materials and Manufacturing Engineering at the University of Nottingham investigated the merits of a polymer material, impregnated with nano-particulate silver, for the production of a urinary catheter. Currently there are some catheters in use based on polymers with a silver coating but such a coating is quickly removed in the body so any anti-microbial properties are short-lived. It is thought that a silver impregnated polymer may release silver into the surrounding media at a slower rate and over a longer period of time therefore having a greater benefit for a patient's health.

A leachate study was proposed on samples of this impregnated polymer whereby the low limits of detection exhibited by ICP-MS would be taken advantage of when analysing leachate media. Such a study would establish the validity of this polymer material as an alternative, or improvement, to those currently in use. The minimum staphylococci inhibition concentration, stated in section 7.2, was taken as a point of reference which would be used to establish whether or not a useful quantity of silver was being leached from the impregnated polymer.

7.4. The Study of Deionised Water and Human Serum Leachate Samples by ICP-MS

Experiments were carried out to establish the $^{107,109}Ag$ content of a series of deionised water and serum leachate samples following their exposure to the silver impregnated polymer material. ICP-MS was employed in the measurement of these isotopes under standard mode as the *m/z* = 107 and 109 ratios do not carry significant interference, analysis was therefore relatively simple. As mentioned in section

Experimental Details

For this experimentation the sample preparation and analysis was very straight-forward. Samples were prepared by researchers of the polymer group and additional deionised water and human serum media was provided for the preparation of control samples.

The leachate samples were prepared by researchers of the polymer group and were then transported to Loughborough University for further sample treatment and analysis for $^{107,109}Ag$ content. A sample of the impregnated polymer material (≈ 0.5 g), prepared using a tin catalyst and cut with a steel tool, was transferred to deionised water (5 ml) and another sample to human serum (5 ml). These samples were left in their respective media for three days before each polymer sample was transferred to fresh 5 ml aliquots of media for a fourth day and again for a fifth day (leaching commenced on 11/04/03). After transfer of the polymer samples from media to media the previous leachates were kept for ICP-MS analysis. At Loughborough University the leachate samples were then assessed prior to analysis for the requirement of any pre-analysis treatment, descriptions of such treatment are as follows.

The deionised water leachates were all clear solutions showing no sign of suspension or the presence of particulate or colloidal matter. Therefore, the only course of pre-analysis treatment applicable to them was a dilution process to bring them into a sensible concentration range compatible with standard solutions. Each deionised water leachate (100 µl), and a deionised water control, were diluted 1 000 fold with a 2 % HNO_3 matrix solution.

The human serum leachate samples appeared yellow in colour and contained a significant degree of particulate material. To avoid any nebulisation problems the particulate material was removed by centrifugation. Each of the serum leachates (1 ml), and a serum control, were centrifuged (2 500 RPM, 5 min), 100 µl of the resulting supernatant was removed and diluted 1 000 fold with a 2 % HNO_3 matrix solution.

The instrument used in the study of these samples was as described previously in this thesis as was the standard nebuliser and spray chamber sample introduction apparatus. Due to the lack of spectroscopic interference at *m/z* = 107 and 109 the leachate samples were analysed by ICP-MS under standard mode for the presence of $^{107,109}Ag$ isotopes, i.e. without the use of specific conditions such as collision cell or cold plasma. External standards of Ag were prepared from a 1 000 µg ml^{-1} single element standard solution (Fisher Scientific, Loughborough, UK) by sequential dilution with high purity deionised water produced using a Maxima Ultra (Elga) water purification system. Measurements were conducted in a standard laboratory and, prior to analysis, the ICP-MS instrument was optimised to produce standard operating conditions, see Table 137.

Table 137. A Table of ICP-MS Instrument Parameters for the Analysis of Deionised Water and Human Serum Leachate Solutions, Via Measurement of $^{107,109}Ag$ Isotopes Employing Standard Conditions.

Instrument Parameter	Parameter Value
Analyser Pressure	8.70 x 10^{-7} mBar
Expansion Pressure	2.3 mBar
Nebuliser Pressure	2.67 Bar
Plasma Forward Power	1350 W
Plasma Reflected Power	1.6 W
Plasma Gas: Cool Flow	12 l min^{-1}
Plasma Gas: Auxilliary Flow	0.7 l min^{-1}
Plasma Gas: Nebuliser Flow	1.13 l min^{-1}
Torch Position: Sampling Depth	352
Torch Position: Vertical	30
Torch Position: Horizontal	76
Extraction Lens Voltage	-750 V
D1 Lens Voltage	-29.1 V
L1 Lens Voltage	-11.8 V
L2 Lens Voltage	-163 V
L3 Lens Voltage	-187.8 V
Focus Lens Voltage	22.6 V
Applied Quadrupole Voltage	+1 V
Applied Hexapole Voltage: Standard Mode	-1.97 V
Applied Hexapole Voltage: Collision Cell Mode	Not Applicable

When the optimum ICP-MS conditions were established the prepared samples, and a series of Ag standard solutions for external calibration, were measured for $^{107,109}Ag$ isotope content. Data for the $^{107,109}Ag$ isotopes was collected by the Thermo Plasmalab software and, again, three replicate readings were taken for each isotope measurement allowing mean, standard deviation and relative standard deviation data to be established.

Results and Discussion

The mean data generated during the ICP-MS analysis of the samples and standards are in Table 138. From these data a calibration curve was constructed, see Figure 142, and following this the ^{107,109}Ag content of each leachate sample was established via the curve equation and considering the 1000 fold dilution, see Table 139.

Table 138. Mean Data Generated Following the ICP-MS Analysis of Leachate Samples and Ag Standards.

Sample Identity	*m/z* = 107 Signal (cps)	*m/z* = 109 Signal (cps)
2 % HNO_3 Blank	1570	1516
0.1 µg l^{-1} Ag Standard	3451	3378
0.25 µg l^{-1} Ag Standard	5400	5272
0.5 µg l^{-1} Ag Standard	10495	10292
0.75 µg l^{-1} Ag Standard	15227	14933
1.0 µg l^{-1} Ag Standard	20669	20174
2.5 µg l^{-1} Ag Standard	50326	49290
5.0 µg l^{-1} Ag Standard	101422	99349
7.5 µg l^{-1} Ag Standard	151580	147981
10 µg l^{-1} Ag Standard	211297	206387
Deionised Water Control	1482	1424
Deionised Water 3 Day Leachate	3705	3617
Deionised Water 4 Day Leachate	1142	1132
Deionised Water 5 Day Leachate	810	823
Human Serum Control	616	589
Human Serum 3 Day Leachate	83854	82034
Human Serum 4 Day Leachate	15924	15512
Human Serum 5 Day Leachate	9880	9600

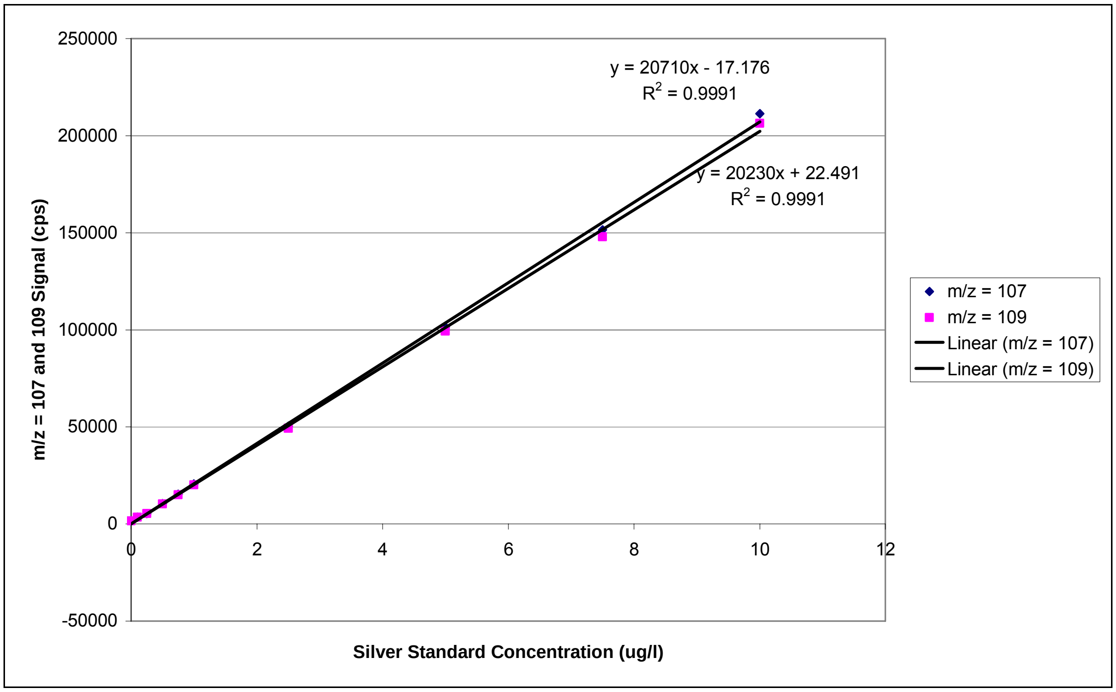

Figure 142. An External Calibration Graph Comparing Ag Standard Concentration (µg l^{-1}) with *m/z* = 107 and 109 Signal (cps) for a Series of Ag Calibration Standards.

Table 139. Silver Content of Each Leachate Sample, Calculated Via External Calibration.

Sample Identity	**Ag Concentration (^{107}Ag), µg ml^{-1}**	**Ag Concentration (^{109}Ag), µg ml^{-1}**
Deionised Water Control	0.07	0.07
Deionised Water 3 Day Leachate	0.18	0.18
Deionised Water 4 Day Leachate	0.06	0.05
Deionised Water 5 Day Leachate	0.04	0.04
Human Serum Control	0.03	0.03
Human Serum 3 Day Leachate	4.05	4.05
Human Serum 4 Day Leachate	0.77	0.77
Human Serum 5 Day Leachate	0.48	0.47

Following calculation of the Ag content of each leachate sample from the data generated by ICP-MS analysis, see Table 139, it is evident that there is a significant difference in the degree of leaching between the two media. Very little silver appears to leach into the deionised water at any point over the five day period, in fact little more is observed in the leachates compared to the control for this particular medium. This is a very different situation to that observed in the human serum leachates. Far more silver is transferred into the human serum, high $\mu g\ l^{-1}$ to low $\mu g\ ml^{-1}$ levels compared to low $\mu g\ l^{-1}$ levels for the deionised water.

The reason for this vast difference in leaching between the two media is likely to be due to the chloride concentration of the human serum. Ag^{+} ions may have leached from the polymer to be precipitated by chloride ions and form AgCl in the human serum.[207] The deionised water medium would not exhibit such a chloride concentration so the impregnated silver would remain within the polymer structure.

As can be seen in the human serum leaching data the concentration of silver leached into the surrounding medium was of the high $\mu g\ l^{-1}$ to low $\mu g\ ml^{-1}$ levels. This is the desired degree of leaching from the silver impregnated polymer that would inhibit staphylococci growth. A greater concentration of silver was observed in the human serum day three sample (4.05 $\mu g\ ml^{-1}$) than in the day four and five samples (0.77 $\mu g\ ml^{-1}$ and 0.48 $\mu g\ ml^{-1}$ respectively) but such a significant difference was due to a poor experimental design. If this leachate experiment was to be repeated then a greater number of samples would have been prepared over a greater period of time. Leachate samples would be taken in the same way as described previously but they would be taken after every 12 h or 24 h period until the silver was exhausted. Such an experimental approach would provide the analyst with far more data that would establish the rate of leaching, leaching consistency and a finite time period over which leaching took place.

Conclusions

As was shown by the data of Table 139, the transfer of silver from the impregnated polymer to surrounding leachate medium was far more successful in human serum than in deionised water. Such transfer into serum was desirable as it was comparable to the environment of a catheter, made of such a material, in the human body and provided sufficient quantities of silver that could inhibit staphylococci growth.

This leachate analysis has shown that the impregnated polymer material produced by the Polymer Group, of the School of Mechanical, Materials and Manufacturing Engineering at the University of Nottingham, exhibits the potential for manufacturing a catheter (or other implantable medical device) that could be kept in the body for extended periods of time whilst limiting, or avoiding, infection. However, further work is required to establish the finite time period over which this leaching is beneficial.

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