SR Allen, RS Fiske, Y Tamura Sumisu methods

FTIR water contents from melt inclusions

Quartz-hosted melt inclusions were analyzed for H_2O and CO_2 by Fourier Transform Infrared Spectroscopy (FTIR) at the University of Oregon using a Thermo Nicolet Nexus 670 spectrometer interfaced with a Continuum IR microscope. Melt inclusions were colorless glass that contained no bubbles. Sizes ranged from 50-120 µm. Sample preparation techniques for doubly intersected inclusions and analytical conditions for FTIR analysis are described in detail by Wallace et al. (1999). The infrared beam was directed through an adjustable aperture and manually focused on the melt inclusion. Band assignments for water and carbon dioxide dissolved in rhyolitic glass are taken from Newman et al. (1986) and Newman et al. (1988) respectively. Water is present as molecular H_2O at 5,200 cm-1 and 1,630 cm-1, as OH- at 4,500 cm-1, and as total H_2O at 3,550 cm-1. Molecular CO_2 is present at 2,350 cm-1. A reference spectrum was obtained for quartz and melt inclusions that showed interference from the quartz host were eliminated as were spectrum with weak peak heights. Peak heights were measured using Omnic software. Concentrations of H_2O and CO_2 were calculated using Beer's law: $c = MA/\delta\rho\varepsilon$, where M is the molecular weight of H_2O or CO_2, A is the absorbance of the band of interest, δ is the room temperature density of rhyolitic glass, ρ is the thickness of the melt inclusion and ε is the molar absorption coefficient. Glass densities and absorption coefficients for hydroxyl and molecular H2O were calculated following the method of Zhang et al., (1997). Melt inclusion thicknesses were measured using both an optical technique (Wallace et al., 1999) and using interference fringes in IR reflectance spectra (Wysoczanski and Tani, 2006).

Vesicularity

Vesicularity was determined by two methods: (1) water displacement, and (2) helium pcynometer. The water displacement method involved determining the volume displaced of fully water saturated (samples from the sea floor had never been in contact with air) cut pumice pieces and then measuring their air-filled weights after drying for 48 hours at 100^{o}C. For the Helium pycnometer large samples were cored to 2.5 cm diameter and approximately 2.5 cm length whereas smaller samples were cubed; exact dimensions were measured using vernier calipers. Most samples are anisotropic and were cored both parallel and perpendicular to the direction of vesicle elongation. Samples were cleaned in an ultrasonic bath, dried and cooled to room temperature. Connected porosity was measured on a Micromeritics helium pycnometer at the University of Oregon (e.g., Klug and Cashman, 1996). The total He non-accessible volume was determined using the pycnometer. This volume includes isolated pores. Solid densities were determined for powders of three separate samples, one from each volcano. The solid density together with the core volume was used to calculate the bulk vesicularities of all other samples. The difference between the He-pycnometry vesicularity and the bulk vesicularity is a measure of the volume percentage of isolated (He-inaccessible) vesicles.

Permeability

The 2.5 cm-diameter cores first analysed by the pycnometer were measured for permeability using a Porous Materials top–down capillary flow porometer at the

University of Oregon. At least two measurements were made per sample following the method of Wright et al. (2009). Permeability is determined by successively increasing the flow rate through sample cores and recording the differential pressure across the sample at each increment. Data are then fit to the Forchheimer's equation (a modification of Darcy's Law), which accounts for the compressibility of air flowing through the sample and can be used to determine Darcian permeability, k_1, and inertial permeability, k_2:

$$\frac{P_i^2 - P_o^2}{2PL_c} = \frac{\mu}{k_1}\nu_s + \frac{\rho}{k_2}\nu_s^2 .$$

Here P_i and P_o are pressure at the inlet and outlet of the sample respectively, L_c is the length of porous media along flow axis (core length), μ is air viscosity, ρ is air density, ν_s is superficial velocity, and P is fluid pressure with $P=P_o$ so that μ and ρ correspond to values at atmospheric pressure.

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SR Allen, RS Fiske, Y Tamura Sumisu sample location data

Dome A1

sample No.	latitude(N)	longitude(E)	depth (m)	rock type	size X (cm)	size Y (cm)	size Z (cm)	weight					
H339-R01	31°31.957'	139°49.789'	653	pumice	20	19	18	2.5kg	ves	por			
H339-R02	31°32.007'	139°49.851'	598	pumice	22	20	12	2.8kg	ves	por			
H339-R03	31°32.007'	139°49.851'	598	pumice	70	50	22	30kg	ves	por			
H339-R04	31°32.217'	139°50.029'	434	pumice	13	12	8	600g	ves	por	FTIR	XRF	EMP
H339-R05	31°32.249'	139°50.086'	400	pumice	23	18	10	1.9kg	ves	por			
H339-R08	31°32.345'	139°50.211'	323	pumice	46	40	23	26kg	ves	por			
H339-R09	31°32.345'	139°50.211'	322						ves	por	FTIR		

Dome B

sample No.	latitude(N)	longitude(E)	depth (m)	rock type	size X (cm)	size Y (cm)	size Z (cm)	weight					
H341-R01	31°29.853'	139°47.243'	973	pumice	28	16	13	4.1kg	ves	por		XRF	
H341-R02	31°29.853'	139°47.243'	973	pumice	15	12	10	1.1kg	ves	por			
H341-R03	31°29.856'	139°47.243'	972	pumice	20	15	8	2.7kg	ves				
H341-R04	31°29.856'	139°47.243'	972	pumice	24	20	18	4.1kg	ves	por			
H341-R06	31°29.860'	139°47.245'	968	pumice	15	13	8	1kg	ves				
H341-R08	31°29.860'	139°47.245'	968	pumice	11	10	7	500g	ves				
H341-R09	31°29.860'	139°47.246'	967	pumice	26	10	8	2kg	ves				
H341-R10	31°29.862'	139°47.247'	965	pumice	10	8	5	200g	ves				
H341-R11	31°29.876'	139°47.253'	957	pumice	17	10	10	1.4kg	ves				
H341-R12	31°29.873'	139°47.253'	955	pumice	23	10	7	1.1kg	ves				
H341-R13	31°29.925'	139°47.283'	915	pumice	23	18	18	6.1kg	ves	por	FTIR	XRF	EMP
H341-R14	31°29.952'	139°47.279'	894	pumice	10	9	9	600g	ves				
H341-R15	31°29.977'	139°47.278'	876	pumice	36	18	11	5.6kg	ves		FTIR	XRF	EMP

Dome C

sample No.	latitude(N)	longitude(E)	depth (m)	rock type	size X (cm)	size Y (cm)	size Z (cm)	weight					
H336-R01	31°30.814'	139°40.387'	1268	pumice	15	13	13	1.5kg	ves	por			
H336-R02	31°30.820'	139°40.391'	1258	lava	26	21	15	7.5kg	ves		FTIR	XRF	EMP
H336-R03	31°30.855'	139°40.405'	1230	pumice	14	10	6	600g	ves				
H336-R05	31°30.894'	139°40.428'	1197	pumice	13	12	4	650g	ves				
H336-R06	31°30.905'	139°40.433'	1187	pumice	15	10	13	1.9kg	ves	por			
H336-R08	31°30.998'	139°40.462'	1142	pumice	20	18	11	2.9kg	ves	por			
H336-R11	31°31.134'	139°40.469'	1101	pumice	20	13	12	2.7kg	ves				
H336-R14	31°31.146'	139°40.360'	1191	pumice	18	14	12	2.3kg	ves		FTIR	XRF	EMP
H336-R16	31°31.148'	139°40.384'	1165	lava	16	12	10	2.4kg	ves				
H336-R17	31°31.148'	139°40.388'	1161	lava	17	14	10	2.3kg	ves		FTIR	XRF	EMP
H336-R18	31°31.150'	139°40.394'	1154	lava	8	7	5	250g	ves				
H336-R20	31°31.162'	139°40.453'	1099	pumice	36	26	18	10.6kg	ves	por			

ves - vesicularity; por, porosity, EMP - melt inclusion electron micrprobe

SR Allen, RS Fiske, Y Tamura Sumisu geochemical data

XRF data (University of Tasmania)

		SiO_2	TiO_2	Al_2O_3	Fe_2O_3	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	LOI inc. S-	TOTAL
		wt. %	wt. %	wt. %	wt. %	wt. %	wt. %	wt. %	wt. %	wt. %	wt. %		
Dome A1	339-4	74.78	0.27	12.39	2.03	0.1	0.35	1.77	5.05	1.22	0.04	1.73	99.73
	339-9	73.2	0.27	12.46	2.05	0.1	0.88	1.78	5.02	1.17	0.04	2.67	99.64
Dome B	341-1	74.53	0.26	12.3	2.01	0.1	0.37	1.78	5.24	1.21	0.04	1.9	99.74
	341-13	74.53	0.28	12.52	2.1	0.1	0.38	1.88	5.07	1.19	0.04	1.38	99.47
	341-15	74.1	0.26	12.27	2.03	0.1	0.39	1.79	5.34	1.19	0.04	2.13	99.64
Dome C	336-2	75.23	0.25	12.79	1.93	0.08	0.38	2.04	4.49	1.39	0.05	1.92	100.55
	336-17	74.04	0.25	12.64	2.01	0.14	0.45	2.11	4.36	1.49	0.05	2.39	99.93
	336-14	74.52	0.26	12.43	2.08	0.1	0.38	1.8	5.02	1.2	0.04	1.74	99.57

		Nb	Zr	Sr	Ba	V	Y	Rb	Zn
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Dome A1	339-4	3.2	196	118	202	4	44	18	55
	339-9	3.1	192	118	198	3	44	18	56
Dome B	341-1	2.6	191	116	204	3	44	19	55
	341-13	2.9	194	123	200	4	43	17	56
	341-15	3.4	187	117	196	3	43	18	53
Dome C	336-2	2.8	158	116	186	12	27	20	31
	336-17	2.4	155	121	186	14	27	18	34
	336-14	3.1	192	117	208	5	44	18	58

ICPMS data (University of Tasmania) in ppm

		45 Sc	139 La	140 Ce	146 Nd	238 U	232 Th	208 Pb	7 Li	9 Be	53 Cr	55 Mn	71 Ga
Dome A1	339-4	10.07266	9.627291	24.31232	18.13078	0.552808	1.226764	4.120988	11.16612	0.881366	0.509845	714.2175	12.91712
	339-9	10.25251	9.567249	24.57214	18.13172	0.557082	1.248482	4.492867	11.89201	0.901288	1.515388	743.4024	12.88891
Dome B	341-1	10.01549	9.43091	24.18407	17.75559	0.544571	1.233317	4.30096	10.98329	0.901371	0.714259	724.3828	12.91256
	341-13	10.30346	9.481823	23.98294	17.79231	0.526654	1.188072	4.039942	11.01922	0.904468	0.473274	740.524	13.13337
	341-15	10.06043	9.597538	24.20562	18.04452	0.536061	1.239399	4.236781	10.85687	0.837282	0.523818	720.7018	12.77212
Dome C	336-2	5.565802	10.34328	23.91613	14.17574	0.545779	1.366935	3.949043	13.88026	0.869103	0.521428	549.3155	12.20596
	336-17	5.653929	10.05237	23.22615	13.68459	0.534953	1.32192	5.468249	9.785414	0.883297	0.822031	1038.978	12.27855
	336-14	10.16653	9.745642	24.63585	18.2706	0.556501	1.238673	4.682915	11.10457	0.840888	0.819832	747.6471	13.06679

		93 Nb	95 Mo	107 Ag (sta	111 Cd	118 Sn	121 Sb	133 Cs	141 Pr	147 Sm	153 Eu	157 Gd	159 Tb
Dome A1	339-4	1.480832	1.645421	1.248358	0.153136	1.664151	0.060214	0.640734	3.772554	5.10349	1.253108	6.000686	1.072544
	339-9	1.848834	1.617374	1.450053	0.201427	5.596186	0.069828	0.634043	3.761063	5.1108	1.271248	6.103744	1.056403
Dome B	341-1	1.45298	1.589465	1.319808	0.151315	3.026464	0.06117	0.647613	3.707838	4.981478	1.24421	5.92484	1.049924
	341-13	1.524827	1.599421	0.883065	0.265032	2.479754	0.059288	0.646829	3.702879	4.958797	1.28918	5.986094	1.065131
	341-15	1.626982	1.588753	1.475156	0.089168	5.348599	0.077359	0.658909	3.726354	4.973524	1.244033	5.893227	1.055088
Dome C	336-2	1.936613	1.107686	0.055565	0.010117	1.210562	0.071817	0.73704	3.26287	3.42329	0.739513	3.743222	0.65768
	336-17	1.709336	1.302213	0.033216	0.046102	1.23961	0.157086	0.708688	3.160483	3.296683	0.751557	3.625334	0.636896
	336-14	1.588089	1.632961	0.507172	0.120668	8.352124	0.093334	0.672628	3.795185	5.081355	1.300697	6.114056	1.09809

		163 Dy	165 Ho	166 Er	169 Tm	172 Yb	175 Lu	178 Hf	181 Ta	205 Tl	209 Bi
Dome A1	339-4	6.913904	1.48172	4.533139	0.694632	4.638128	0.749299	4.954105	0.485019	0.136326	0.064436
	339-9	6.858369	1.445499	4.468825	0.684233	4.658813	0.737942	5.060795	0.527853	0.13648	0.074352
Dome B	341-1	6.649107	1.449172	4.482001	0.688286	4.6127	0.740485	5.002459	0.692524	0.137525	0.06516
	341-13	6.727509	1.450473	4.446094	0.675809	4.535763	0.728478	4.880625	0.607271	0.132079	0.067511
	341-15	6.724388	1.460671	4.450278	0.679686	4.586791	0.733089	4.965871	0.722964	0.133287	0.065685
Dome C	336-2	4.160241	0.895388	2.792355	0.436696	3.104207	0.497753	3.780301	0.446446	0.165261	0.080211
	336-17	4.007487	0.871232	2.694285	0.429552	2.928122	0.490813	3.722177	0.647343	0.285703	0.078648
	336-14	6.970756	1.499803	4.620729	0.708672	4.736934	0.766777	4.955389	1.048486	0.140703	0.071491

SR Allen, RS Fiske, Y Tamura Sumisu FTIR data

Sample number	melt incl number	spectral thickness (μm)	optical thickness (μm)	Abs (5200 cm-1)	Abs (4500 cm-1)	H2Otot wt.%
Volcano A						
339-4	3-2a	36.0	55	0.037	0.0241	5.01
339-4	2a	0.0	55	0.05179	0.0127	4.74
339-4	4-2b	40.6	55	0.0406	0.0149	5.66
339-4	8a	60.1	55	0.0515	0.0147	4.49
339-4	4b	39.0	55	0.0393	0.0145	5.71
339-4	4a	39.0	55	0.0443	0.0153	6.27
339-4	6a	58.6	65	0.042	0.019	4.41
339-4	6b	60.7	65	0.0514	0.0218	5.08
339-4	3-1b	40.3	55	0.0421	0.0223	7.08
339-9	5-1a	52.8	60	0.051	0.0176	5.35
339-9	5-1b	52.8	60	0.05	0.019	5.44
339-9	5-3a	53.7	60	0.0524	0.0192	5.52
339-9	5-3b	53.7	60	0.052	0.02	5.58
339-9	5-2a	48.2	60	0.0495	0.0181	5.80
339-9	5-2b	48.2	60	0.0531	0.0205	6.36
339-9	2a	31.3	58	0.0402	0.0148	7.26
339-9	2b	32.3	58	0.0398	0.0161	7.27
339-9	3-1c	44.2	54	0.039	0.012	4.72
339-9	3-1b	44.2	54	0.037	0.013	4.67
volcano B						
341-13	8a	36.5	43	0.0345	0.0122	5.27
341-13	8b	36.5	43	0.0374	0.0126	5.62
341-13	6-1b	45.0	60	0.0517	0.0145	5.94
341-13	6-1a	45.0	60	0.0487	0.0141	5.66
341-13	4b	35.8	55	0.046	0.0104	6.28
341-13	4a	36.0	55	0.0413	0.011	5.85
341-13	3-1b	44.0	40	0.0433	0.0112	5.01
341-13	3-1a	44.1	40	0.0396	0.0115	4.72
341-13	7-1a	32.3	45	0.0304	0.0093	5.02
341-13	7-1c	33.0	45	0.0321	0.0102	5.24
341-13	2b	39.4	40	0.0428	0.0128	5.72
341-13	2A	37.9	40	0.0394	0.0133	5.70
341-15	6b	38.0	55	0.0356	0.012	5.15
341-15	6a	38.0	55	0.035	0.012	5.09
341-15	3-1b	66.5	50	0.0372	0.0121	4.05
341-15	3-1c	65.2	50	0.0369	0.0115	3.97
341-15	8-1a	48.6	55	0.0489	0.0158	5.45
341-15	8-1b	47.2	55	0.0502	0.0162	5.75
341-15	7b	39.8	60	0.0431	0.0137	5.82
341-15	7a	39.8	60	0.0418	0.0151	5.91
341-15	5a	46.2	55	0.0369	0.0119	4.34
341-15	5b	46.2	55	0.0392	0.015	4.88
341-15	3-3a	45.8	50	0.0332	0.0136	4.28
341-15	3-3b	45.8	50	0.0321	0.0145	4.31
volcano C						
336-14	2-2-b	50.6	50	0.048	0.01	4.62
336-14	2-2-a	50.6	50	0.048	0.009	4.54
336-14	3-1-b		35	0.0555	0.0167	8.27
336-14	3-1-a	7.5	35	0.0445	0.0124	6.54
336-14	1a	34.5	40	0.035	0.01	5.30
336-14	1c	34.5	40	0.0381	0.0129	6.06
336-14	1b	34.5	40	0.034	0.009	5.04
336-14	2-1-b	32.0	50	0.0432	0.0092	5.26
336-14	2-1-a	32.0	50	0.0422	0.008	5.04
336-2	2a	45.2	55	0.0385	0.0118	4.55
336-2	2b	45.2	55	0.0382	0.0113	4.47
336-2	4b	46.1	45	0.0475	0.0128	5.29
336-2	4a	46.1	45	0.0427	0.0132	4.96
336-2	5a	35.8	55	0.0355	0.01	5.15
336-2	5b	35.8	55	0.0373	0.0115	5.55
336-2	3a	44.2	55	0.0407	0.0122	4.88
336-2	3b	44.2	55	0.0411	0.0116	4.85
336-17	2-2b	40.6	65	0.031	0.009	4.03
336-17	2-2a	40.6	65	0.03	0.009	3.94
336-17	3-2b	48.3	55	0.0401	0.0145	4.68
336-17	3-2a	48.3	55	0.0403	0.0148	4.73
336-17	1-1b	53.7	60	0.0459	0.0147	4.63
336-17	1-1a	46.1	60	0.0463	0.0154	5.49
336-17	4a	42.7	45	0.043	0.0141	5.48
336-17	4b	42.7	45	0.0421	0.0135	5.32
336-17	5b	49.5	60	0.038	0.027	6.15
336-17	5a	47.3	60	0.042	0.022	5.92
336-17	6a	42.7	50	0.0468	0.0175	6.24

SR Allen, RS Fiske, Y Tamura Sumisu vesicularity data

	vesicularity (vol. %) connected	total	isolated	melt	number of samples	method
Dome A1						
339-1	67.37	73.04	5.67	79.22	4	2
339-2	65.66	71.68	6.02	77.74	4	2
339-3		69.47		75.35	7	1
339-4	70.41	75.07	4.66	81.42	3	2
339-5	83.26	84.41	1.15	91.55	3	2
339-8	72.66	73.72	1.06	79.96	6	2
339-9	64.93	71.82	6.89	77.90	3	2
339dredge		79.87		86.62	1	1
339dredge		78.91		85.59	1	1
339dredge		78.67		85.33	1	1
339dredge		80.62		87.44	1	1
339dredge		78.44		85.08	1	1
339dredge		77.69		84.26	1	1
339dredge		79.55		86.28	1	1
339dredge		79.36		86.07	1	1
339dredge		80.59		87.41	1	1
339dredge		68.10		73.86	1	1
339dredge		76.77		83.27	1	1
339dredge		72.61		78.76	1	1
339dredge		65.81		71.38	1	1
339dredge		69.71		75.60	1	1
339dredge		72.94		79.11	1	1
339dredge		74.39		80.68	1	1
339dredge		77.58		84.15	1	1
339dredge		66.94		72.61	1	1
339dredge		72.44		78.57	1	1
339dredge		74.52		80.82	1	1
339dredge		69.34		75.20	1	1
339dredge		72.93		79.10	1	1
339dredge		68.31		74.09	1	1
Dome B						
341-1	77.99	78.33	0.34	84.96	4	2
341-2	69.42	72.77	3.35	78.93	5	2
341-3		74.00		80.26	1	1
341-4	80.48	81.08	0.60	87.94	3	2
341-6		68.14		73.90	1	1
341-8		69.93		75.85	1	1
341-9	82.08	82.71	0.63	89.71	3	2
341-10		85.31		92.53	1	1
341-11	53.76	62.07	8.31	67.32	3	2
341-12		80.46		87.27	2	1
341-13	65.45	71.43	5.98	77.47	3	2
341-14		68.83		74.65	1	1
341-15		71.09		77.10	2	1
341dredge		72.04		78.14	1	1
341dredge		66.11		71.70	1	1
341dredge		67.70		73.43	1	1

341dredge		70.83		76.82	1	1
341dredge		70.13		76.06	1	1
341dredge		65.53		71.07	1	1
341dredge		65.63		71.18	1	1
341dredge		69.16		75.01	1	1
Dome C						
336-1	65	70.71	5.52	76.69	3	2
336-3	64.07	70.28	6.21	76.23	5	2
336-5		69.19		75.04	1	1
336-6	75.43	76.23	0.80	82.68	3	2
336-8	65.06	69.29	4.23	75.15	5	2
336-11		74.39		80.68	1	1
336-14		64.65		70.12	1	1
336-20	63.37	68.72	5.35	74.53	7	2
336-2rock		4.45		4.83	1	1
336-16rock		7.77		8.43	1	1
336-17rock		15.26		16.55	1	1
336-18rock		12.49		13.55	1	1

method: 1- mass and volume; 2 - helium pycnometer

SR Allen, RS Fiske, Y Tamura Sumisu permeability data

Sample	vesicle elongation	k1 (m^2)	Log K1	k2 (m)	number of samples/runs
Dome A1					
339-1A	X	1.3558E-10	-9.86779243	4.9198E-08	1
339-1B	w	2.8166E-12	-11.5532219	2.322E-08	3
339-2B	w	4.714E-13	-12.3266098	2.8599E-09	1
339-3 A	X	3.249E-13	-12.5280265	1.2211E-09	3
339-3B	w	1.0734E-12	-12.159523	4.0607E-09	5
339-4A	X	1.524E-12	-11.9842771	3.0391E-08	4
339-4B	w	1.1597E-12	-11.9432115	7.6351E-09	3
339-5A	X	2.696E-10	-9.56927308	4.1465E-06	1
339-5B	w	2.0371E-12	-11.6939568	6.7797E-08	3
339-8	X	3.099E-12	-11.5286967	1.41E-08	2
339-8B2	w	9.6688E-12	-11.1434531	7.6274E-08	4
339-9A	X	1.4198E-13	-12.847788	5.4105E-10	1
339-9B	w	8.181E-12	-11.1072957	1.7102E-08	2
Dome B					
341-13A	X	1.3162E-12	-11.8910961	5.1746E-09	3
341-13B	w	1.2856E-11	-10.8908917	2.5344E-08	1
341-1A	X	4.3037E-12	-11.381788	1.7312E-08	2
341-1B	w	2.6927E-12	-11.5937329	1.4431E-08	2
341-2A	X	1.5666E-13	-12.8050454	7.4875E-10	2
341-2B	w	6.2413E-13	-12.206161	4.0769E-09	2
341-4A	X	7.1524E-13	-12.1459542	3.3419E-09	3
341-4B	w	8.4519E-12	-11.073441	9.7826E-08	2
341-4A	X	6.6178E-12	-11.1793306	4.1459E-08	2
341-4B	w	2.8771E-12	-11.541875	1.7048E-08	4
Dome C					
336-1A	X	4.3782E-12	-11.3823002	1.2493E-08	2
336-1B	w	1.0654E-12	-11.9982027	6.1859E-09	4
336-20A	X	1.5413E-13	-12.8200891	2.1833E-10	2
336-20B	w	3.4246E-13	-12.4657098	3.1199E-09	2
336-6A	X	2.8169E-13	-12.558123	7.7773E-10	3
336-6B	w	7.0956E-12	-11.1497014	1.521E-07	2
336-8A	X	9.2161E-12	-11.0371266	1.0259E-07	2
336-8B	w	2.9983E-12	-12.0359192	2.0626E-08	4