TO DETERMINE MASS SUSCEPTIBILITY OF SLAG SAMPLES FROM BOTCHERGATE

Calibration samples	Mass g	Bridge reading	Total susceptibility $k_T \times 10^{-8}$ m^3	Mass susceptibility $\chi \times 10^{-8}$ m^3 kg^{-1}
Manganese sulphate	50.00	61.3	4.06	81.2
High alumina cement	50.00	548	35.80	716
Test samples				
100A	13.18	0.5	0.03	3
100B	14.55	1.1	0.07	5
100C	28.29	1185	77.34	2734
103A	13.61	1365	89.08	6545
103B	9.06	1218	79.49	8774
103C	6.18	570	37.23	6025
128A	92.53	650	42.45	459
128B	38.72	9.1	0.60	16
128C	37.14	40.8	2.70	73
128D	19.08	5.7	0.38	20
148A	43.16	436	28.50	660
148B	16.71	39.9	2.64	158
151A	66.07	13.4	0.89	13
151B	5.90	0.6	0.04	7
151C	14.68	520	33.97	2314
155A	18.05	9.2	0.61	34
155B	12.55	2.1	0.14	11
155C	14.25	3.0	0.20	14
159A	23.61	7.2	0.48	20
159B	23.75	86	5.67	239
160	15.20	52.1	3.45	227
163A	25.64	7.2	0.48	19
163B	20.52	5.6	0.37	18
163C	22.35	90	5.93	265
163D	21.07	31.0	2.05	97
163E	19.44	1.5	0.10	5
183A	43.93	353	23.08	525
183B	31.21	1065	69.52	2227
183C	21.26	100	6.58	310
184A	6.83	1.4	0.09	14
184B	37.05	563	36.78	993
220	100.08			
232	5.42	124	8.15	1503
267A	25.82	144	9.45	366
267B	14.01	47.4	3.14	224
267C	11.18	251	16.43	1470
267D	20.62	256	16.76	813
267E	16.87	1050	68.54	4063
336	37.46	6.7	0.44	12
337A	34.46	9.5	0.63	18
337B	29.14	4.0	0.26	9
337C	25.15	6.0	0.40	16
267/2023A	66.00	710	46.36	702
267/2023B	68.00	674	44.02	647
335/2025A	74.00	167	10.95	148
335/2025B	82.00	124	8.15	99

Mean		) All	954
Median		) samples	158
Standard Deviation	+/-	)	1895
Mean		) Group P	1570
Median		) Iron working	310
Standard Deviation	+/-	) slags	2505
Mean		) Group Q	36
Median		) Lead working	18
Standard Deviation	+/-	) slags	57
Mean		) Group R	235
Median		) Lead	235
Standard Deviation	+/-	)	316
Mean		) Group S	2126
Median		) Slag/furnace	1503
Standard Deviation	+/-	) lining	1712
Mean		) Group T	399
Median		) Heavy fraction	398
Standard Deviation	+/-	)	320

Chart data

Total sus.	Meter	Total sus.	Meter
0	0		
4.06	61.3	4.06	61.3
		35.80	548

Slope & constant values as calculated by data trendline:

m	c	x	y
0.0662	0	61.3	4.0581
0.0652	0.0623	61.3	4.0591
0.0652	0.0623	548	35.7919

Slope & constant values as calculated from raw data:

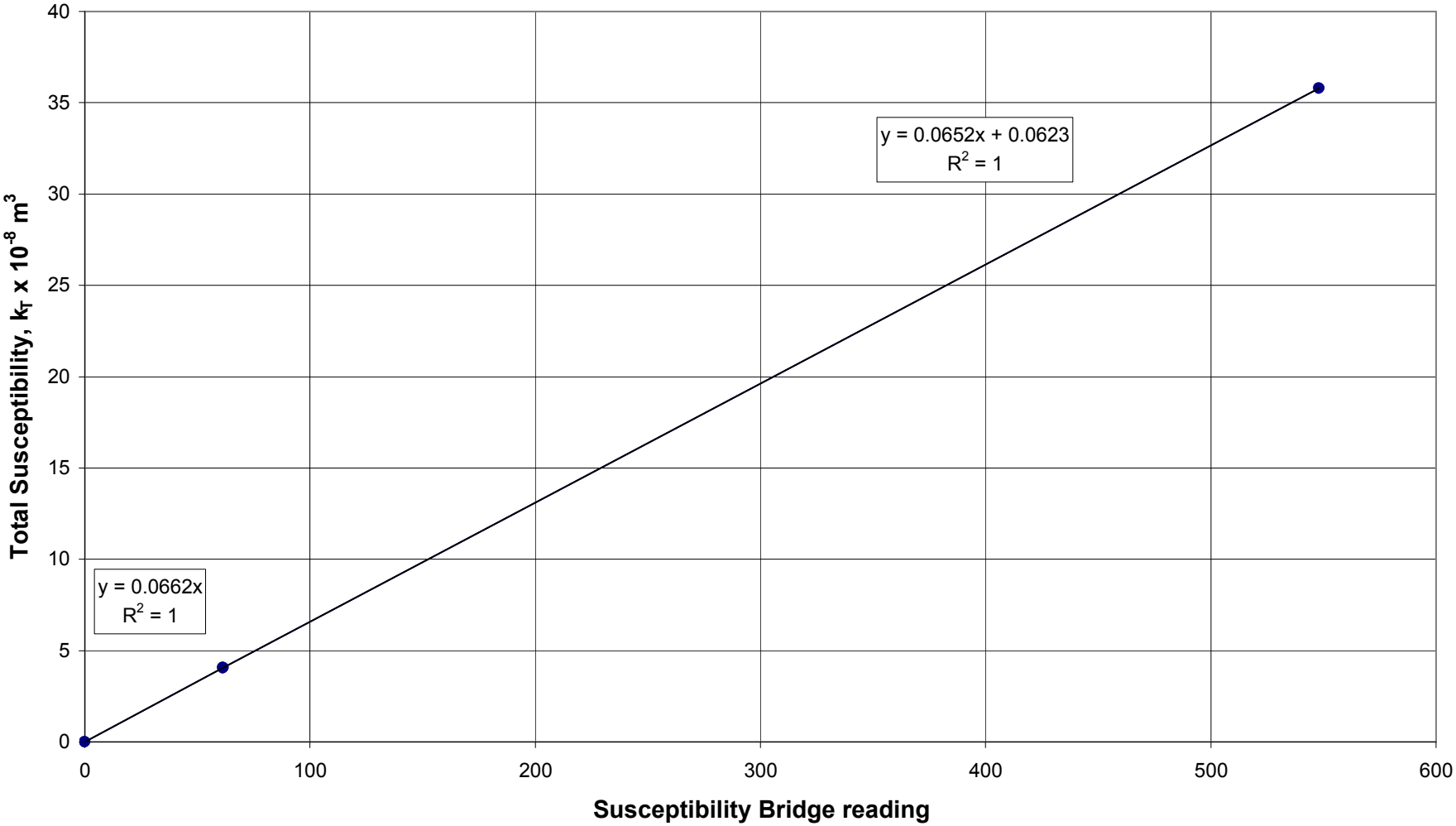
m	c	x	y
0.06623	0	61.3	4.06
0.06521	0.0623382	61.3	4.06
0.06521	0.0623382	548	35.80

Above slope & constant values used in formula to calculate total susceptibility from the corresponding meter reading.

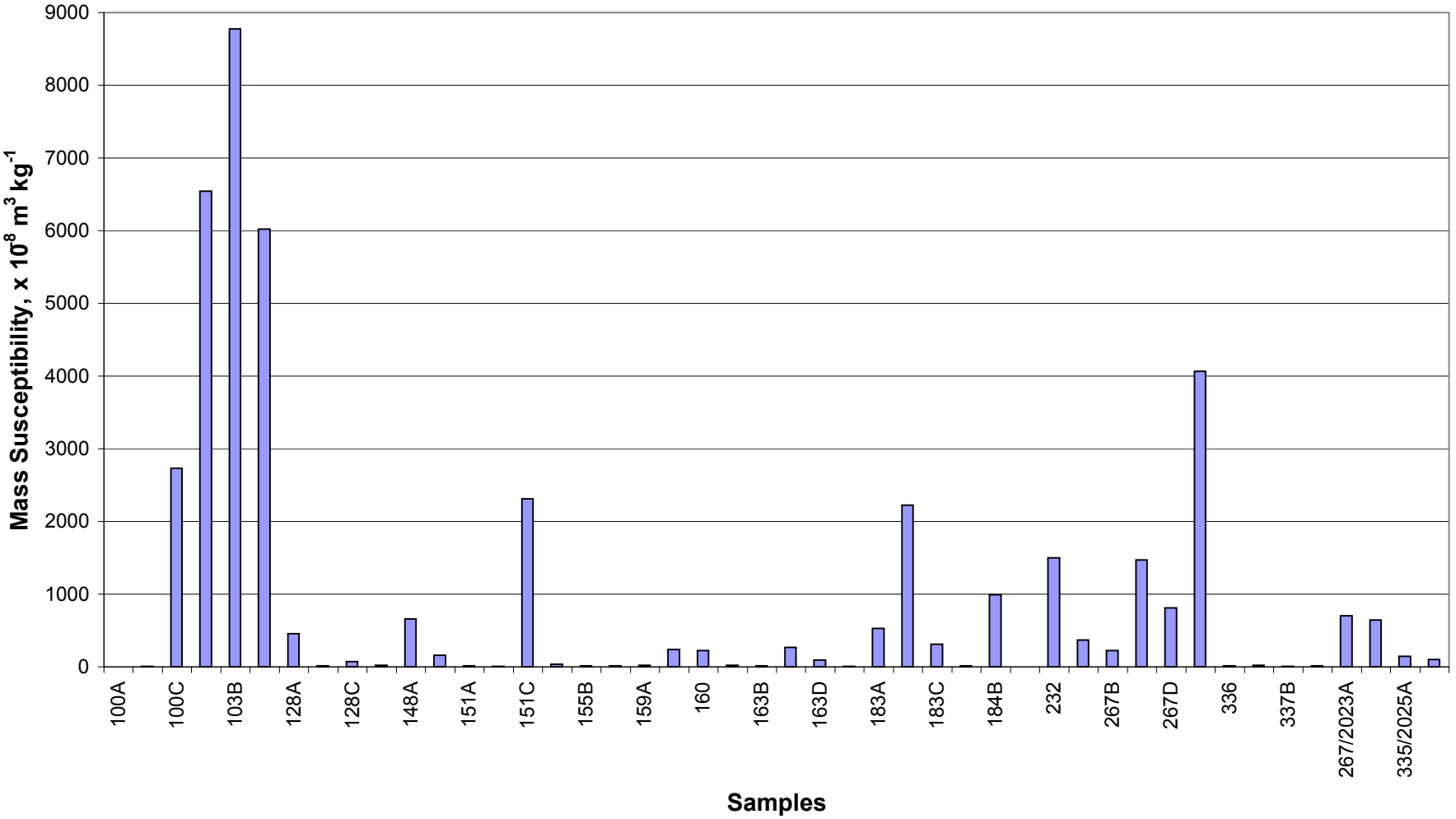
Test sampl	Type	Group
100A	P	Cinder
100B	P	Cinder
100C	P	Grey slag
103A	P	Black slag
103B	P	Black slag
103C	P	Black slag
128A	R	Lead
128B	Q	Black slag
128C	Q	Black slag
128D	Q	Black slag
148A	P	Grey slag
148B	P	Grey slag
151A	Q	Black slag
151B	Q	Black slag
151C	P	Grey slag
155A	Q	Black slag
155B	Q	Black slag
155C	P	Grey slag
159A	Q	Black slag
159B	P	Grey slag
160	Q	Black slag
163A	Q	Black slag
163B	Q	Black slag
163C	P	Grey slag
163D	P	Grey slag
163E	P	Grey slag
183A	P	Grey slag
183B	P	Grey slag
183C	P	Grey slag
184A	P	Cinder
184B	P	Grey slag
220	R	Lead
232	S	Furnace lining
267A	P	Grey slag
267B	P	Grey slag
267C	P	Grey slag
267D	S	Slag/furnace lining
267E	S	Slag/furnace lining
336	R	Lead
337A	Q	Black slag
337B	Q	Black slag
337C	Q	Black slag
267/2023A	T	Heavy fraction/lead slag
267/2023B	T	Heavy fraction/lead slag
335/2025A	T	Heavy fraction
335/2025B	T	Heavy fraction

Group	Test samples	
P	100A	3
Iron working slags:	100B	5
cinder	163E	5
"grey" slag	155C	14
"black" slag, high	184A	14
mag. sus.	163D	97
	148B	158
	267B	224
	159B	239
	163C	265
	183C	310
	267A	366
	183A	525
	148A	660
	184B	993
	267C	1470
	183B	2227
	151C	2314
	100C	2734
	103C	6025
	103A	6545
	103B	8774
Q	151B	7
Lead working slags	337B	9
"black" slag, low	155B	11
mag.sus.	151A	13
	128B	16
	337C	16
	163B	18
	337A	18
	163A	19
	128D	20
	159A	20
	155A	34
	128C	73
	160	227
R	336	12
Lead	128A	459
	220	
S	267D	813
Slag/furnace lining	232	1503
	267E	4063
T	335/2025B	99
Heavy fraction	335/2025A	148
	267/2023B	647
	267/2023A	702

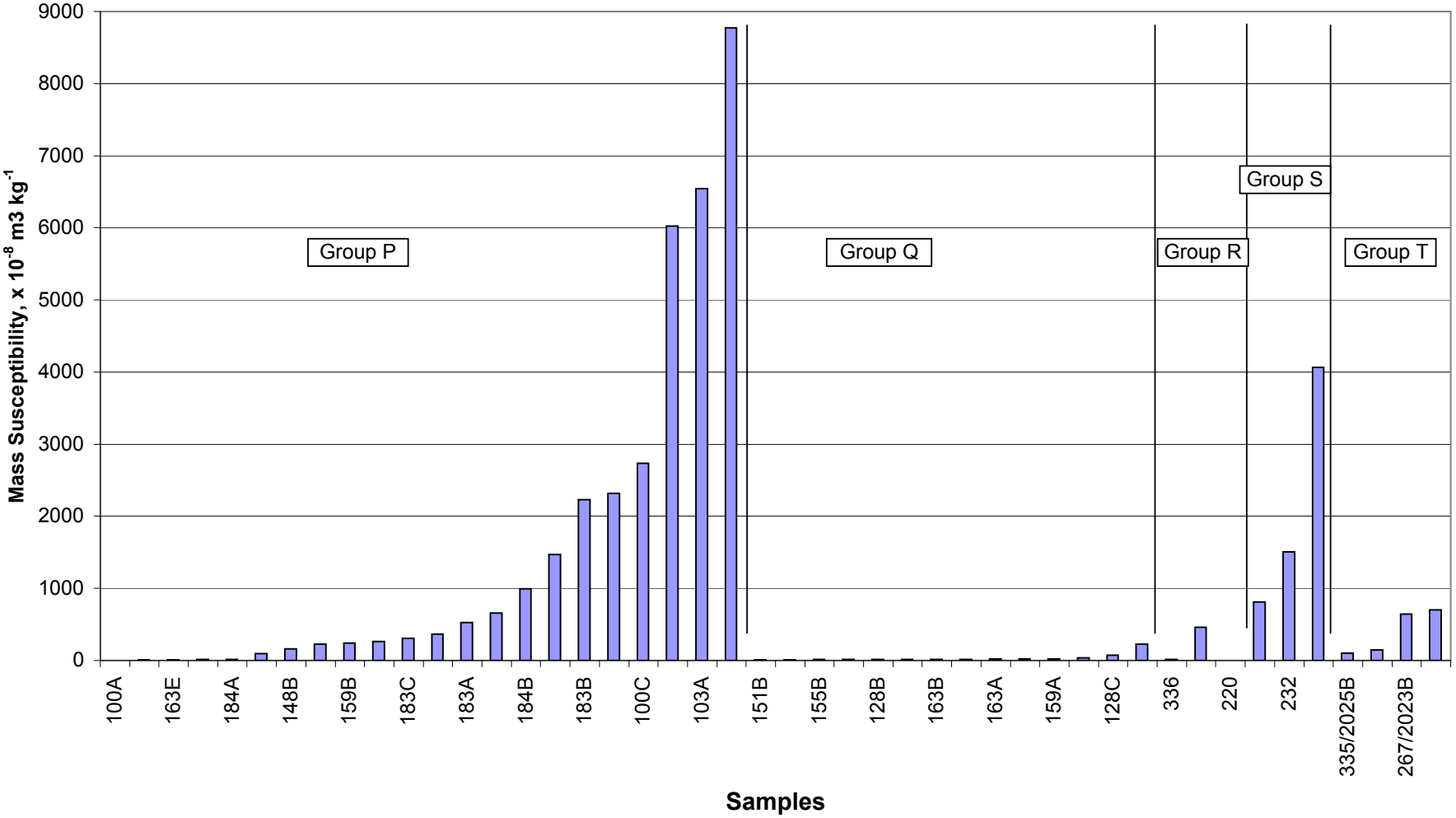
BOTCHERGATE SLAG SAMPLES SUSCEPTIBILITY CALIBRATION CURVE



BOTCHERGATE SLAG SAMPLES MASS SUSCEPTIBILITY



BOTCHERGATE SLAG SAMPLES GROUP MASS SUSCEPTIBILITY



TO DETERMINE MASS QUADRATURE SUSCEPTIBILITY AND MAGNETIC VISCOSIT
OF SLAG SAMPLES FROM BOTCHERGATE SITE

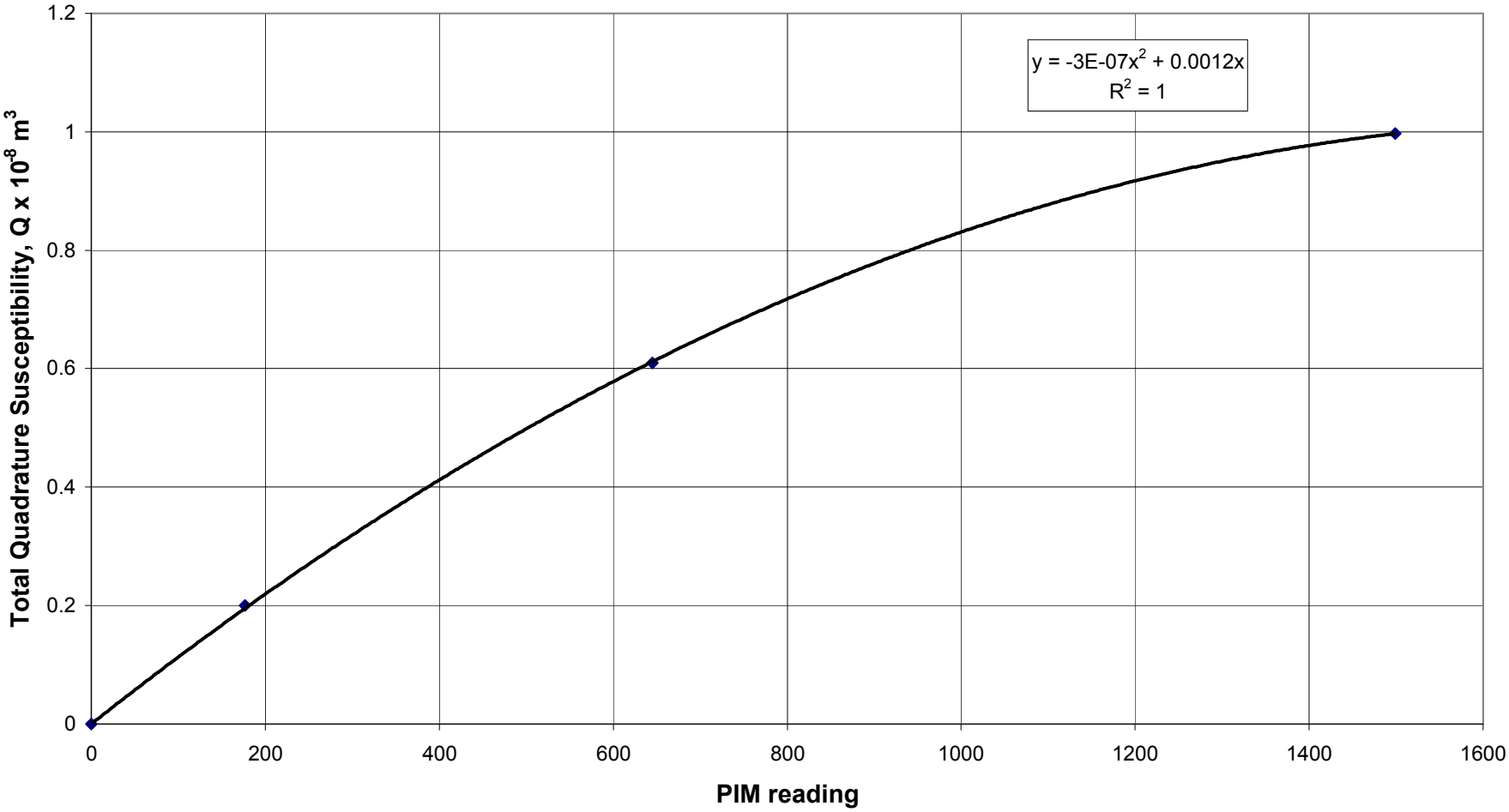
Calibration samples	Mass g	PIM reading	Total quad. sus. Q x 10^{-8} m^3	Mass quad. sus. q x 10^{-8} m^3 kg^{-1}	Magnetic viscosity %
High alumina cement	50.00	177	0.20	4.0	
BS87	50.00	645	0.61	12.2	
BS62	38.20	1499	1.00	26.1	
Test samples					
100A	13.18	3	0.00	0	10.9
100B	14.55	5	0.01	0	8.2
100C	28.29	82	0.10	3	0.1
103A	13.61	900	0.84	61	0.9
103B	9.06	533	0.55	61	0.7
103C	6.18	323	0.36	58	1.0
128A	92.53				
128B	38.72	6	0.01	0	1.2
128C	37.14	185	0.21	6	7.8
128D	19.08	4	0.00	0	1.3
148A	43.16	760	0.74	17	2.6
148B	16.71	79	0.09	6	3.5
151A	66.07	8	0.01	0	1.1
151B	5.90	2	0.00	0	6.0
151C	14.68	141	0.16	11	0.5
155A	18.05	4	0.00	0	0.8
155B	12.55	2	0.00	0	1.7
155C	14.25	7	0.01	1	4.2
159A	23.61	2	0.00	0	0.5
159B	23.75	38	0.05	2	0.8
160	15.20	27	0.03	2	0.9
163A	25.64	3	0.00	0	0.8
163B	20.52	4	0.00	0	1.3
163C	22.35	528	0.55	25	9.3
163D	21.07	188	0.21	10	10.5
163E	19.44	2	0.00	0	2.4
183A	43.93	66	0.08	2	0.3
183B	31.21	83	0.10	3	0.1
183C	21.26	26	0.03	1	0.5
184A	6.83	5	0.01	1	6.5
184B	37.05	614	0.62	17	1.7
220	100.08				
232	5.42	580	0.60	110	7.3
267A	25.82	320	0.35	14	3.7
267B	14.01	35	0.04	3	1.3
267C	11.18	120	0.14	12	0.9
267D	20.62	508	0.53	26	3.2
267E	16.87	490	0.52	31	0.8
336	37.46				
337A	34.46	4	0.00	0	0.8
337B	29.14	1	0.00	0	0.5
337C	25.15	3	0.00	0	0.9
267/2023A	66.00	339	0.37	6	0.8
267/2023B	68.00	438	0.47	7	1.1
335/2025A	74.00	206	0.23	3	2.1
335/2025B	82.00	203	0.23	3	2.8
Mean)				12	2.3
Median)				2	1.1
Standard Deviation +/-)				22	2.5

Test samples	Type	Group	Group	Test samples		
100A	P	Cinder	P	163E	0	2.4
100B	P	Cinder	Iron working	100A	0	10.9
100C	P	Grey slag	slags:	100B	0	8.2
103A	P	Black slag	cinder	155C	1	4.2
103B	P	Black slag	"grey" slag	184A	1	6.5
103C	P	Black slag	"black" slag	183C	1	0.5
128A	R	Lead	(high mag. sus.)	183A	2	0.3
128B	Q	Black slag		159B	2	0.8
128C	Q	Black slag		267B	3	1.3
128D	Q	Black slag		183B	3	0.1
148A	P	Grey slag		100C	3	0.1
148B	P	Grey slag		148B	6	3.5
151A	Q	Black slag		163D	10	10.5
151B	Q	Black slag		151C	11	0.5
151C	P	Grey slag		267C	12	0.9
155A	Q	Black slag		267A	14	3.7
155B	Q	Black slag		184B	17	1.7
155C	P	Grey slag		148A	17	2.6
159A	Q	Black slag		163C	25	9.3
159B	P	Grey slag		103C	58	1.0
160	Q	Black slag		103B	61	0.7
163A	Q	Black slag		103A	61	0.9
163B	Q	Black slag	Q	337B	0	0.5
163C	P	Grey slag	Lead working sl	159A	0	0.5
163D	P	Grey slag	"black" slag, low	337A	0	0.8
163E	P	Grey slag	mag.sus.	163A	0	0.8
183A	P	Grey slag		337C	0	0.9
183B	P	Grey slag		151A	0	1.1
183C	P	Grey slag		128B	0	1.2
184A	P	Cinder		155B	0	1.7
184B	P	Grey slag		163B	0	1.3
220	R	Lead		128D	0	1.3
232	S	Furnace lining		155A	0	0.8
267A	P	Grey slag		151B	0	6.0
267B	P	Grey slag		160	2	0.9
267C	P	Grey slag		128C	6	7.8
267D	S	Slag/furna	R	128A		
267E	S	Slag/furna	Lead	220		
336	R	Lead		336		
337A	Q	Black slag	S	267D	26	3.2
337B	Q	Black slag	Slag/furnace lini	267E	31	0.8
337C	Q	Black slag		232	110	7.3
267/2023A	T	Heavy fra	T	335/2025B	3	2.8
267/2023B	T	Heavy fra	Heavy fraction	335/2025A	3	2.1
335/2025A	T	Heavy fraction		267/2023A	6	0.8
335/2025B	T	Heavy fraction		267/2023B	7	1.1

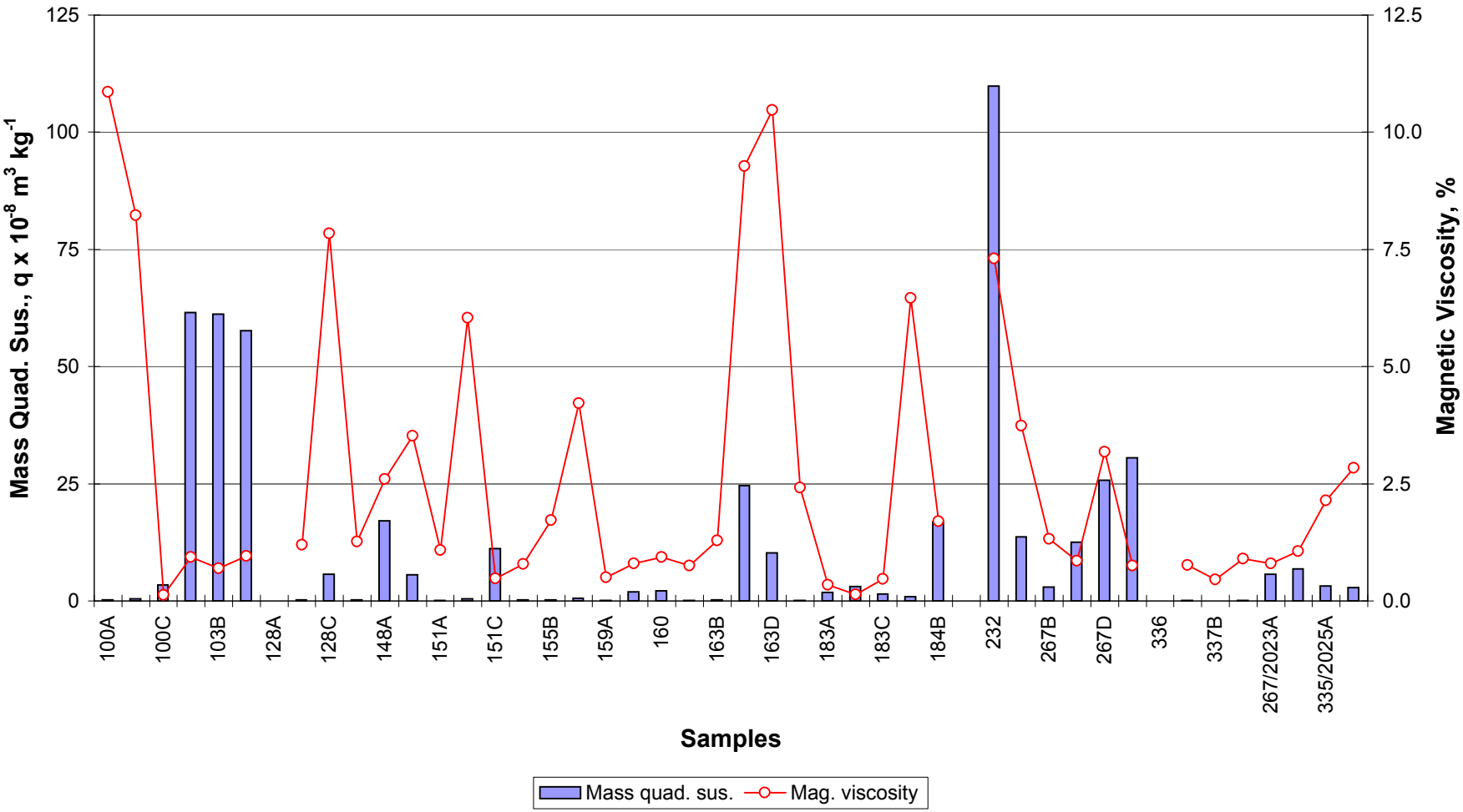
Chart data

Total quad.	PIM
0	0
0.20	177
0.61	645
1.00	1499

BOTCHERGATE SLAG SAMPLES QUADRATURE SUSCEPTIBILITY CALIBRATION CURVE



BOTCHERGATE SLAG SAMPLES MASS QUADRATURE SUSCEPTIBILITY & MAGNETIC VISCOSITY



BOTCHERGATE SLAG SAMPLES GROUP MASS QUADRATURE SUSCEPTIBILITY & MAGNETIC VISCOSITY