

References

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Appendices

Appendix 1

Classification of ceramics by function

Function	Class	Nominal Composition
Electrical	Insulation	α -Al ₂ O ₃ , MgO, porcelain
	Ferroelectrics	BaTiO ₃ , SrTiO ₃
	Piezoelectric	PbZr _{0.5} Ti _{0.5} O ₃
	Fast ion conduction	β -Al ₂ O ₃ , doped ZrO ₂
	Superconductors	Ba ₂ YCu ₃ O _{7-x}
Magnetic	Soft ferrite	Mn _{0.4} Zn _{0.6} Fe ₂ O ₄
	Hard ferrite	BaFe ₁₂ O ₁₉ , SrFe ₁₂ O ₁₉
Nuclear	Fuel	UO ₂ , UO ₂ -PuO ₂
	Cladding/shielding	SiC, B ₄ C
Optical	Transparent envelope	α -Al ₂ O ₃ , MgAl ₂ O ₄
	Light memory	doped PbZr _{0.5} Ti _{0.5} O ₃
	Colors	doped ZrSiO ₄ , doped ZrO ₂ , doped Al ₂ O ₃
Mechanical	Structural refractory	α -Al ₂ O ₃ , MgO, SiC, Si ₃ N ₄ , Al ₆ Si ₂ O ₁₃
	Wear resistance	α -Al ₂ O ₃ , ZrO ₂ , SiC, Si ₃ N ₄ , toughened Al ₂ O ₃
	Cutting	α -Al ₂ O ₃ , ZrO ₂ , TiC, Si ₃ N ₄ , SIALON
	Abrasive	α -Al ₂ O ₃ , SiC, toughened Al ₂ O ₃ , SIALON
	Construction	Al ₂ O ₃ -SiO ₂ , CaO-Al ₂ O ₃ -SiO ₂ , porcelain
Thermal	Insulation	α -Al ₂ O ₃ , ZrO ₂ , Al ₆ Si ₂ O ₁₃ , SiO ₂
Chemical	Radiator	ZrO ₂ , TiO ₂
	Gas sensor	ZnO, ZrO ₂ , SnO ₂ , Fe ₂ O ₃
	Catalyst carrier	Mg ₂ Al ₄ Si ₃ O ₁₈ , Al ₂ O ₃
	Electrodes	TiO ₂ , TiB ₂ , SnO ₂ , ZnO
	Filters	SiO ₂ , α -Al ₂ O ₃
Biological	Coatings	NaO-CaO-Al ₂ O ₃ -SiO ₂
	Structural prostheses	α -Al ₂ O ₃ , porcelain
Aesthetic	Cements	CaHPO ₄ · 2H ₂ O
	Pottery, artware	Whiteware, porcelain
	Tile, concrete	Whiteware, CaO-SiO ₂ -H ₂ O

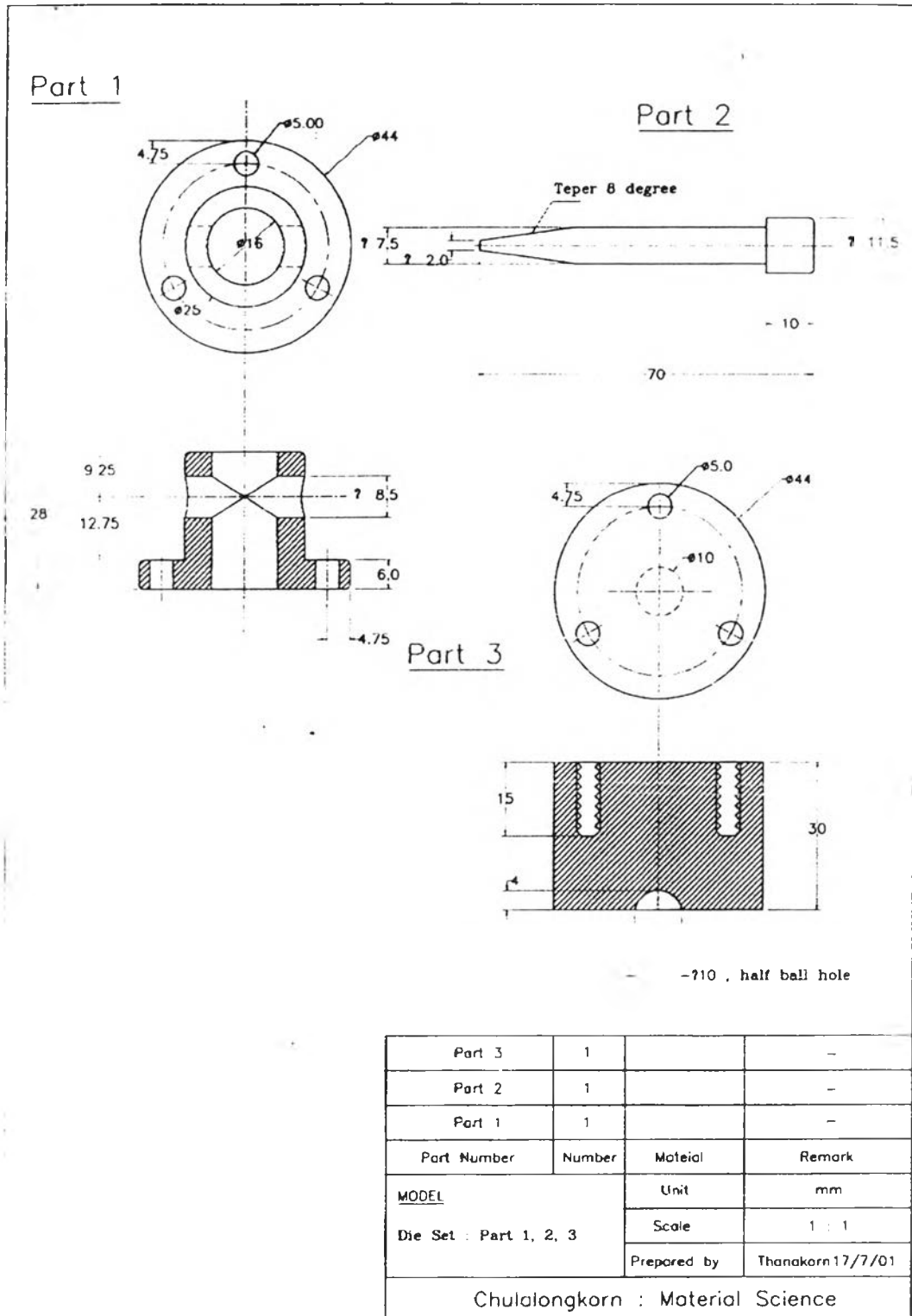
Appendix 2

Thermal Conductivity of Alumina from Several Manufacturers

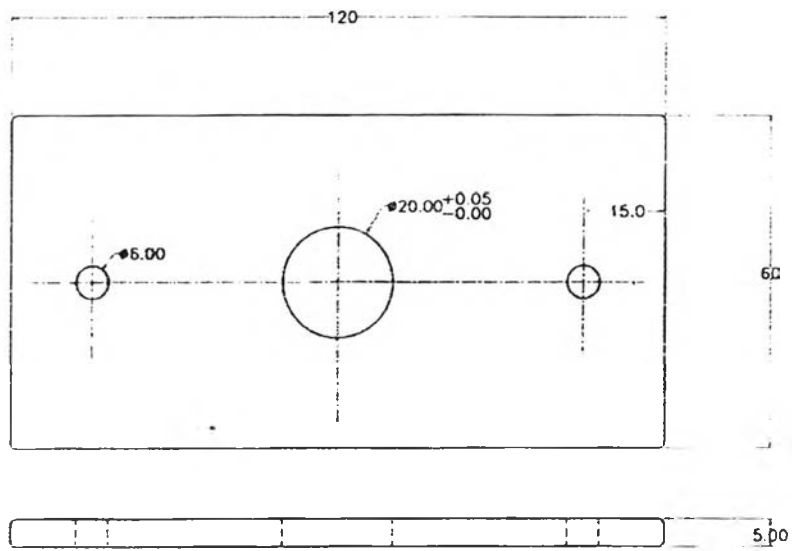
Manufacturer	% Purity	Thermal conductivity at R.T. (W/m.K)	Crystal
AISIN	96.00	24.00	Poly
HITACHI	90.00	16.70	Poly
	95.00	18.80	Poly
	96.00	17.60	Poly
	99.70	29.30	Poly
	99.80	29.30	Poly
SCIMAREC	92.00	16.70	Poly
	97.00	20.90	Poly
	99.50	29.30	Poly
NTK	92.00	23.00	Poly
	95.00	27.00	Poly
	99.50	30.00	Poly
SHINAGAWA Refractory	99.80	33.50	Poly
	99.00	33.50	Poly
KYOCERA	96.00	20.00	Poly
	99.60	28.00	Poly
	-	42.00	Single
HITACHI KASEI	96.00	27.00	Poly
Ronald G. Munro	99.50	33.00	Poly
Coors Electronic	92.00	20.30	Poly
Tokuyama	96.00	20.00	Poly
INTEL	92.00	18.00	Poly
Amitron	96.00	26.00	Poly
	99.50	35.00	Poly
Coors Tek	96.00	26.00	Poly
	99.50	31.00	Poly
Ultra Source	99.60	30.00	Poly

Intertec Southnest	99.60	35.00	Poly
Thermal Interface Webpage	96.00	20.90	Poly
Ferro-Ceramic Grinding	99.50	35.00	Poly
	-	40.00	Single
Yasufuku Ceramic	80.00	16.80	Poly
	92.00	16.80	Poly
	92.00	21.00	Poly
	92.00	21.00	Poly
	96.00	21.00	Poly
	99.50	25.20	Poly

Appendix 3

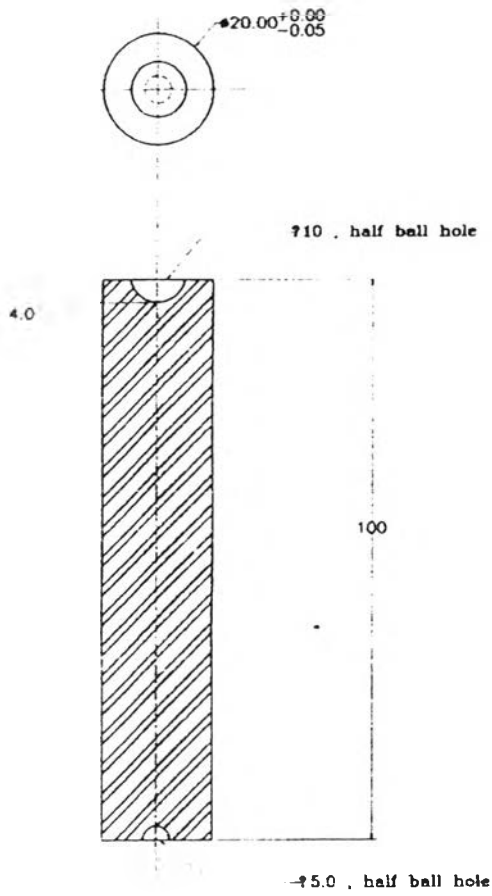


Part 5

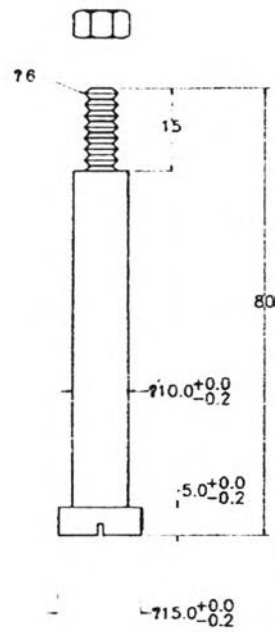


Part 5	1		-
Part Number	Number	Material	Remark
MODEL		Unit	mm.
Die Set . Part 5		Scale	1 : 1
		Prepared by	Thanakorn17/7/01
Chulalongkorn : Material Science			

Part 4



Part 6



Part 6	2		-
Part 4	1		-
Part Number	Number	Material	Remark
<u>MODEL</u>		Unit	mm.
Die Set : Part 4,6		Scale	1 : 1
		Prepared by	Thanakorn17/7/D1
Chulalongkorn : Material Science			

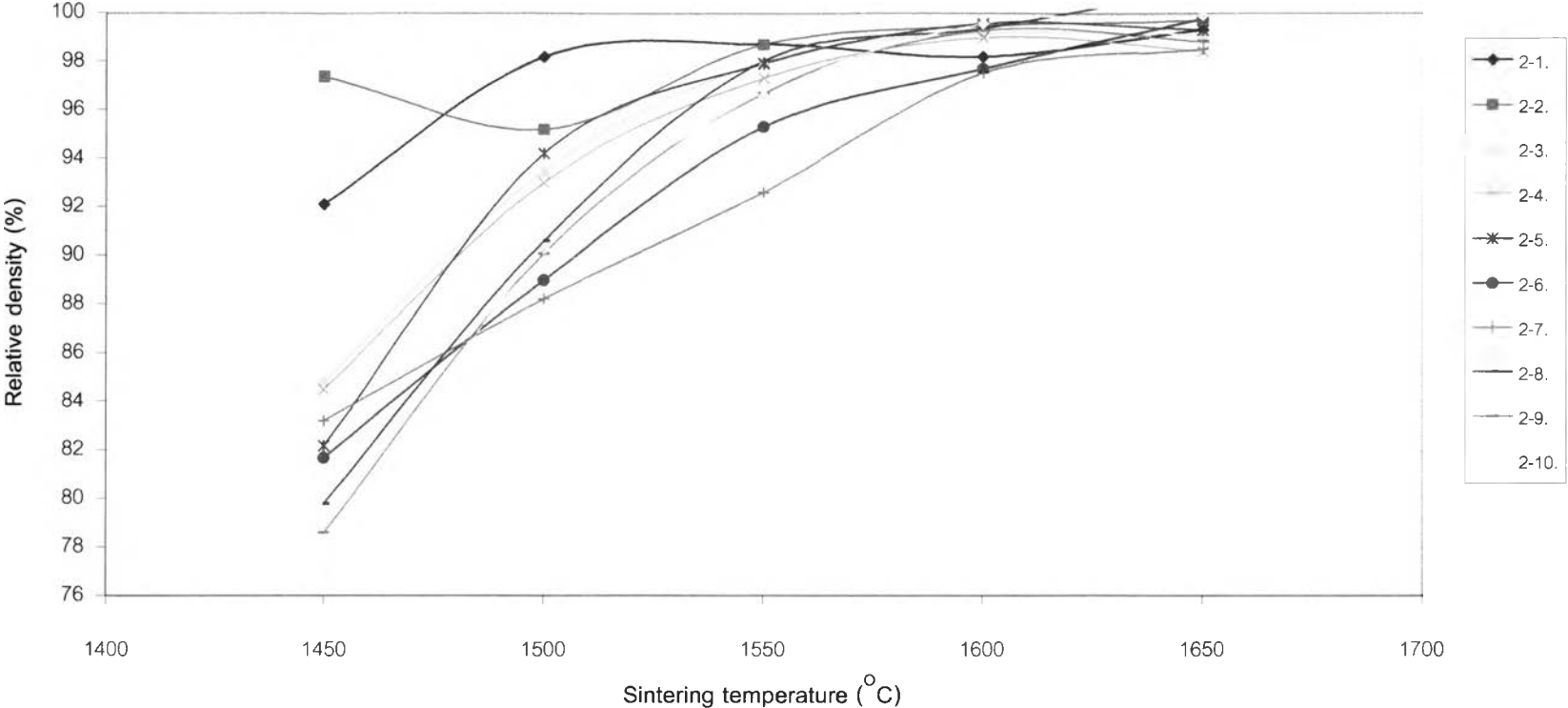
Appendix 4

Specific gravity, Water absorption and Relative density						
Firing Temperature : 1450 °C						
No	Dry Weight	Saturated Weight	Suspended Weight	Specific gravity	Water Absorption(%)	Relative density(%)
2-1/2.	2.9763	3.0046	2.1908	3.66	0.95	92.1
2-2/2.	2.8815	2.8910	2.1452	3.86	0.33	97.4
2-3/2.	2.9683	3.0991	2.2234	3.39	4.4	84.9
2-4/2.	2.9716	3.1080	2.2310	3.39	4.6	84.5
2-5/2.	2.9608	3.1214	2.2368	3.35	5.4	82.2
2-6/2.	2.9620	3.1336	2.2209	3.24	5.8	81.7
2-7/2.	2.8739	3.0206	2.1504	3.30	5.1	83.2
2-8/2.	2.9598	3.1522	2.2232	3.19	6.5	79.8
2-9/2.	2.9612	3.1581	2.2193	3.15	6.6	78.6
2-10/2.	2.9595	3.1773	2.2361	3.14	7.4	77.2
Firing Temperature : 1500 °C						
No	Dry Weight	Saturated Weight	Suspended Weight	Specific gravity	Water Absorption(%)	Relative density(%)
2-1/2.	2.9748	2.9804	2.2172	3.90	0.19	98.2
2-2/2.	2.8700	2.8957	2.1360	3.78	0.90	95.2
2-3/2.	2.9735	3.0000	2.2027	3.73	0.89	93.5
2-4/2.	2.9721	2.9969	2.2003	3.73	0.83	93.0
2-5/2.	2.9616	2.9692	2.1975	3.84	0.26	94.2
2-6/2.	2.9405	3.0299	2.1980	3.53	3.0	89.0
2-7/2.	2.8726	2.9733	2.1521	3.50	3.5	88.2
2-8/2.	2.9577	3.0405	2.2225	3.62	2.8	90.6
2-9/2.	2.9619	3.0397	2.2198	3.61	2.6	90.1
2-10/2.	1.7347	1.7839	1.3124	3.68	2.8	90.3

Specific gravity, Water absorption and Relative density						
Firing Temperature : 1550 °C						
No	Dry Weight	Saturated Weight	Suspended Weight	Specific gravity	Water Absorption(%)	Relative density(%)
2-1/2.	2.9767	2.9802	2.2203	3.92	0.12	98.7
2-2/2.	2.8571	2.8604	2.1312	3.92	0.12	98.7
2-3/2.	2.9666	2.9692	2.2107	3.91	0.09	98.0
2-4/2.	2.9663	2.9702	2.2099	3.90	0.13	97.3
2-5/2.	2.9642	2.9666	2.2236	3.99	0.08	97.9
2-6/2.	2.9428	2.9588	2.1810	3.78	0.54	95.3
2-7/2.	2.8624	2.9034	2.1244	3.67	1.4	92.6
2-8/2.	2.9448	2.9461	2.1930	3.91	0.04	98.0
2-9/2.	2.964	2.9677	2.2036	3.88	0.12	96.7
2-10/2.	2.9551	2.9581	2.2075	3.94	0.10	96.6
Firing Temperature : 1600 °C						
No	Dry Weight	Saturated Weight	Suspended Weight	Specific gravity	Water Absorption(%)	Relative density(%)
2-1/2.	2.9778	2.9853	2.2215	3.90	0.25	98.2
2-2/2.	2.8782	2.8805	2.1516	3.95	0.08	99.5
2-3/2.	2.9745	2.9761	2.2249	3.96	0.05	99.2
2-4/2.	2.9637	2.9654	2.2194	3.97	0.06	99.0
2-5/2.	2.9813	2.9823	2.2476	4.06	0.03	99.6
2-6/2.	2.9372	2.9437	2.1866	3.88	0.2	97.7
2-7/2.	2.8490	2.8519	2.1157	3.87	0.10	97.5
2-8/2.	2.9609	2.9626	2.2162	3.97	0.06	99.4
2-9/2.	2.9643	2.9666	2.2221	3.98	0.08	99.3
2-10/2.	2.9596	2.9608	2.2311	4.06	0.04	99.6

Specific gravity, Water absorption and Relative density						
Firing Temperature : 1650 °C						
No	Dry Weight	Saturated Weight	Suspended Weight	Specific gravity	Water Absorption(%)	Relative density (%)
2-1/2.	2.9690	2.9705	2.2172	3.94	0.05	99.3
2-2/2.	2.8572	2.8588	2.1368	3.96	0.06	99.7
2-3/2.	2.9685	2.9708	2.2199	3.95	0.08	99.1
2-4/2.	2.9726	2.9769	2.2235	3.94	0.14	98.4
2-5/2.	2.9649	2.9658	2.2333	4.05	0.03	99.3
2-6/2.	2.9633	2.9641	2.2166	3.96	0.03	99.8
2-7/2.	2.8772	2.8787	2.1426	3.91	0.05	98.5
2-8/2.	2.9647	2.9658	2.2279	4.02	0.04	101
2-9/2.	2.9472	2.9509	2.2072	3.96	0.12	98.8
2-10/2.	2.9616	2.9617	2.2344	4.07	0.00	99.9

Appendix 5



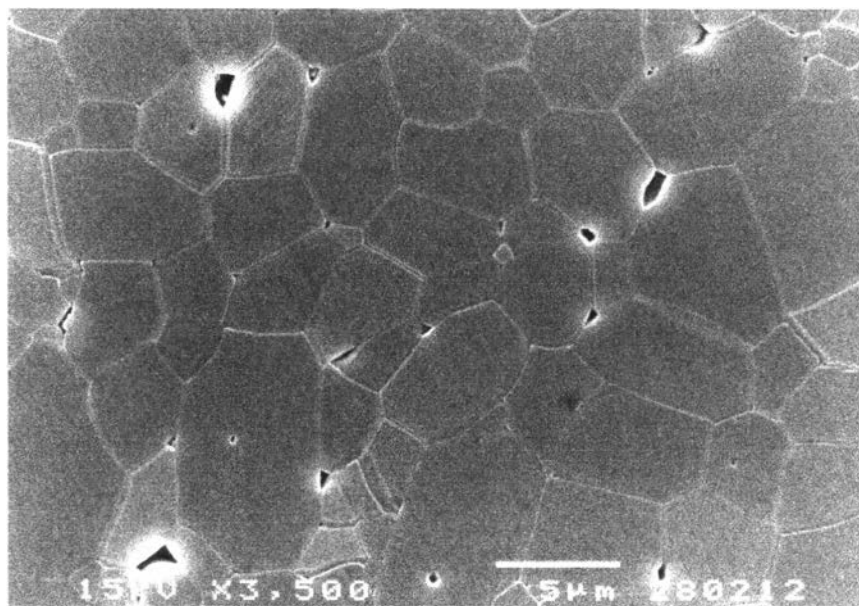
The relationship between relative density and sintering temperature of AKP-30 and AES-11

Appendix 6

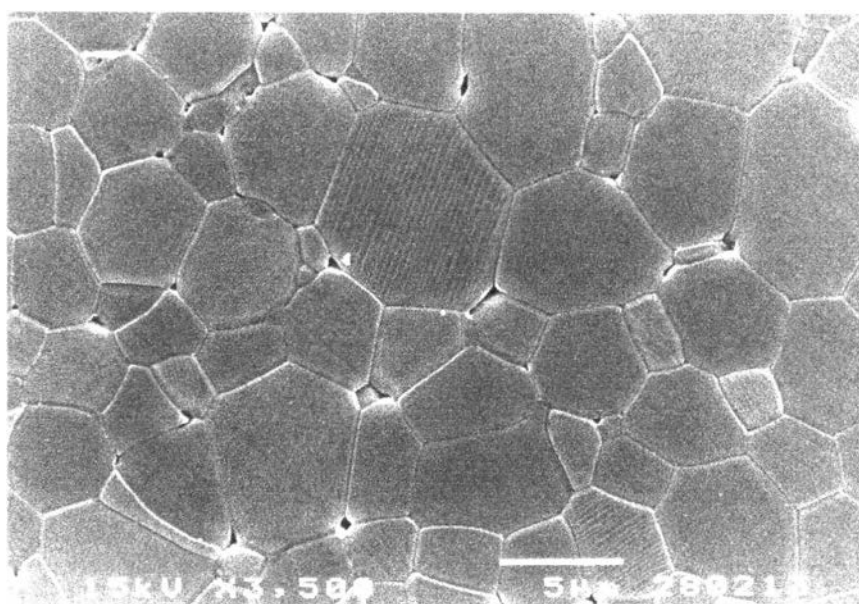
Specific gravity, Water absorption and Relative density of AKP-30						
Firing Temp : 1650 °C						
No.	Suspended weight	Saturated weight	Dry weight	Specific gravity	Water absorption(%)	Relative density(%)
2-1/1.	0.6252	0.8446	0.8436	3.83	0.12	96.5
2-1/2.	0.6388	0.8618	0.8614	3.85	0.05	97.0
2-1/3.	0.6248	0.8438	0.8432	3.84	0.07	96.7
2-1/4.	0.6006	0.8114	0.8111	3.84	0.04	96.6
2-1/5.	0.6346	0.8573	0.8566	3.83	0.08	96.6
2-2/1.	0.6123	0.8244	0.8231	3.87	0.16	97.5
2-2/2.	0.5777	0.7801	0.7791	3.84	0.13	96.7
2-2/3.	0.6050	0.8144	0.8135	3.87	0.11	97.6
2-2/4.	0.6226	0.8359	0.8357	3.90	0.02	98.4
2-2/5.	0.6074	0.8171	0.8161	3.88	0.12	97.8
2-3/1.	0.6287	0.8522	0.8479	3.78	0.51	94.8
2-3/2.	0.5862	0.7960	0.7914	3.76	0.58	94.2
2-3/3.	0.6100	0.8272	0.8244	3.78	0.34	94.8
2-3/4.	0.6308	0.8553	0.8537	3.79	0.19	95.0
2-3/5.	0.5951	0.8051	0.8046	3.82	0.06	95.7
2-4/1.	0.6235	0.8365	0.8352	3.91	0.16	97.4
2-4/2.	0.6210	0.8368	0.8351	3.86	0.20	96.2
2-4/3.	0.5977	0.8040	0.8027	3.88	0.16	96.7
2-4/4.	0.6100	0.8228	0.8223	3.85	0.06	96.0
2-4/5.	0.6392	0.8597	0.8591	3.88	0.07	96.8
2-5/1.	0.6143	0.8252	0.8248	3.90	0.05	95.7
2-5/2.	0.6269	0.8426	0.8404	3.88	0.26	95.3
2-5/3.	0.6287	0.8430	0.8421	3.92	0.11	96.1
2-5/4.	0.6159	0.8278	0.8260	3.89	0.22	95.4
2-5/5.	0.6194	0.8313	0.8300	3.90	0.16	95.8

Specific gravity, Water absorption and Relative density of AES-11						
Firing Temperature : 1650 °C						
No	Dry Weight	Saturated Weight	Suspended Weight	Specific gravity	Water Absorption(%)	Relative density(%)
2-6/1.	0.6909	0.6912	0.5161	3.94	0.04	99.4
2-6/2.	0.6691	0.6697	0.5010	3.97	0.09	99.9
2-6/3.	0.6899	0.6916	0.5161	3.93	0.25	99.0
2-7/1.	0.6724	0.6740	0.5025	3.92	0.24	98.8
2-7/2.	0.6105	0.6122	0.4548	3.88	0.28	97.7
2-7/3.	0.6720	0.6733	0.5022	3.93	0.19	99.0
2-8/1.	0.6860	0.6872	0.5155	4.00	0.17	100
2-8/2.	0.6919	0.6930	0.5197	3.99	0.16	100
2-8/3.	0.6929	0.6939	0.5198	3.98	0.14	99.7
2-9/1.	0.6424	0.6430	0.4759	3.84	0.09	95.8
2-9/2.	0.6421	0.6430	0.4809	3.96	0.14	98.8
2-9/3.	0.6936	0.6960	0.5200	3.94	0.35	98.2
2-10/1.	0.6809	0.6815	0.5138	4.06	0.09	99.6
2-10/2.	0.6644	0.6650	0.5001	4.03	0.09	98.9
2-10/3.	0.6780	0.6796	0.5124	4.06	0.24	99.5

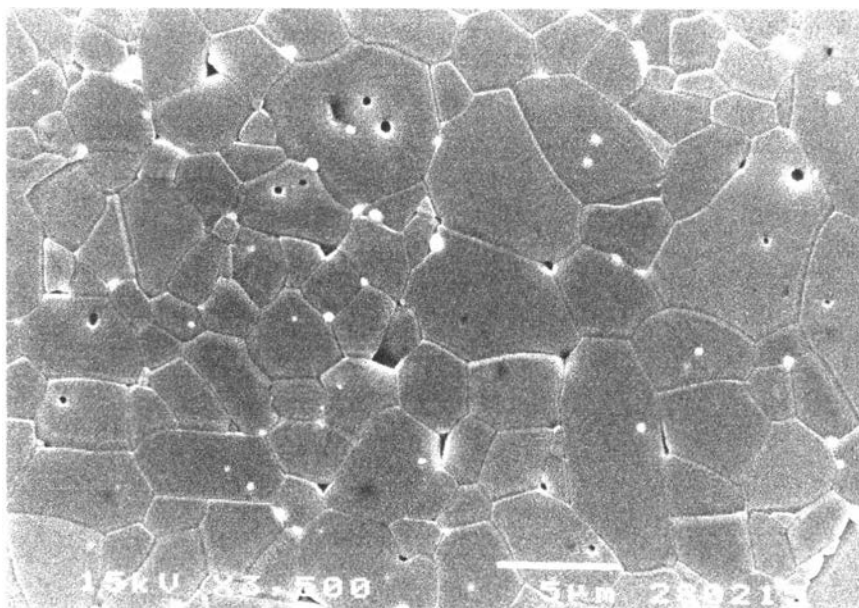
Appendix 7



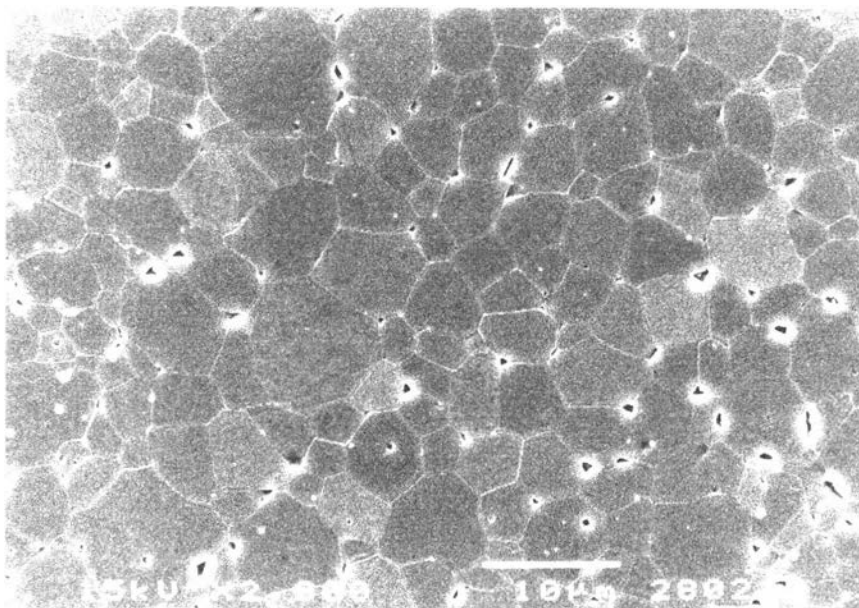
SEM micrograph of undoped AKP-30 alumina sintered at 1650 °C 2 h



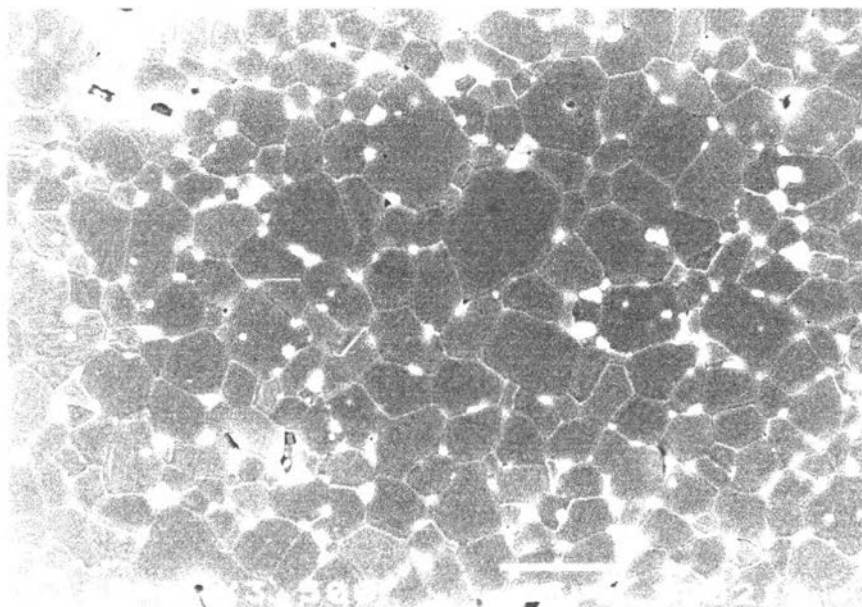
SEM micrograph of 0.5% MgO doped AKP-30 alumina sintered at 1650 °C 2 h



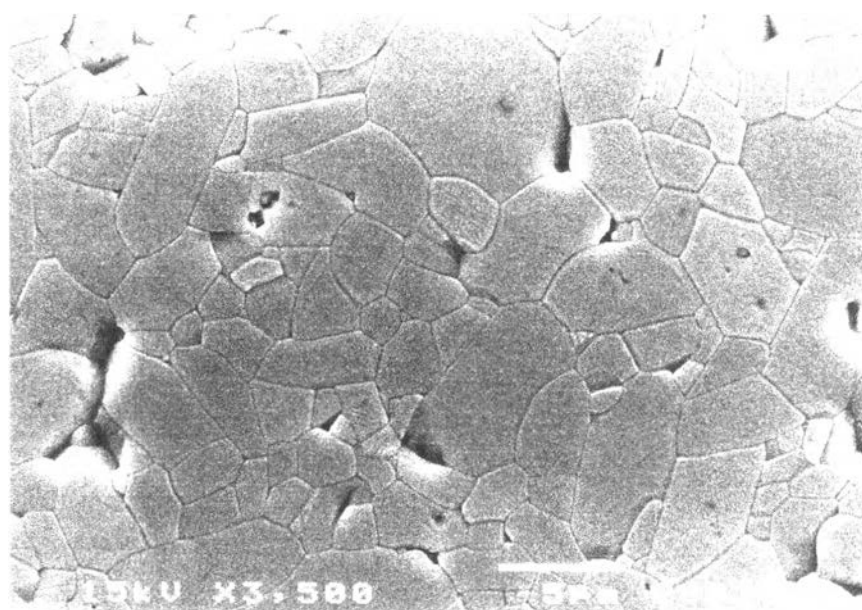
SEM micrograph of 1.5% ZrO₂ doped AKP-30 alumina sintered at 1650 °C 2 h



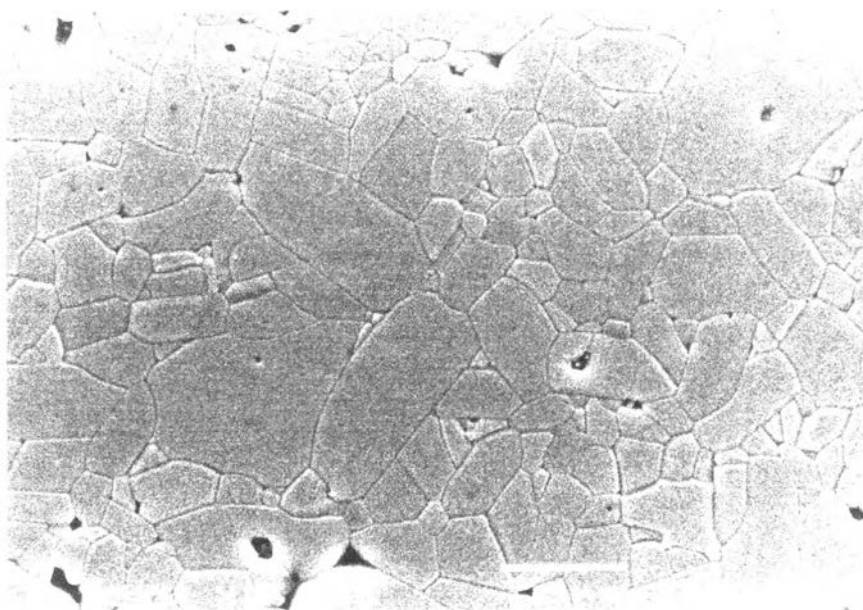
SEM micrograph of 3.0% ZrO₂ doped AKP-30 alumina sintered at 1650 °C 2 h



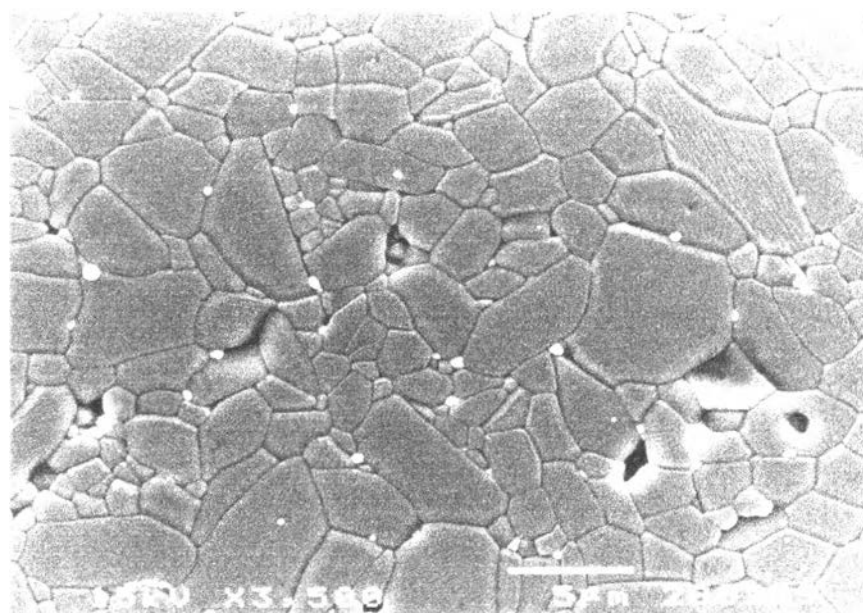
SEM micrograph of 7.5% ZrO₂ doped AKP-30 alumina sintered at 1650 °C 2 h



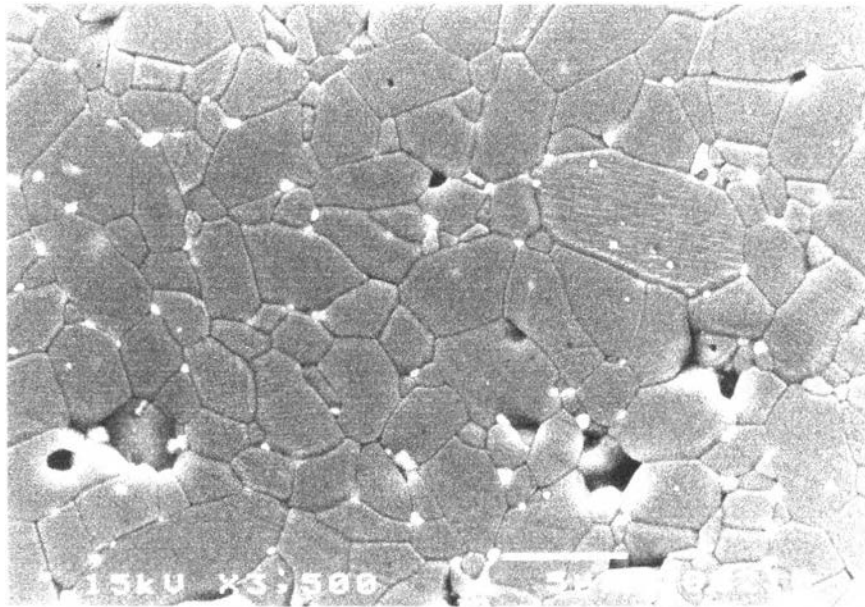
SEM micrograph of undoped AES-11 alumina sintered at 1650 °C 2 h



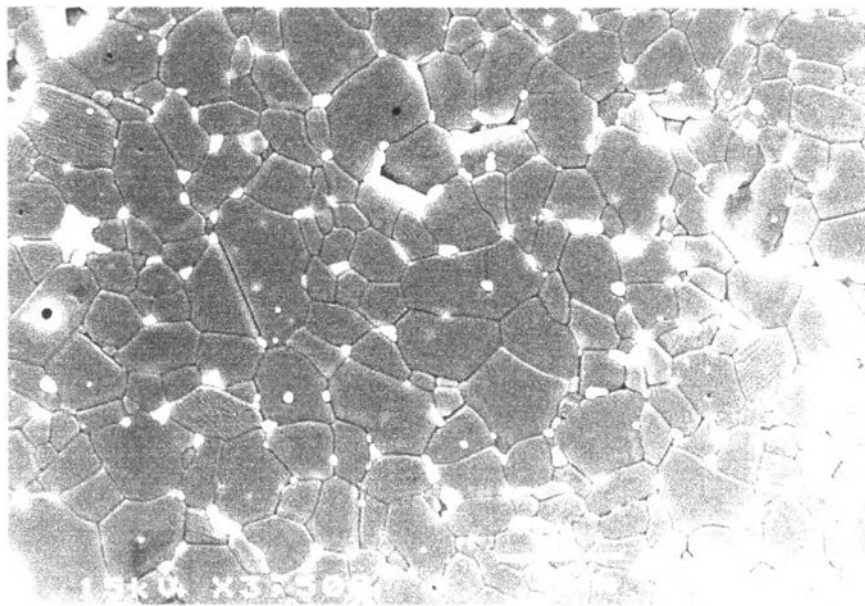
SEM micrograph of 0.5% MgO doped AES-11 alumina sintered at 1650 °C 2 h



SEM micrograph of 1.5% ZrO₂ doped AES-11 alumina sintered at 1650 °C 2 h



SEM micrograph of 3.0% ZrO₂ doped AES-11 alumina sintered at 1650 °C 2 h



SEM micrograph of 7.5% ZrO₂ doped AES-11 alumina sintered at 1650 °C 2 h

Appendix 8

Specific gravity, Water absorption and Relative density of AES-11						
Firing Temp : 1450 °C						
No.	Suspended weight	Saturated weight	Dry weight	Specific gravity	Water absorption(%)	Relative density(%)
2-6/1.	4.4387	6.3007	5.9033	3.16	6.7	79.6
2-6/2.	4.4643	6.3295	5.9653	3.19	6.1	80.3
2-6/3.	4.4441	6.3243	5.9404	3.15	6.5	79.3
2-6/4.	4.3989	6.2328	5.8792	3.20	6.0	80.5
2-6/5.	4.4078	6.2180	5.8922	3.24	5.5	81.7
2-7/1.	4.4131	6.3696	5.9001	3.01	8.0	75.7
2-7/2.	4.4214	6.3018	5.9088	3.13	6.7	78.9
2-7/3.	4.4571	6.3128	5.9578	3.20	6.0	80.6
2-7/4.	4.3501	6.1561	5.8112	3.21	5.9	80.8
2-7/5.	4.3365	6.1510	5.7963	3.18	6.1	80.2
2-8/1.	4.4420	6.3788	5.9486	3.06	7.2	76.7
2-8/2.	4.4636	6.3857	5.9566	3.09	7.2	77.4
2-8/3.	4.4345	6.4276	5.9127	2.96	8.7	74.1
2-8/4.	4.4866	6.4133	5.9852	3.10	7.2	77.6
2-8/5.	4.4568	6.3520	5.9425	3.13	6.9	78.3
2-9/1.	4.4613	6.3908	5.9366	3.07	7.6	76.5
2-9/2.	4.4289	6.4481	5.9180	2.92	9.0	72.8
2-9/3.	4.4397	6.3935	5.9120	3.02	8.1	75.2
2-9/4.	4.4433	6.3732	5.9174	3.06	7.7	76.2
2-9/5.	4.4343	6.3261	5.9021	3.11	7.2	77.5
2-10/1.	4.4455	6.3413	5.9373	3.12	6.8	76.6
2-10/2.	4.4298	6.3322	5.9209	3.10	6.9	76.1
2-10/3.	4.5052	6.4796	6.0554	3.06	7.0	75.0
2-10/4.	4.4820	6.4610	5.9586	3.00	8.4	73.7
2-10/5.	4.4812	6.4518	5.9453	3.01	8.5	73.8

Specific gravity, Water absorption and Relative density of AES-11						
Firing Temp : 1500 °C						
No.	Suspended weight	Saturated weight	Dry weight	Specific gravity	Water absorption(%)	Relative density(%)
2-6/1.	4.4559	6.1681	5.9576	3.47	3.5	87.4
2-6/2.	4.3710	6.0696	5.8498	3.43	3.7	86.5
2-6/3.	4.4015	6.1268	5.8947	3.41	3.9	85.8
2-6/4.	4.4489	6.1183	5.9538	3.55	2.8	89.5
2-6/5.	4.3914	6.0795	5.8748	3.47	3.5	87.4
2-7/1.	4.3967	6.0812	5.8772	3.48	3.5	87.6
2-7/2.	4.3734	6.1029	5.8548	3.37	4.2	85.0
2-7/3.	4.4152	6.1412	5.9073	3.41	3.9	86.0
2-7/4.	4.3423	6.0427	5.8041	3.40	4.1	85.7
2-7/5.	4.3324	6.0346	5.7954	3.39	4.1	85.5
2-8/1.	4.4184	6.1196	5.9026	3.46	3.7	86.7
2-8/2.	4.4637	6.1811	5.9667	3.46	3.6	86.8
2-8/3.	4.4287	6.1649	5.9146	3.40	4.2	85.1
2-8/4.	4.4498	6.1562	5.9591	3.48	3.3	87.2
2-8/5.	4.4372	6.1806	5.9242	3.39	4.3	84.9
2-9/1.	4.4697	6.1683	5.9629	3.50	3.4	87.2
2-9/2.	4.4705	6.1898	5.9626	3.46	3.8	86.2
2-9/3.	4.4432	6.2022	5.9235	3.36	4.7	83.7
2-9/4.	4.3741	6.0391	5.7676	3.45	4.7	86.1
2-9/5.	4.4105	6.1138	5.8759	3.44	4.0	85.7
2-10/1.	4.5052	6.2353	5.9704	3.44	4.4	84.4
2-10/2.	4.4836	6.1880	5.9403	3.47	4.2	85.3
2-10/3.	4.4821	6.2544	5.9440	3.34	5.2	82.0
2-10/4.	4.4802	6.2099	5.9406	3.42	4.5	84.0
2-10/5.	4.4904	6.2511	5.9511	3.37	5.0	82.7

Specific gravity, Water absorption and Relative density of AES-11						
Firing Temp : 1550 °C						
No.	Suspended weight	Saturated weight	Dry weight	Specific gravity	Water absorption(%)	Relative density(%)
2-6/1.	4.4417	6.0733	5.9644	3.64	1.8	91.8
2-6/2.	4.4029	6.0163	5.9188	3.66	1.6	92.1
2-6/3.	4.4307	6.0855	5.9521	3.58	2.2	90.3
2-6/4.	4.4058	6.0189	5.9183	3.66	1.7	92.1
2-6/5.	4.4113	5.9972	5.9350	3.73	1.0	94.0
2-7/1.	4.3683	5.9838	5.8643	3.62	2.0	91.1
2-7/2.	4.4152	6.0762	5.9496	3.57	2.1	90.0
2-7/3.	4.3823	6.0096	5.8890	3.61	2.0	90.9
2-7/4.	4.3778	6.0121	5.8803	3.59	2.2	90.4
2-7/5.	4.3910	6.0209	5.8725	3.59	2.5	90.5
2-8/1.	4.4117	6.0154	5.9191	3.68	1.6	92.2
2-8/2.	4.4035	6.0022	5.9161	3.69	1.5	92.4
2-8/3.	4.4118	5.9738	5.9476	3.80	0.4	95.1
2-8/4.	4.3944	5.9779	5.9066	3.72	1.2	93.2
2-8/5.	4.4157	6.0178	5.9225	3.68	1.6	92.3
2-9/1.	4.4123	5.9960	5.8889	3.70	1.8	92.4
2-9/2.	4.4118	5.9804	5.9367	3.77	0.74	94.0
2-9/3.	4.4193	5.9934	5.9768	3.78	0.28	94.4
2-9/4.	4.4316	6.0598	5.9407	3.64	2.0	90.7
2-9/5.	4.4149	5.9744	5.9213	3.78	0.90	94.4
2-10/1.	4.4689	6.0460	6.0228	3.81	0.39	93.4
2-10/2.	4.4321	5.9995	5.9863	3.81	0.22	93.4
2-10/3.	4.4381	5.9884	5.9910	3.85	0.04	94.5
2-10/4.	4.4730	6.0695	6.0288	3.76	0.68	92.4
2-10/5.	4.4331	5.9833	5.9622	3.83	0.35	94.1

Specific gravity, Water absorption and Relative density of AES-11						
Firing Temp : 1600 °C						
No.	Suspended weight	Saturated weight	Dry weight	Specific gravity	Water absorption(%)	Relative density(%)
2-6/1.	4.4299	6.0136	5.9590	3.75	0.92	94.5
2-6/2.	4.3958	5.9587	5.9092	3.77	0.84	94.9
2-6/3.	4.3773	5.9198	5.8900	3.81	0.50	95.9
2-6/4.	4.4165	5.9565	5.9149	3.83	0.70	96.4
2-6/5.	4.3737	5.9117	5.8847	3.81	0.46	96.1
2-7/1.	4.3627	5.9148	5.8668	3.77	0.82	94.9
2-7/2.	4.3244	5.8386	5.8190	3.83	0.34	96.5
2-7/3.	4.3552	5.8726	5.8553	3.85	0.30	96.9
2-7/4.	4.3663	5.9021	5.8702	3.81	0.54	96.0
2-7/5.	4.4074	5.9674	5.9246	3.78	0.72	95.4
2-8/1.	4.4291	5.9684	5.9540	3.86	0.24	96.6
2-8/2.	4.4274	5.9514	5.9345	3.88	0.28	97.3
2-8/3.	4.3949	5.9273	5.8965	3.84	0.52	96.1
2-8/4.	4.4142	5.9425	5.9308	3.87	0.20	96.9
2-8/5.	4.4046	5.9618	5.9048	3.78	0.96	94.7
2-9/1.	4.3995	5.9261	5.8860	3.84	0.68	95.8
2-9/2.	4.4242	5.9783	5.9167	3.79	1.04	94.6
2-9/3.	4.4409	5.9758	5.9440	3.86	0.54	96.2
2-9/4.	4.4364	5.9568	5.9502	3.90	0.11	97.2
2-9/5.	4.4152	5.9179	5.9428	3.94	0.42	98.3
2-10/1.	4.4367	5.9596	5.9317	3.88	0.47	95.3
2-10/2.	4.4196	5.9034	5.9277	3.98	0.41	97.7
2-10/3.	4.4394	5.9356	6.0020	4.00	1.1	98.1
2-10/4.	4.4360	5.9351	5.9997	3.99	1.1	97.9
2-10/5.	4.4331	5.9301	5.9199	3.94	0.17	96.8

Specific gravity, Water absorption and Relative density of AES-11						
Firing Temp : 1650 °C						
No.	Suspended weight	Saturated weight	Dry weight	Specific gravity	Water absorption(%)	Relative density(%)
2-6/1.	4.3236	5.8190	5.8079	3.87	0.19	97.5
2-6/2.	4.4140	5.9380	5.9317	3.88	0.11	97.7
2-6/3.	4.3852	5.8962	5.8949	3.89	0.02	98.0
2-6/4.	4.4157	5.9524	5.9332	3.85	0.32	96.9
2-6/5.	4.4204	5.9685	5.9393	3.82	0.49	96.3
2-7/1.	4.3986	5.9373	5.8179	3.77	2.0	95.0
2-7/2.	4.3804	5.9350	5.8707	3.76	1.1	94.8
2-7/3.	4.3721	5.8919	5.8651	3.85	0.46	96.9
2-7/4.	4.4018	5.9121	5.9081	3.90	0.07	98.3
2-7/5.	4.3827	5.9188	5.8796	3.82	0.67	96.1
2-8/1.	4.4263	5.9281	5.9273	3.93	0.01	98.6
2-8/2.	4.4344	5.9415	5.9393	3.93	0.04	98.4
2-8/3.	4.4350	5.9404	5.9393	3.93	0.02	98.6
2-8/4.	4.4330	5.9671	5.9340	3.86	0.56	96.6
2-8/5.	4.3937	5.9001	5.8868	3.90	0.22	97.6
2-9/1.	4.4192	5.9159	5.9106	3.94	0.09	98.1
2-9/2.	4.4031	5.9049	5.8843	3.90	0.35	97.4
2-9/3.	4.4113	5.8997	5.8956	3.95	0.07	98.4
2-9/4.	4.4092	5.9017	5.8974	3.94	0.07	98.2
2-9/5.	4.4266	5.9402	5.9172	3.90	0.39	97.2
2-10/1.	4.4935	5.9814	6.0132	4.03	0.53	98.9
2-10/2.	4.4493	5.9260	5.9288	4.00	0.05	98.2
2-10/3.	4.4705	5.9525	5.9513	4.00	0.02	98.2
2-10/4.	4.4466	5.9472	5.9129	3.93	0.58	96.4
2-10/5.	4.4770	5.9598	5.9583	4.00	0.02	98.3

Appendix 9

Thickness and Radius of AES-11		
Firing Temperature :1450 °C		
No.	d : Thickness(mm)	C : Radius (mm)
2-6/1.	2.604	15.13
2-6/2.	2.609	15.13
2-6/3.	2.593	15.20
2-6/4.	2.529	15.20
2-6/5.	2.530	15.15
2-7/1.	2.749	15.13
2-7/2.	2.618	15.13
2-7/3.	2.579	15.25
2-7/4.	2.457	15.28
2-7/5.	2.491	15.25
2-8/1.	2.649	15.30
2-8/2.	2.635	15.30
2-8/3.	2.680	15.40
2-8/4.	2.607	15.38
2-8/5.	2.590	15.30
2-9/1.	2.635	15.30
2-9/2.	2.757	15.33
2-9/3.	2.605	15.48
2-9/4.	2.587	15.45
2-9/5.	2.601	15.40
2-10/1.	2.557	15.38
2-10/2.	2.583	15.40
2-10/3.	2.609	15.55
2-10/4.	2.632	15.50
2-10/5.	2.660	15.43

Thickness and Radius of AES-11		
Firing Temperature :1500 °C		
No.	d : Thickness(mm)	C : Radius (mm)
2-6/1.	2.493	14.85
2-6/2.	2.470	14.85
2-6/3.	2.477	14.90
2-6/4.	2.444	14.85
2-6/5.	2.566	14.83
2-7/1.	2.438	14.90
2-7/2.	2.482	14.90
2-7/3.	2.462	14.98
2-7/4.	2.435	14.90
2-7/5.	2.432	15.00
2-8/1.	2.515	14.75
2-8/2.	2.528	14.75
2-8/3.	2.511	14.88
2-8/4.	2.502	14.75
2-8/5.	2.549	14.83
2-9/1.	2.479	14.78
2-9/2.	2.513	14.78
2-9/3.	2.545	14.90
2-9/4.	2.438	14.88
2-9/5.	2.442	14.95
2-10/1.	2.554	14.78
2-10/2.	2.493	14.80
2-10/3.	2.548	14.93
2-10/4.	2.556	14.83
2-10/5.	2.518	14.95

Thickness and Radius of AES-11		
Firing Temperature :1550 °C		
No.	d : Thickness(mm)	C : Radius (mm)
2-6/1.	2.482	14.55
2-6/2.	2.458	14.55
2-6/3.	2.525	15.00
2-6/4.	2.416	14.65
2-6/5.	2.419	14.50
2-7/1.	2.452	14.60
2-7/2.	2.542	15.00
2-7/3.	2.457	14.60
2-7/4.	2.536	14.65
2-7/5.	2.489	14.50
2-8/1.	2.521	14.30
2-8/2.	2.490	14.35
2-8/3.	2.421	14.40
2-8/4.	2.442	14.45
2-8/5.	2.503	14.40
2-9/1.	2.499	14.33
2-9/2.	2.417	14.48
2-9/3.	2.443	14.35
2-9/4.	2.523	14.45
2-9/5.	2.421	14.40
2-10/1.	2.148	14.35
2-10/2.	2.429	14.43
2-10/3.	2.419	14.38
2-10/4.	2.468	14.45
2-10/5.	2.413	14.43

Thickness and Radius of AES-11		
Firing Temperature :1600 °C		
No.	d : Thickness(mm)	C : Radius (mm)
2-6/1.	2.475	14.40
2-6/2.	2.483	14.25
2-6/3.	2.416	14.30
2-6/4.	2.388	14.40
2-6/5.	2.806	14.30
2-7/1.	2.446	14.35
2-7/2.	2.368	14.30
2-7/3.	2.371	14.35
2-7/4.	2.418	14.30
2-7/5.	2.460	14.30
2-8/1.	2.438	14.25
2-8/2.	2.425	14.30
2-8/3.	2.486	14.18
2-8/4.	2.439	14.30
2-8/5.	2.533	14.25
2-9/1.	2.421	14.25
2-9/2.	2.507	14.20
2-9/3.	2.468	14.20
2-9/4.	2.399	14.30
2-9/5.	2.380	14.30
2-10/1.	2.452	14.18
2-10/2.	2.361	14.25
2-10/3.	2.404	14.18
2-10/4.	2.406	14.18
2-10/5.	2.402	14.20

Thickness and Radius of AES-11		
Firing Temperature :1650 °C		
No.	d : Thickness(mm)	C : Radius (mm)
2-6/1.	2.344	14.30
2-6/2.	2.396	14.35
2-6/3.	2.373	14.30
2-6/4.	2.459	14.23
2-6/5.	2.450	14.25
2-7/1.	2.450	14.28
2-7/2.	2.471	14.25
2-7/3.	2.410	14.25
2-7/4.	2.365	14.30
2-7/5.	2.477	14.10
2-8/1.	2.398	14.18
2-8/2.	2.454	14.15
2-8/3.	2.423	14.13
2-8/4.	2.493	14.08
2-8/5.	2.426	14.15
2-9/1.	2.442	14.13
2-9/2.	2.422	14.10
2-9/3.	2.387	14.15
2-9/4.	2.397	14.18
2-9/5.	2.452	14.15
2-10/1.	2.433	14.05
2-10/2.	2.430	14.08
2-10/3.	2.412	14.08
2-10/4.	2.496	13.95
2-10/5.	2.392	14.18

Appendix 10

Strength measurement of 1450 °C specimens		
Composition	No.	Strength (MPa)
2-6.	1	43.5
	2	214.6
	3	244.3
	4	203.8
	5	308.7
	Average	242.9
2-7.	1	215.4
	2	291.4
	3	254.3
	4	189.2
	5	296.5
	Average	264.4
2-8.	1	241.1
	2	173.7
	3	210.2
	4	178.0
	5	235.1
	Average	207.6
2-9.	1	139.5
	2	192.4
	3	221.4
	4	175.6
	5	238.3
	Average	229.9
2-10.	1	200.6
	2	167.6
	3	195.9
	4	231.4
	5	205.0
	Average	200.1


























Strength measurement of 1500 °C specimens		
Composition	No.	Strength (MPa)
2-6.	1	405.4
	2	344.4
	3	395.6
	4	378.2
	5	384.7
	Average	381.7
2-7.	1	351.6
	2	384.9
	3	321.3
	4	394.0
	5	388.4
	Average	368.0
2-8.	1	437.3
	2	302.1
	3	400.5
	4	407.3
	5	395.6
	Average	388.6
2-9.	1	362.8
	2	410.0
	3	387.1
	4	402.8
	5	403.8
	Average	393.3
2-10.	1	374.5
	2	397.5
	3	400.3
	4	389.3
	5	360.5
	Average	384.42












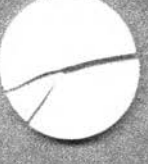



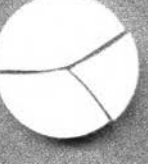
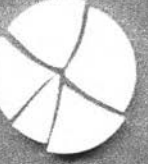
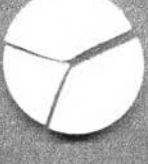







Strength measurement of 1550 °C specimens		
Composition	No.	Strength (MPa)
2-6.	1	455.4
	2	485.0
	3	391.8
	4	469.8
	5	42.5
	Average	450.5
2-7.	1	468.9
	2	399.9
	3	419.8
	4	463.6
	5	415.3
	Average	433.5
2-8.	1	436.2
	2	396.6
	3	384.6
	4	432.2
	5	529.7
	Average	435.9
2-9.	1	495.6
	2	435.3
	3	505.9
	4	490.2
	5	465.3
	Average	478.5
2-10.	1	475.0
	2	404.0
	3	533.6
	4	449.6
	5	472.5
	Average	466.94





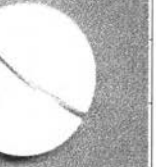



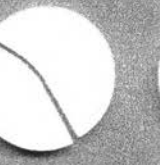
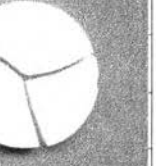
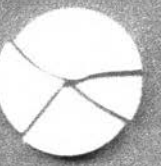


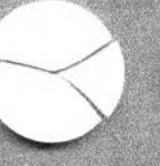
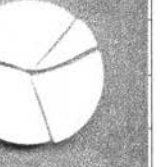

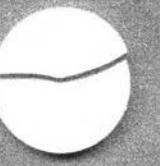



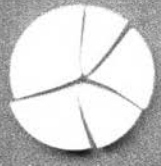

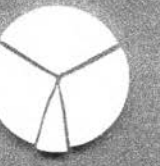

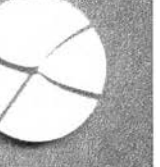
Strength measurement of 1600 °C specimens		
Composition	No.	Strength (MPa)
2-6.	1	407.3
	2	423.4
	3	494.3
	4	446.5
	5	118.0
	Average	442.9
2-7.	1	547.5
	2	518.4
	3	615.7
	4	545.4
	5	478.0
	Average	541.0
2-8.	1	663.2
	2	541.7
	3	632.7
	4	502.1
	5	726.2
	Average	613.6
2-9.	1	567.3
	2	502.4
	3	557.6
	4	458.2
	5	583.2
	Average	533.7
2-10.	1	541.9
	2	537.8
	3	562.7
	4	511.2
	5	576.9
	Average	546.1

Strength measurement of 1650 °C specimens		
Composition	No.	Strength (MPa)
2-6.	1	491.2
	2	430.3
	3	468.2
	4	465.5
	5	380.1
	Average	463.8
2-7.	1	381.2
	2	417.2
	3	325.0
	4	372.2
	5	364.4
	Average	383.8
2-8.	1	201.5
	2	423.3
	3	413.9
	4	453.4
	5	326.4
	Average	430.2
2-9.	1	428.5
	2	457.1
	3	440.0
	4	384.5
	5	395.8
	Average	421.2
2-10.	1	436.5
	2	357.4
	3	448.0
	4	475.7
	5	453.4
	Average	453.4

Appendix 11

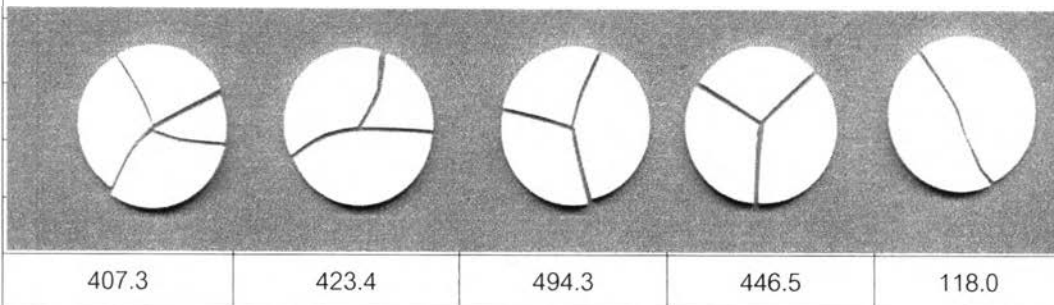
Fracture of 1450 °C specimens				
AES-11 pure				
				
43.5	214.6	244.3	203.8	308.7
AES-11 + 0.5%MgO				
				
215.4	291.4	254.3	189.2	296.5
AES-11 + 1.5%ZrO ₂				
				
241.1	173.7	210.2	178.0	235.1
AES-11 + 3.0%ZrO ₂				
				
139.5	192.4	221.4	175.6	238.3
AES-11 + 7.5%ZrO ₂				
				
200.6	167.6	195.9	231.4	205.0

Fracture of 1500 °C specimens				
AES-11 pure				
				
405.4	344.4	395.6	378.2	384.7
AES-11 + 0.5%MgO				
				
351.6	384.9	321.3	394.0	388.4
AES-11 + 1.5%ZrO ₂				
				
437.3	302.1	400.5	407.3	395.6
AES-11 + 3.0%ZrO ₂				
				
362.8	410.0	387.1	402.8	403.8
AES-11 + 7.5%ZrO ₂				
				
374.5	397.5	400.3	389.3	360.5

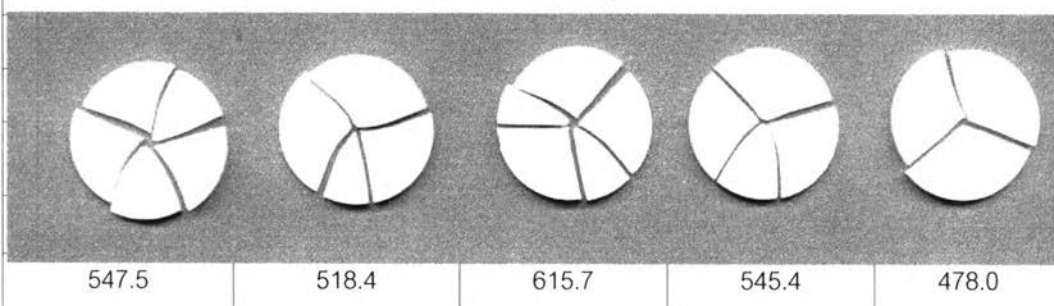
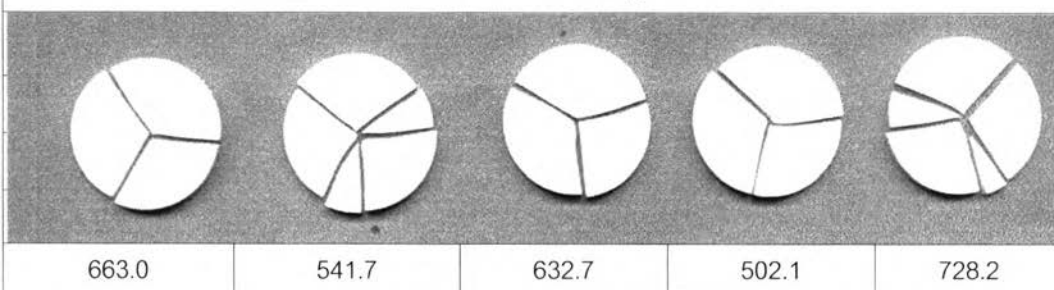
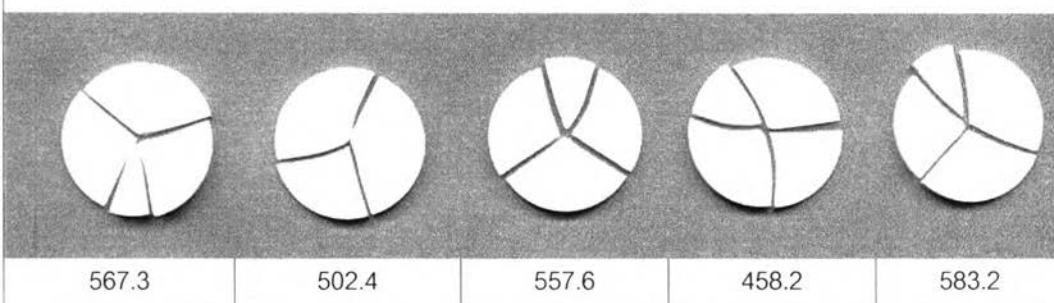
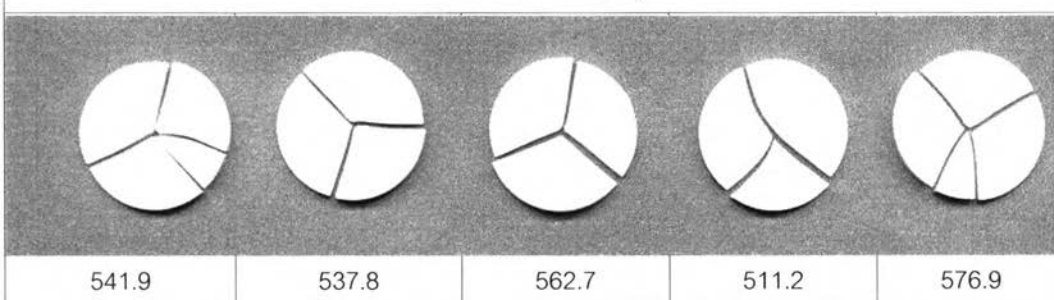
Fracture of 1550 °C specimens				
AES-11 pure				
				
455.4	485.0	391.8	469.8	42.5
AES-11 + 0.5%MgO				
				
463.9	399.9	419.8	463.6	415.3
AES-11 + 1.5%ZrO ₂				
				
436.2	396.6	384.6	432.2	529.7
AES-11 + 3.0%ZrO ₂				
				
495.6	435.3	505.9	490.2	465.3
AES-11 + 7.5%ZrO ₂				
				
475.0	404.0	533.6	449.6	472.5












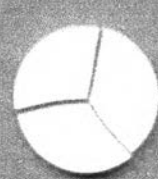
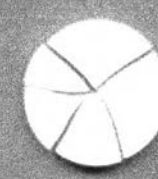

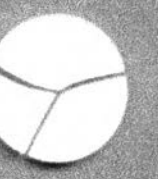

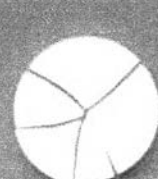

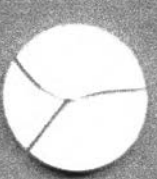
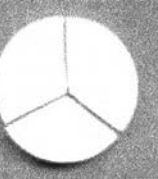
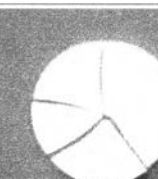




Fracture of 1600 °C specimens

AES-11 pure

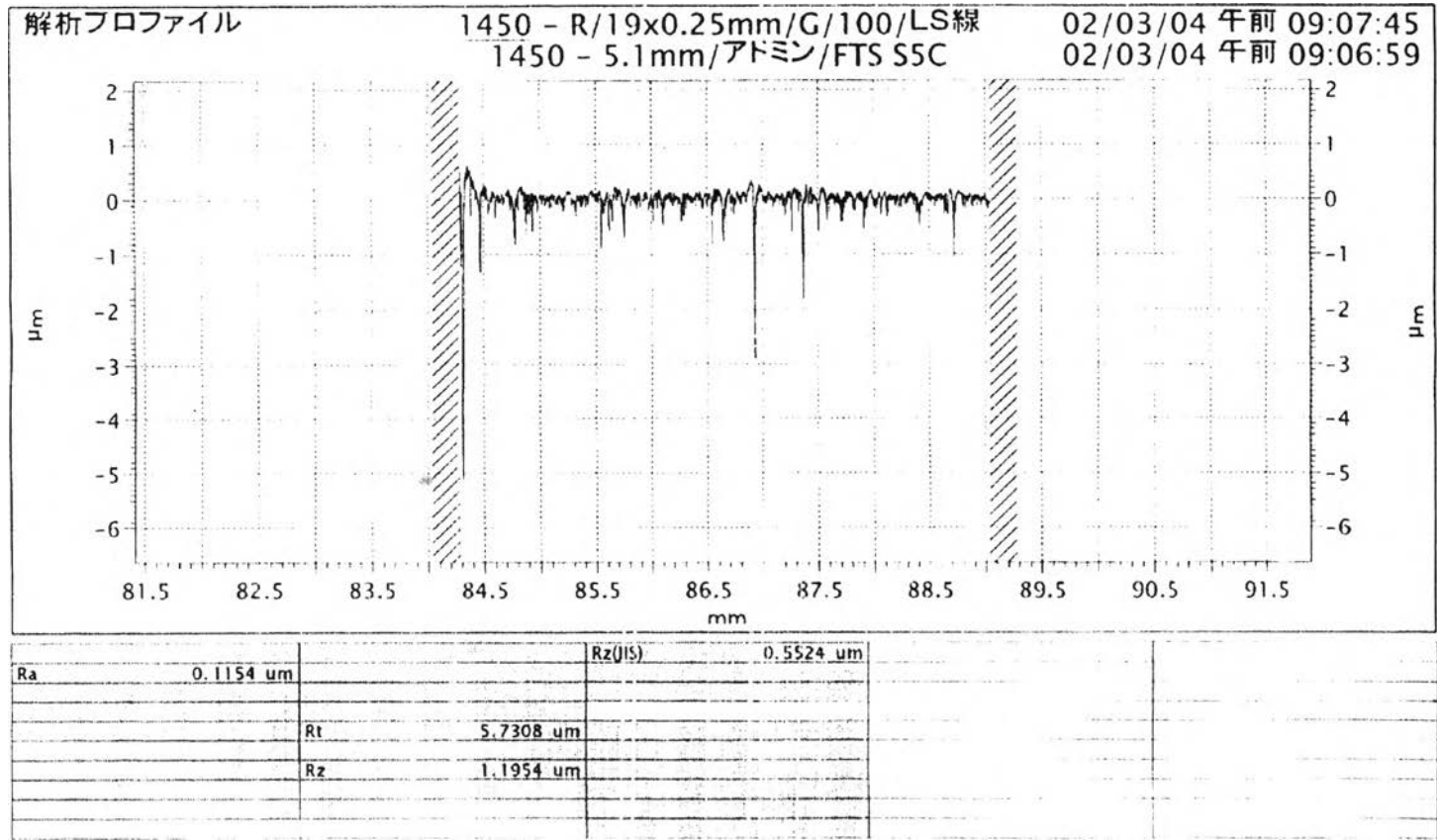


AES-11 + 0.5%MgO

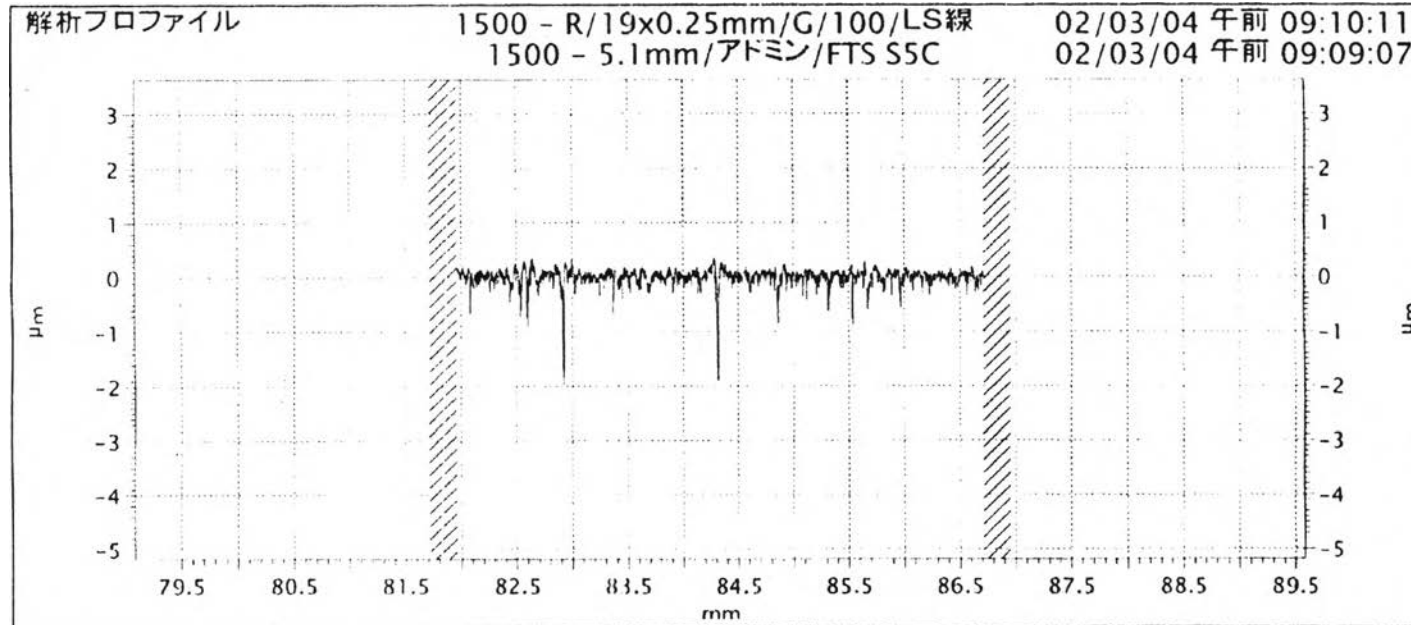
AES-11 + 1.5%ZrO₂AES-11 + 3.0%ZrO₂AES-11 + 7.5%ZrO₂

Fracture of 1650 °C specimens				
AES-11 pure				
				
491.2	430.3	468.2	465.5	380.1
AES-11 + 0.5%MgO				
				
381.2	417.2	325.0	372.2	364.4
AES-11 + 1.5%ZrO ₂				
				
201.5	423.3	413.9	453.4	326.4
AES-11 + 3.0%ZrO ₂				
				
428.5	457.1	440.0	384.5	395.8
AES-11 + 7.5%ZrO ₂				
				
436.5	357.4	448.0	475.7	453.4

Taylor Hobson

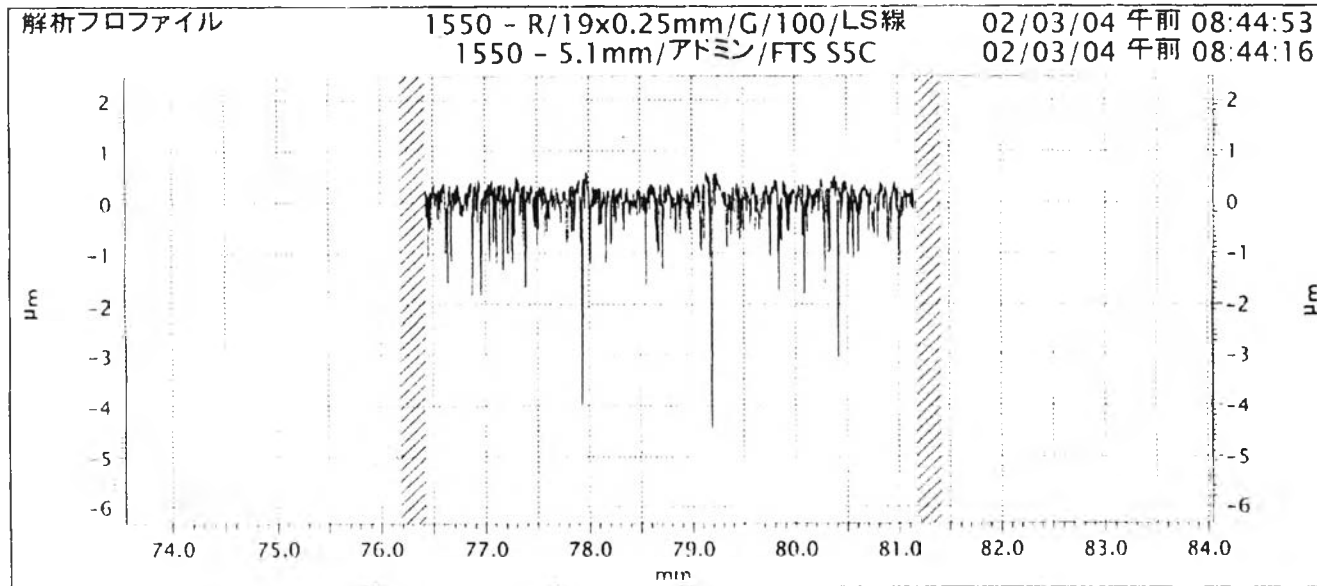


Taylor Hobson



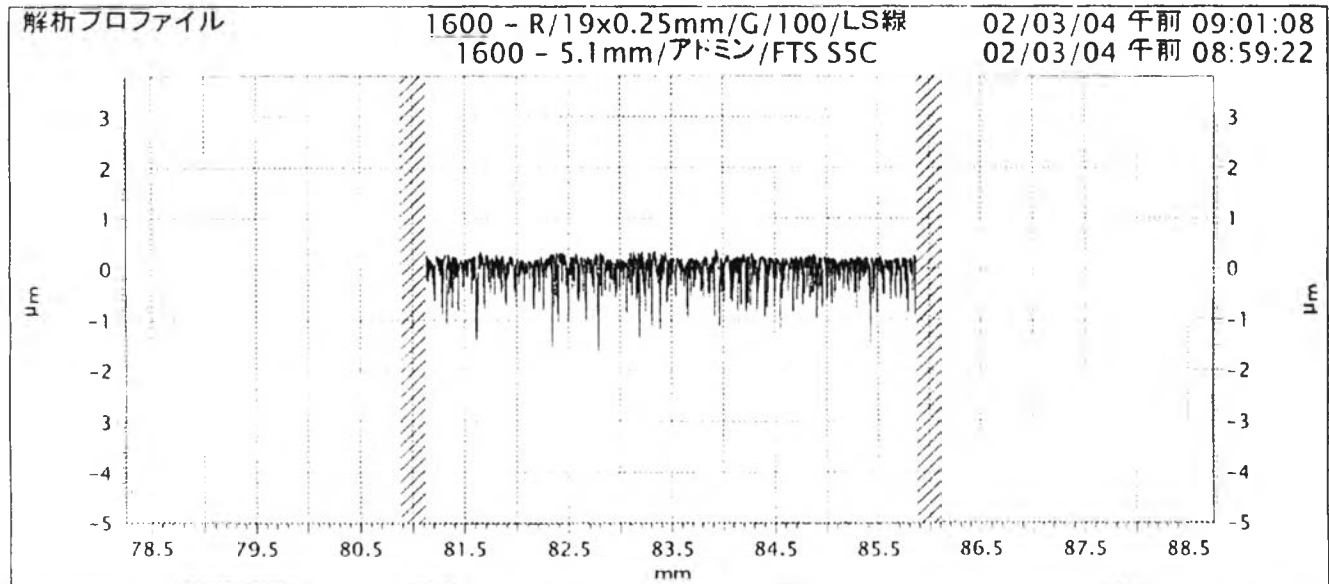
Ra	0.0937 μm	Rz(JIS)	0.4637 μm
	Rt	2.3465 μm	
	Rz	0.8888 μm	

Taylor Hobson



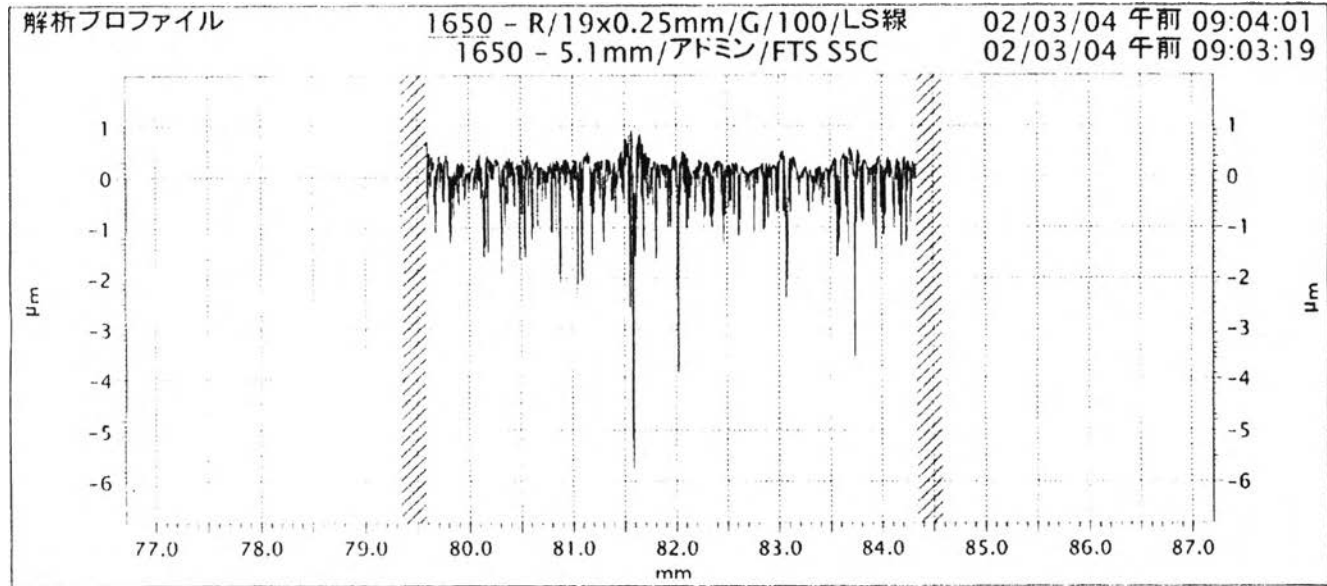
Ra	0.2364 μm	Rz(JIS)	1.1685 μm
	Rt	5.0528 μm	
	Rz	2.1389 μm	

Taylor Hobson



Ra	0.1806 μm	Rz(IIS)	0.9843 μm
		Rt	2.0022 μm
		Rz	1.3918 μm

Taylor Hobson



Ra	0.2982 μm	Rz(jIS)	1.4471 μm
	Rt	6.6768 μm	
	Rz	2.6578 μm	

Appendix 13

Specific gravity, Water absorption and Relative density of AES-11						
Sintered at 1450 °C for 1 hr						
No.	Suspended weight	Saturated weight	Dry weight	Water absorption (%)	Specific gravity	Relative density
2-6/1.	0.6156	0.8807	0.8276	6.4	3.11	78.4
2-6/2.	0.6199	0.8905	0.8352	6.6	3.08	77.5
2-6/3.	0.6171	0.8849	0.8323	6.3	3.10	78.0
2-7/1.	0.6176	0.8836	0.8311	6.3	3.11	78.5
2-7/2.	0.6265	0.9035	0.8464	6.7	3.05	76.8
2-7/3.	0.5697	0.8156	0.7692	6.0	3.12	78.6
2-8/1.	0.6003	0.8672	0.8065	7.5	3.01	75.5
2-8/2.	0.5851	0.8575	0.7886	8.7	2.89	72.3
2-8/3.	0.6165	0.8921	0.8262	8.0	2.99	74.9
2-9/1.	0.6637	0.9763	0.8919	9.5	2.84	70.9
2-9/2.	0.6276	0.9187	0.8444	8.8	2.89	72.1
2-9/3.	0.5830	0.8590	0.7827	9.7	2.83	70.5
2-10/1.	0.6402	0.9294	0.8566	8.5	2.95	72.5
2-10/2.	0.5943	0.8632	0.7934	8.80	2.94	72.2
2-10/3.	0.5976	0.8671	0.7965	8.86	2.95	72.3

Specific gravity, Water absorption and Relative density of AES-11						
Sintered at 1450 °C for 4 hrs						
No.	Suspended weight	Saturated weight	Dry weight	Water absorption (%)	Specific gravity	Relative density (%)
2-6/1.	0.5963	0.8459	0.7904	7.0	3.16	79.5
2-6/2.	0.5874	0.8296	0.8020	3.4	3.30	83.1
2-6/3.	0.6075	0.8674	0.8203	5.7	3.15	79.2
2-7/1.	0.6366	0.9006	0.8567	5.1	3.24	81.5
2-7/2.	0.6344	0.8978	0.8528	5.3	3.23	81.3
2-7/3.	0.6119	0.8633	0.8217	5.1	3.26	82.1
2-8/1.	0.6419	0.9086	0.8627	5.3	3.22	80.8
2-8/2.	0.5835	0.8359	0.7909	5.7	3.12	78.3
2-8/3.	0.5661	0.8031	0.7596	5.7	3.20	80.1
2-9/1.	0.6175	0.8886	0.8292	7.2	3.05	76.0
2-9/2.	0.6430	0.9174	0.8596	6.7	3.12	77.8
2-9/3.	0.5926	0.8495	0.7946	6.9	3.08	76.9
2-10/1.	0.6114	0.8616	0.8132	6.0	3.24	79.5
2-10/2.	0.5963	0.8472	0.7949	6.58	3.16	77.5
2-10/3.	0.6355	0.9032	0.8465	6.70	3.15	77.4

Specific gravity, Water absorption and Relative density of AES-11						
Sintered at 1450 °C for 6 hrs						
No.	Suspended weight	Saturated weight	Dry weight	Water absorption (%)	Specific gravity	Relative density
2-6/1.	0.6177	0.8681	0.8285	4.78	3.30	83.1
2-6/2.	0.6237	0.8766	0.8367	4.77	3.30	83.1
2-6/3.	0.5867	0.8249	0.7842	5.19	3.28	82.7
2-7/1.	0.6465	0.9123	0.8702	4.84	3.26	82.2
2-7/2.	0.6210	0.8693	0.8347	4.14	3.35	84.4
2-7/3.	0.5947	0.8301	0.7896	5.13	3.34	84.2
2-8/1.	0.6035	0.8510	0.8103	5.02	3.26	81.8
2-8/2.	0.6260	0.8864	0.8440	5.02	3.23	81.0
2-8/3.	0.6108	0.8604	0.8196	4.98	3.27	82.0
2-9/1.	0.6060	0.8607	0.8117	6.04	3.18	79.2
2-9/2.	0.6287	0.8940	0.8400	6.43	3.16	78.7
2-9/3.	0.6109	0.8727	0.8174	6.76	3.11	77.6
2-10/1.	0.6259	0.8852	0.8376	5.68	3.22	79.0
2-10/2.	0.5967	0.8413	0.7965	5.62	3.25	79.7
2-10/3.	0.6511	0.9179	0.8669	5.88	3.24	79.5

Specific gravity, Water absorption and Relative density of AES-11						
Sintered at 1500 °C for 1 hr						
No.	Suspended weight	Saturated weight	Dry weight	Water absorption (%)	Specific gravity	Relative density (%)
2-6/1.	0.6285	0.8880	0.8468	4.9	3.25	81.9
2-6/2.	0.5801	0.8286	0.7882	5.1	3.16	79.6
2-6/3.	0.6046	0.8553	0.8135	5.1	3.23	81.5
2-7/1.	0.6110	0.8574	0.8223	4.3	3.33	83.8
2-7/2.	0.5976	0.8377	0.8030	4.3	3.33	84.0
2-7/3.	0.5640	0.7957	0.7603	4.7	3.27	82.4
2-8/1.	0.6452	0.9062	0.8637	4.9	3.30	82.7
2-8/2.	0.6177	0.8667	0.8290	4.5	3.32	83.2
2-8/3.	0.6063	0.8549	0.8162	4.7	3.27	82.0
2-9/1.	0.6259	0.8874	0.8391	5.8	3.20	79.8
2-9/2.	0.6035	0.8559	0.8089	5.8	3.20	79.6
2-9/3.	0.6240	0.8825	0.8348	5.7	3.22	80.2
2-10/1.	0.5937	0.8329	0.7936	5.0	3.31	81.2
2-10/2.	0.6040	0.8449	0.8035	5.2	3.32	81.6
2-10/3.	0.6445	0.9105	0.8615	5.7	3.23	79.2

Specific gravity, Water absorption and Relative density of AES-11						
Sintered at 1500 °C for 4 hrs						
No.	Suspended weight	Saturated weight	Dry weight	Water absorption (%)	Specific gravity	Relative density
2-6/1.	0.5752	0.8017	0.7769	3.2	3.42	86.1
2-6/2.	0.6342	0.8798	0.8470	3.9	3.44	86.6
2-6/3.	0.6156	0.8603	0.8281	3.9	3.37	85.0
2-7/1.	0.6410	0.8908	0.8630	3.2	3.44	86.8
2-7/2.	0.6181	0.8575	0.8320	3.1	3.46	87.3
2-7/3.	0.6325	0.8866	0.8591	3.2	3.37	84.9
2-8/1.	0.6083	0.8450	0.8195	3.1	3.45	86.5
2-8/2.	0.6180	0.8535	0.8292	2.9	3.51	88.0
2-8/3.	0.6199	0.8540	0.8349	2.3	3.56	89.1
2-9/1.	0.6476	0.9016	0.8677	3.9	3.40	84.9
2-9/2.	0.6102	0.8437	0.8180	3.1	3.49	87.1
2-9/3.	0.6083	0.8480	0.8154	4.0	3.39	84.5
2-10/1.	0.6460	0.8872	0.8624	2.9	3.56	87.5
2-10/2.	0.6314	0.8673	0.8416	3.0	3.56	87.3
2-10/3.	0.6139	0.8442	0.8190	3.1	3.54	87.0

Specific gravity, Water absorption and Relative density of AES-11						
Sintered at 1500 °C for 6 hrs						
No.	Suspended weight	Saturated weight	Dry weight	Water absorption (%)	Specific gravity	Relative density
2-6/1.	0.5968	0.8363	0.8077	3.5	3.36	84.7
2-6/2.	0.5829	0.8101	0.7844	3.3	3.44	86.7
2-6/3.	0.6069	0.8478	0.8183	3.6	3.39	85.3
2-7/1.	0.6589	0.9076	0.8842	2.6	3.54	89.3
2-7/2.	0.6314	0.8716	0.8493	2.6	3.52	88.8
2-7/3.	0.5787	0.7987	0.7800	2.4	3.53	89.1
2-8/1.	0.6599	0.9078	0.8900	2.0	3.58	89.7
2-8/2.	0.5969	0.8199	0.8059	1.7	3.60	90.3
2-8/3.	0.5755	0.7870	0.7735	1.7	3.64	91.4
2-9/1.	0.5808	0.8060	0.7846	2.7	3.47	86.6
2-9/2.	0.6412	0.8859	0.8624	2.7	3.51	87.6
2-9/3.	0.5843	0.8087	0.7849	3.0	3.49	86.9
2-10/1.	0.6559	0.8971	0.8787	2.1	3.63	89.1
2-10/2.	0.6457	0.8823	0.8635	2.2	3.64	89.3
2-10/3.	0.5776	0.7899	0.7715	2.4	3.62	88.9

Specific gravity, Water absorption and Relative density of AES-11						
Sintered at 1550 °C for 1 hr						
No.	Suspended weight	Saturated weight	Dry weight	Water absorption (%)	Specific gravity	Relative density (%)
2-6/1.	0.6046	0.8486	0.8108	4.7	3.31	83.4
2-6/2.	0.6177	0.8658	0.8301	4.3	3.33	84.0
2-6/3.	0.6023	0.8445	0.8103	4.2	3.33	84.0
2-7/1.	0.5933	0.8476	0.7960	6.5	3.12	78.6
2-7/2.	0.6743	0.9176	0.9045	1.4	3.70	93.4
2-7/3.	0.5979	0.8208	0.8028	2.2	3.59	90.4
2-8/1.	0.6310	0.8443	0.8384	0.70	3.92	98.2
2-8/2.	0.6261	0.8248	0.8009	3.0	4.02	101
2-8/3.	0.6376	0.8584	0.8520	0.75	3.84	96.4
2-9/1.	0.5906	0.8112	0.7908	2.6	3.57	89.1
2-9/2.	0.6162	0.8471	0.8260	2.6	3.56	88.9
2-9/3.	0.5882	0.8090	0.7876	2.7	3.56	88.6
2-10/1.	0.6237	0.8584	0.8426	1.9	3.58	87.8
2-10/2.	0.5962	0.8512	0.8342	2.0	3.26	80.0
2-10/3.	0.6339	0.8633	0.8478	1.8	3.68	90.4

Specific gravity, Water absorption and Relative density of AES-11						
Sintered at 1550 °C for 4 hrs						
No.	Suspended weight	Saturated weight	Dry weight	Water absorption (%)	Specific gravity	Relative density (%)
2-6/1.	0.6259	0.8648	0.8415	2.8	3.51	88.4
2-6/2.	0.6324	0.8685	0.8496	2.2	3.59	90.3
2-6/3.	0.5960	0.8217	0.8015	2.5	3.54	89.1
2-7/1.	0.5806	0.7929	0.7814	1.5	3.67	92.4
2-7/2.	0.6288	0.8567	0.8469	1.2	3.70	93.3
2-7/3.	0.6340	0.8636	0.8526	1.3	3.70	93.25
2-8/1.	0.6140	0.8308	0.8296	0.14	3.81	95.6
2-8/2.	0.6161	0.8321	0.8307	0.17	3.83	96.0
2-8/3.	0.6562	0.8857	0.8844	0.15	3.84	96.2
2-9/1.	0.5998	0.8137	0.8051	1.1	3.75	93.5
2-9/2.	0.6000	0.8140	0.8036	1.3	3.74	93.3
2-9/3.	0.5713	0.7742	0.7656	1.1	3.76	93.8
2-10/1.	0.5919	0.7963	0.7957	0.08	3.88	95.2
2-10/2.	0.5913	0.7948	0.7937	0.14	3.89	95.4
2-10/3.	0.6325	0.8505	0.8496	0.10	3.88	95.3

Specific gravity, Water absorption and Relative density of AES-11						
Sintered at 1550 °C for 6 hrs						
No.	Suspended weight	Saturated weight	Dry weight	Water absorption (%)	Specific gravity	Relative density(%)
2-6/1.	0.6363	0.8698	0.8550	1.7	3.65	91.9
2-6/2.	0.6093	0.8374	0.8190	2.2	3.58	90.1
2-6/3.	0.6010	0.8219	0.8073	1.8	3.64	91.7
2-7/1.	0.6424	0.8725	0.8655	0.81	3.75	94.5
2-7/2.	0.6007	0.8166	0.8081	1.0	3.73	94.0
2-7/3.	0.5944	0.8084	0.8014	0.87	3.73	94.0
2-8/1.	0.6053	0.8156	0.8152	0.05	3.86	96.8
2-8/2.	0.5978	0.8063	0.8053	0.12	3.85	96.4
2-8/3.	0.6011	0.8115	0.8100	0.18	3.84	96.1
2-9/1.	0.6373	0.8637	0.8546	1.1	3.76	93.8
2-9/2.	0.6018	0.8115	0.8071	0.54	3.84	95.6
2-9/3.	0.6228	0.8418	0.8364	0.65	3.81	94.9
2-10/1.	0.5989	0.8029	0.8025	0.05	3.92	96.2
2-10/2.	0.6029	0.8070	0.8066	0.05	3.94	96.7
2-10/3.	0.6404	0.8571	0.8569	0.02	3.94	96.7

Specific gravity, Water absorption and Relative density of AES-11						
Sintered at 1600 °C for 1 hr						
No.	Suspended weight	Saturated weight	Dry weight	Water absorption (%)	Specific gravity	Relative density (%)
2-6/1.	0.6523	0.8845	0.8712	1.5	3.74	94.2
2-6/2.	0.5684	0.7677	0.7599	1.0	3.80	95.7
2-6/3.	0.5857	0.7944	0.7835	1.4	3.74	94.3
2-7/1.	0.5894	0.7963	0.7915	0.61	3.81	96.1
2-7/2.	0.6294	0.8523	0.8452	0.84	3.78	95.2
2-7/3.	0.6357	0.8533	0.8448	1.0	3.87	97.5
2-8/1.	0.6340	0.8525	0.8518	0.08	3.89	97.4
2-8/2.	0.5707	0.7686	0.7682	0.05	3.87	97.0
2-8/3.	0.5973	0.8029	0.8020	0.11	3.89	97.4
2-9/1.	0.6368	0.8568	0.8518	0.59	3.86	96.2
2-9/2.	0.5925	0.7993	0.7935	0.73	3.82	95.4
2-9/3.	0.5870	0.7927	0.7857	0.89	3.81	94.9
2-10/1.	0.5974	0.7958	0.7951	0.09	4.00	98.0
2-10/2.	0.6328	0.8425	0.8410	0.16	4.00	98.1
2-10/3.	0.6276	0.8366	0.8363	0.04	3.99	97.9

Specific gravity, Water absorption and Relative density of AES-11						
Sintered at 1600 °C for 4 hrs						
No.	Suspended weight	Saturated weight	Dry weight	Water absorption (%)	Specific gravity	Relative density (%)
2-6/1.	0.6380	0.8653	0.8554	1.2	3.75	94.5
2-6/2.	0.6203	0.8391	0.8300	1.1	3.78	95.2
2-6/3.	0.5806	0.7905	0.7802	1.3	3.70	93.3
2-7/1.	0.6236	0.8467	0.8405	0.74	3.76	94.6
2-7/2.	0.6341	0.8582	0.8550	0.37	3.80	95.8
2-7/3.	0.5642	0.7632	0.7629	0.04	3.82	96.3
2-8/1.	0.5832	0.7849	0.7846	0.04	3.88	97.2
2-8/2.	0.5824	0.7839	0.7833	0.08	3.88	97.1
2-8/3.	0.5902	0.7947	0.7946	0.01	3.87	97.1
2-9/1.	0.6036	0.8147	0.8132	0.18	3.84	95.7
2-9/2.	0.6261	0.8433	0.8423	0.12	3.87	96.4
2-9/3.	0.5822	0.7852	0.7840	0.15	3.85	96.0
2-10/1.	0.5824	0.7783	0.7782	0.01	3.96	97.2
2-10/2.	0.6408	0.8561	0.8560	0.01	3.96	97.3
2-10/3.	0.6535	0.8743	0.8739	0.04	3.94	96.8

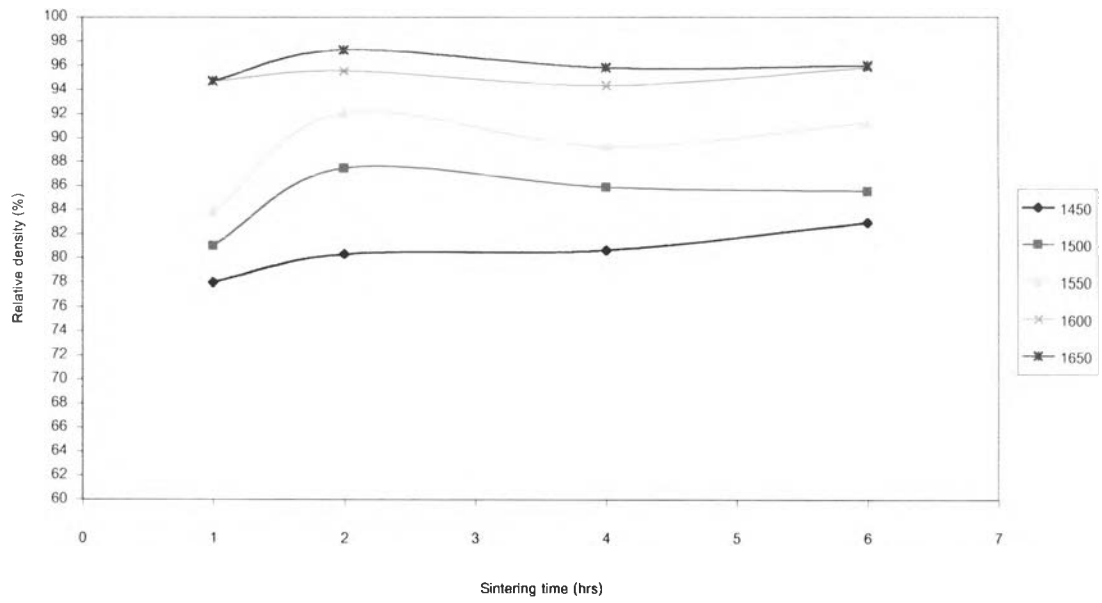
Specific gravity, Water absorption and Relative density of AES-11						
Sintered at 1600 °C for 6 hrs						
No.	Suspended weight	Saturated weight	Dry weight	Water absorption (%)	Specific gravity	Relative density (%)
2-6/1.	0.6066	0.8164	0.8124	0.49	3.86	97.2
2-6/2.	0.5838	0.7911	0.7854	0.72	3.78	95.1
2-6/3.	0.5970	0.8089	0.8027	0.77	3.78	95.1
2-7/1.	0.5868	0.7904	0.7901	0.04	3.87	97.5
2-7/2.	0.6292	0.8482	0.8477	0.06	3.86	97.2
2-7/3.	0.6049	0.8169	0.8155	0.17	3.83	96.6
2-8/1.	0.6447	0.8656	0.8654	0.02	3.90	97.9
2-8/2.	0.6419	0.8629	0.8627	0.02	3.89	97.5
2-8/3.	0.5989	0.8072	0.8070	0.02	3.86	96.8
2-9/1.	0.6027	0.8128	0.8074	0.67	3.83	95.5
2-9/2.	0.6265	0.8437	0.8431	0.07	3.87	96.5
2-9/3.	0.5779	0.7798	0.7787	0.14	3.84	95.8
2-10/1.	0.5967	0.7948	0.7944	0.05	4.00	98.1
2-10/2.	0.6622	0.8810	0.8809	0.01	4.01	98.5
2-10/3.	0.6354	0.8465	0.8464	0.01	4.00	98.1

Specific gravity, Water absorption and Relative density of AES-11						
Sintered at 1650 °C for 1 hr						
No.	Suspended weight	Saturated weight	Dry weight	Water absorption (%)	Specific gravity	Relative density (%)
2-6/1.	0.6039	0.8184	0.8103	1.0	3.76	94.8
2-6/2.	0.6080	0.8242	0.8159	1.0	3.76	94.7
2-6/3.	0.5971	0.8098	0.8023	0.93	3.76	94.7
2-7/1.	0.6401	0.8637	0.8628	0.10	3.84	96.9
2-7/2.	0.5876	0.7914	0.7909	0.06	3.87	97.4
2-7/3.	0.5857	0.7900	0.7895	0.06	3.85	97.0
2-8/1.	0.6358	0.8555	0.8553	0.02	3.88	97.2
2-8/2	0.6028	0.8095	0.8093	0.02	3.90	97.8
2-8/3.	0.6365	0.8545	0.8541	0.05	3.90	97.8
2-9/1.	0.6141	0.8259	0.8255	0.05	3.88	96.8
2-9/2.	0.6037	0.8082	0.8078	0.05	3.94	98.1
2-9/3.	0.6004	0.8068	0.8066	0.02	3.89	97.1
2-10/1.	0.6417	0.8427	0.8420	0.08	4.17	102
2-10/2.	0.6322	0.8552	0.8424	1.5	3.76	92.4
2-10/3.	0.6072	0.8107	0.8102	0.06	3.97	97.4

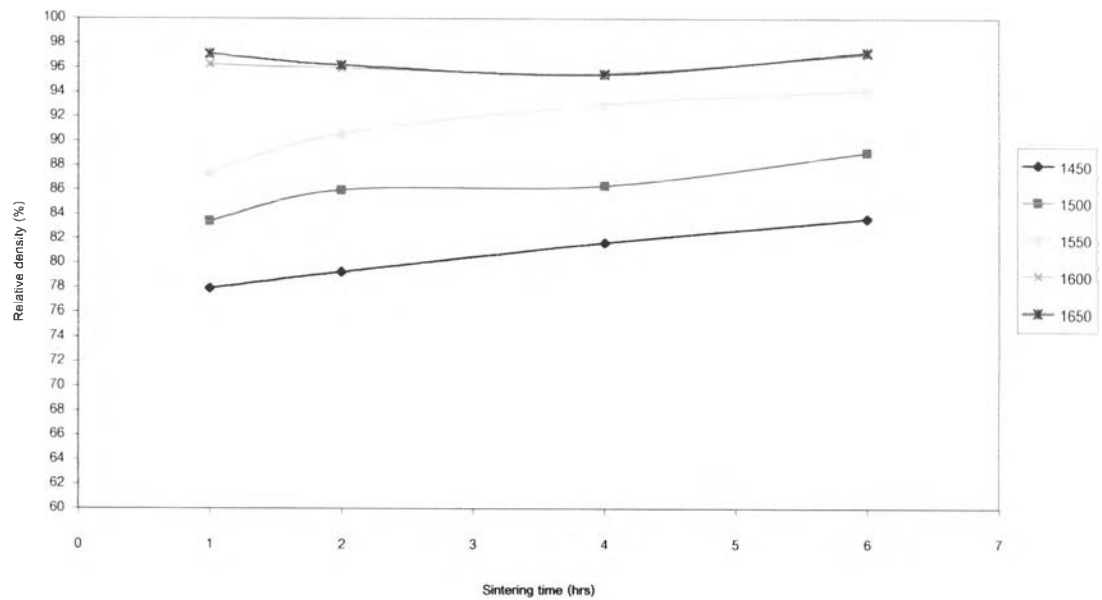
Specific gravity, Water absorption and Relative density of AES-11						
Sintered at 1650 °C for 4 hrs						
No.	Suspended weight	Saturated weight	Dry weight	Water absorption (%)	Specific gravity	Relative density (%)
2-6/1.	0.6192	0.8374	0.8371	0.04	3.84	96.6
2-6/2.	0.6173	0.8355	0.8339	0.19	3.82	96.3
2-6/3.	0.6260	0.8496	0.8396	1.2	3.76	94.6
2-7/1.	0.6438	0.8803	0.8706	1.1	3.68	92.8
2-7/2.	0.5941	0.8027	0.8024	0.04	3.85	96.9
2-7/3.	0.6507	0.8799	0.8793	0.07	3.84	96.7
2-8/1.	0.6370	0.8598	0.8595	0.03	3.86	96.7
2-8/2.	0.6021	0.8117	0.8112	0.06	3.87	97.0
2-8/3.	0.6140	0.8303	0.8293	0.12	3.83	96.1
2-9/1.	0.6106	0.8235	0.8231	0.05	3.87	96.4
2-9/2.	0.6437	0.8718	0.8626	1.1	3.78	94.3
2-9/3.	0.6087	0.8155	0.8149	0.07	3.94	98.2
2-10/1.	0.6164	0.8232	0.8230	0.02	3.98	97.7
2-10/2.	0.6138	0.8224	0.8175	0.60	3.92	96.2
2-10/3.	0.6312	0.8422	0.8420	0.02	3.99	98.0

Specific gravity, Water absorption and Relative density of AES-11						
Sintered at 1650 °C for 6 hrs						
No.	Suspended weight	Saturated weight	Dry weight	Water absorption (%)	Specific gravity	Relative density (%)
2-6/1.	0.6031	0.8155	0.8132	0.28	3.83	96.4
2-6/2.	0.6318	0.8553	0.8487	0.78	3.80	95.6
2-6/3.	0.5825	0.7885	0.7839	0.59	3.80	95.8
2-7/1.	0.5862	0.7917	0.7915	0.02	3.85	97.1
2-7/2.	0.6036	0.8146	0.8143	0.04	3.86	97.2
2-7/3.	0.5979	0.8064	0.8062	0.02	3.87	97.4
2-8/1.	0.5806	0.7836	0.7835	0.01	3.86	96.7
2-8/2.	0.6054	0.8170	0.8169	0.01	3.86	96.8
2-8/3.	0.6233	0.8417	0.8410	0.08	3.85	96.5
2-9/1.	0.5830	0.7856	0.7854	0.02	3.88	96.6
2-9/2.	0.6192	0.8339	0.8338	0.01	3.88	96.8
2-9/3.	0.6289	0.8464	0.8462	0.02	3.89	97.0
2-10/1.	0.5883	0.7869	0.7868	0.01	3.96	97.2
2-10/2.	0.5819	0.7799	0.7798	0.01	3.94	96.7
2-10/3.	0.6532	0.8735	0.8734	0.01	3.96	97.3

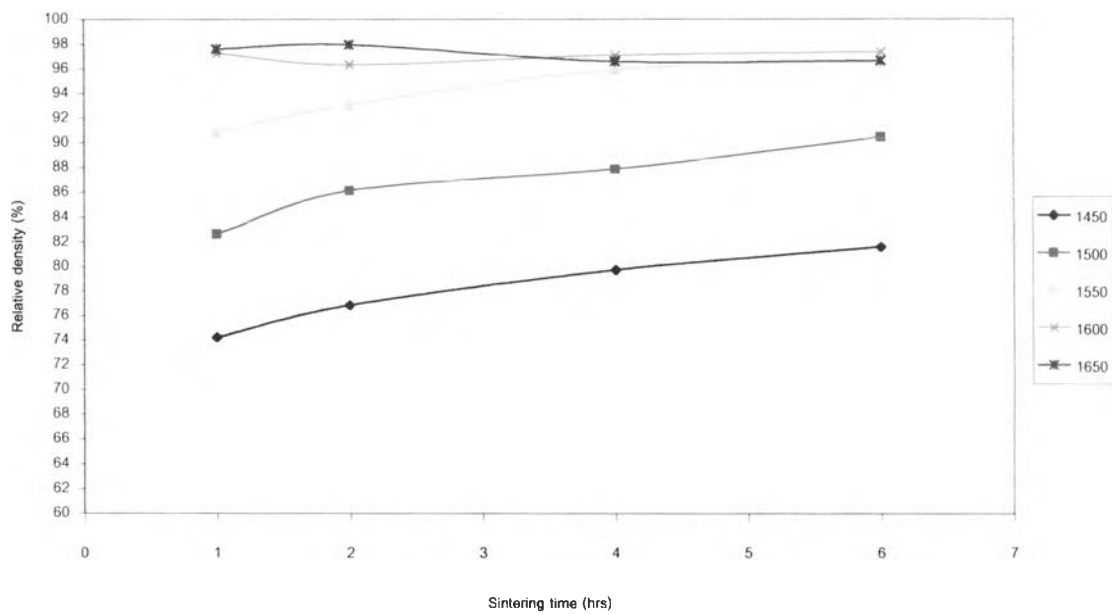
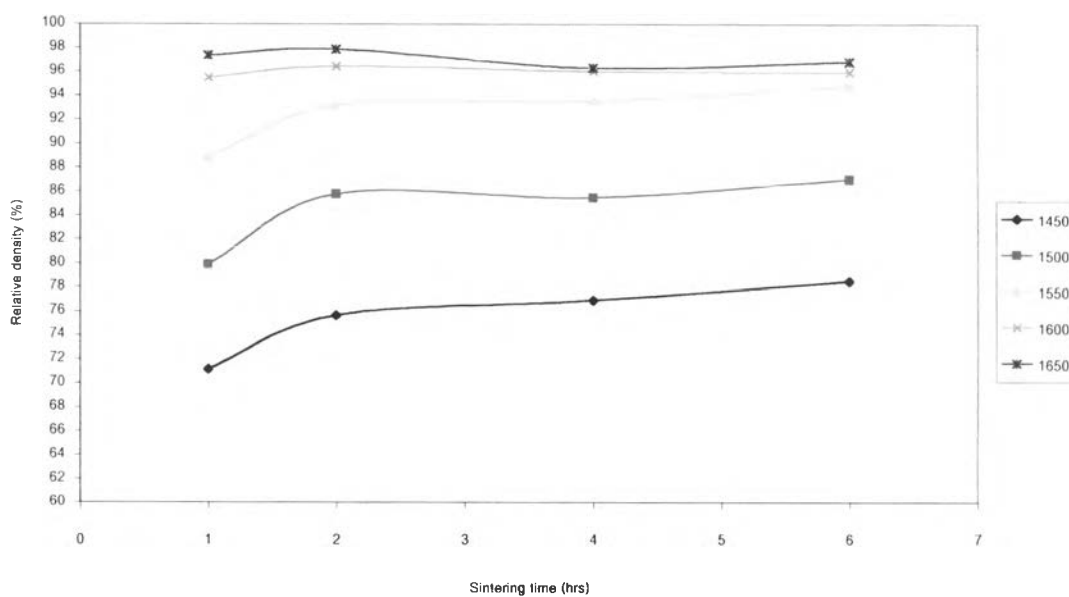
Appendix 14

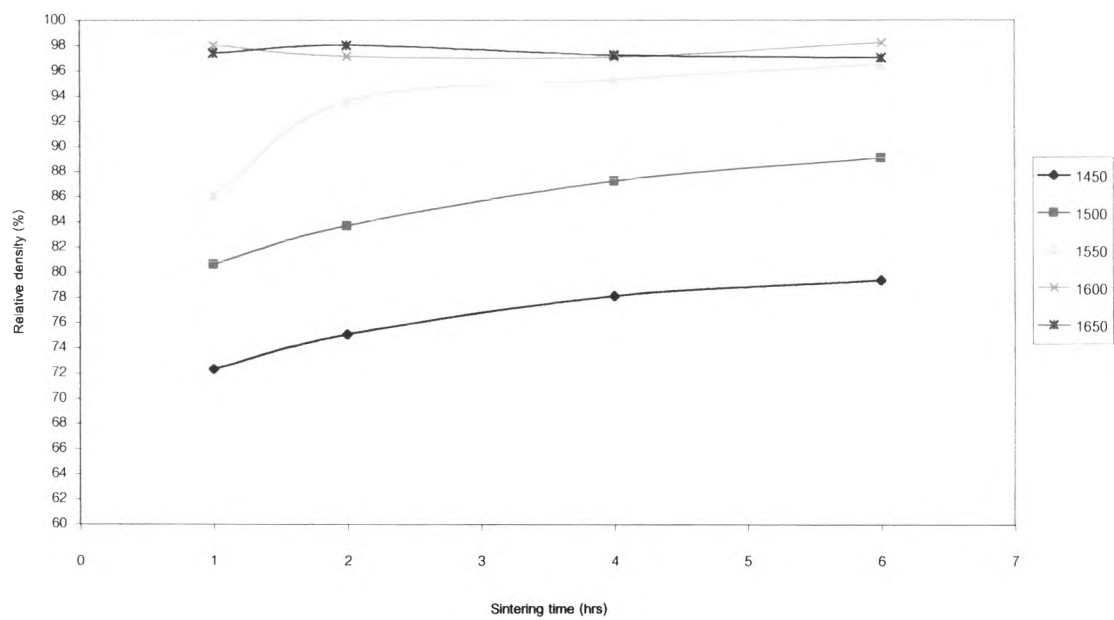


(a) pure AES-11



(b) 0.5% MgO doped AES-11

(c) 1.5%ZrO₂ doped AES-11(d) 3.0%ZrO₂ doped AES-11



(e) 7.5%ZrO₂ doped AES-11

Appendix 15

Specific gravity, Water absorption and Relative density of both additives						
Specimen No.1 /First measurement						
Firing temperature : 1450 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	1.9439	1.9859	1.4470	3.61	2.2	90.4
1-2.	2.8756	2.8773	2.1321	3.86	0.06	96.2
1-3.	2.8238	2.8245	2.1112	3.96	0.02	97.2
1-4.	2.9264	3.0305	2.1862	3.47	3.6	86.9
1-5.	2.8979	2.9822	2.1696	3.57	2.9	89.0
1-6.	2.8844	3.0089	2.1707	3.44	4.3	84.5
Firing temperature : 1500 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	2.8791	2.8921	2.1434	3.85	0.45	96.4
1-2.	2.8944	2.8981	2.1554	3.90	0.13	97.2
1-3.	2.8565	2.8906	2.1413	3.81	1.2	93.6
1-4.	2.8955	2.9871	2.1668	3.53	3.2	88.5
1-5.	2.9030	2.9909	2.1778	3.57	3.0	89.1
1-6.	2.9054	3.0239	2.1928	3.50	4.1	85.8
Firing temperature : 1550 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	2.9013	2.9042	2.1731	3.97	0.10	99.5
1-2.	3.3567	3.3589	2.5160	3.98	0.07	99.3
1-3.	2.8054	2.8074	2.1120	4.03	0.07	99.1
1-4.	2.8825	2.9429	2.1475	3.62	2.1	90.9
1-5.	2.8879	2.9135	2.1517	3.79	0.89	94.6
1-6.	2.8979	2.9080	2.1663	3.91	0.35	95.9

Specific gravity, Water absorption and Relative density of both additives						
Specimen No.1/First measurement						
Firing temperature : 1600 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	2.8754	2.8976	2.1549	3.87	0.77	97.1
1-2.	2.8736	2.8756	2.1575	4.00	0.07	99.8
1-3.	2.8244	2.8554	2.1244	3.86	1.1	94.9
1-4.	2.8838	2.9154	2.1543	3.79	1.1	95.0
1-5.	2.8824	2.8961	2.1540	3.88	0.48	96.9
1-6.	2.9103	2.9116	2.1848	4.00	0.04	98.3
Firing temperature : 1650 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	1.9369	1.9388	1.4494	3.96	0.10	99.2
1-2.	1.9105	1.9167	1.4296	3.92	0.32	97.8
1-3.	2.8159	2.8176	2.1249	4.07	0.06	99.8
1-4.	2.8900	2.8944	2.1596	3.93	0.15	98.6
1-5.	2.9167	2.9177	2.1889	4.00	0.03	99.8
1-6.	2.9148	2.9160	2.1921	4.03	0.04	98.9

Specific gravity, Water absorption and Relative density of both additives						
Specimen No.1/Second measurement						
Firing temperature : 1450 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	1.9438	1.9858	1.4475	3.61	2.2	90.5
1-2.	2.8759	2.8776	2.1320	3.86	0.06	96.2
1-3.	2.8238	2.8249	2.1115	3.96	0.08	97.2
1-4.	2.9265	3.0301	2.1867	3.47	3.5	87.0
1-5.	2.8978	2.9819	2.1695	3.57	2.9	89.0
1-6.	2.8845	3.0088	2.1708	3.44	4.3	84.5
Firing temperature : 1500 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	2.8797	2.8918	2.1458	3.86	0.42	96.8
1-2.	2.8947	2.8980	2.1556	3.90	0.11	97.3
1-3.	2.8584	2.8909	2.1404	3.81	1.1	93.5
1-4.	2.8953	2.9876	2.1677	3.53	3.2	88.5
1-5.	2.9029	2.9900	2.1795	3.58	3.0	89.3
1-6.	2.9053	3.0237	2.1908	3.49	4.1	85.7
Firing temperature : 1550 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	2.9013	2.9043	2.1699	3.95	0.10	99.0
1-2.	3.3569	3.3592	2.5166	3.98	0.07	99.4
1-3.	2.8054	2.8071	2.1125	4.04	0.06	99.2
1-4.	2.8826	2.9432	2.1477	3.62	2.1	90.8
1-5.	2.8882	2.9137	2.1499	3.78	0.88	94.3
1-6.	2.8983	2.9077	2.1677	3.92	0.32	96.2

Specific gravity, Water absorption and Relative density of both additives						
Specimen No.1/Second measurement						
Firing temperature : 1600 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	2.8755	2.8972	2.1514	3.86	0.75	96.7
1-2.	2.8736	2.8747	2.1568	4.00	0.04	99.8
1-3.	2.8247	2.8554	2.1275	3.88	1.1	95.3
1-4.	2.8844	2.9151	2.1537	3.79	1.1	95.0
1-5.	2.8829	2.8958	2.1565	3.90	0.45	97.3
1-6.	2.9103	2.9120	2.1852	4.00	0.06	98.3
Firing temperature : 1650 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	1.9370	1.9378	1.4521	3.99	0.04	100
1-2.	1.9104	1.9175	1.4314	3.93	0.37	98.0
1-3.	2.8154	2.8183	2.1245	4.06	0.10	99.6
1-4.	2.8908	2.8947	2.1583	3.93	0.13	98.4
1-5.	2.9168	2.9181	2.1870	3.99	0.04	99.5
1-6.	2.9149	2.9202	2.1939	4.01	0.18	98.6

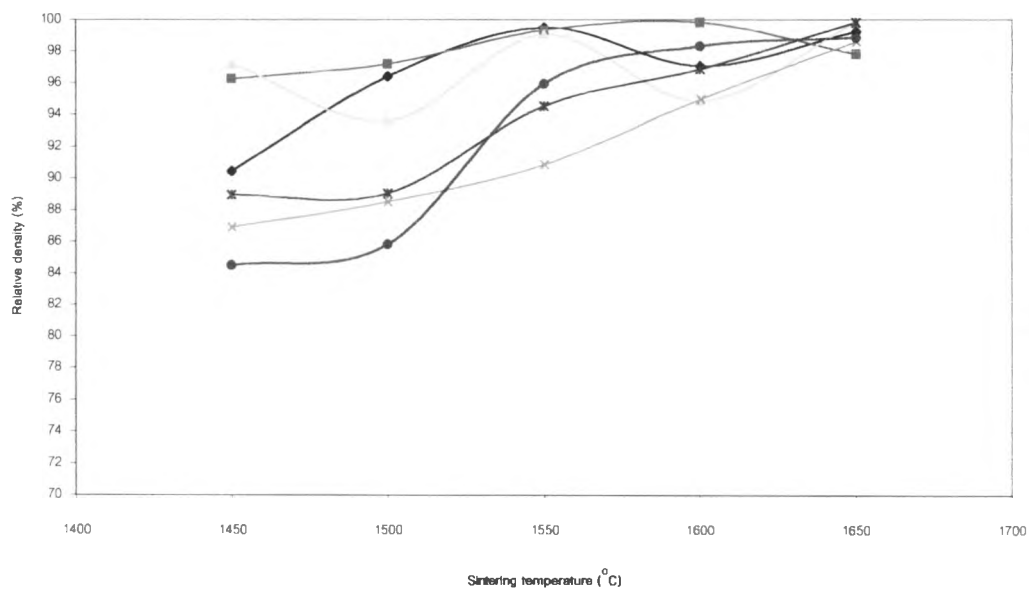
Specific gravity, Water absorption and Relative density of both additives						
Specimen No.2/First measurement						
Firing temperature : 1450 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	2.9190	3.0094	2.1691	3.47	3.1	87.1
1-2.	2.8862	2.9595	2.1506	3.57	2.5	89.0
1-3.	2.8770	2.9797	2.1590	3.50	3.6	86.1
1-4.	2.9044	3.1368	2.1776	3.03	8.0	75.9
1-5.	2.8817	3.1108	2.1737	3.08	8.0	76.7
1-6.	2.7684	2.9888	2.0781	3.04	8.0	74.6
Firing temperature : 1500 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	2.8782	2.8988	2.1333	3.76	0.72	94.3
1-2.	2.8928	2.8984	2.1439	3.83	0.19	95.6
1-3.	2.8562	2.8883	2.1315	3.77	1.1	92.7
1-4.	2.8956	2.9850	2.1690	3.55	3.1	89.0
1-5.	2.9031	2.9827	2.1790	3.61	2.7	90.1
1-6.	2.9055	3.0241	2.1890	3.48	4.1	85.4
Firing temperature : 1550 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	2.8753	2.8784	2.1454	3.92	0.11	98.3
1-2.	2.8431	2.8654	2.1274	3.85	0.78	96.1
1-3.	2.8527	2.8780	2.1436	3.88	0.89	95.4
1-4.	2.9015	2.9415	2.1607	3.72	1.4	93.2
1-5.	2.8829	2.9187	2.1491	3.75	1.2	93.4
1-6.	2.8876	2.9262	2.1612	3.77	1.3	92.7

Specific gravity, Water absorption and Relative density of both additives						
Specimen No.2/First measurement						
Firing temperature : 1600 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	2.9082	2.9145	2.1513	3.81	0.22	95.5
1-2.	2.8884	2.8991	2.1401	3.81	0.37	94.9
1-3.	2.8833	2.9124	2.1692	3.88	1.0	95.3
1-4.	2.8827	2.8995	2.1734	3.97	0.58	99.5
1-5.	2.8055	2.8311	2.1138	3.91	0.91	97.6
1-6.	2.8820	2.8933	2.1643	3.95	0.39	97.1
Firing temperature : 1650 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	2.9166	2.9433	2.2042	3.95	0.92	98.9
1-2.	2.8869	2.8901	2.1453	3.88	0.11	96.7
1-3.	2.8540	2.8958	2.1655	3.91	1.5	96.0
1-4.	2.8903	2.9029	2.1727	3.96	0.44	99.2
1-5.	2.7635	2.7652	2.0753	4.00	0.06	100
1-6.	2.8800	2.8914	2.1544	3.91	0.40	96.0

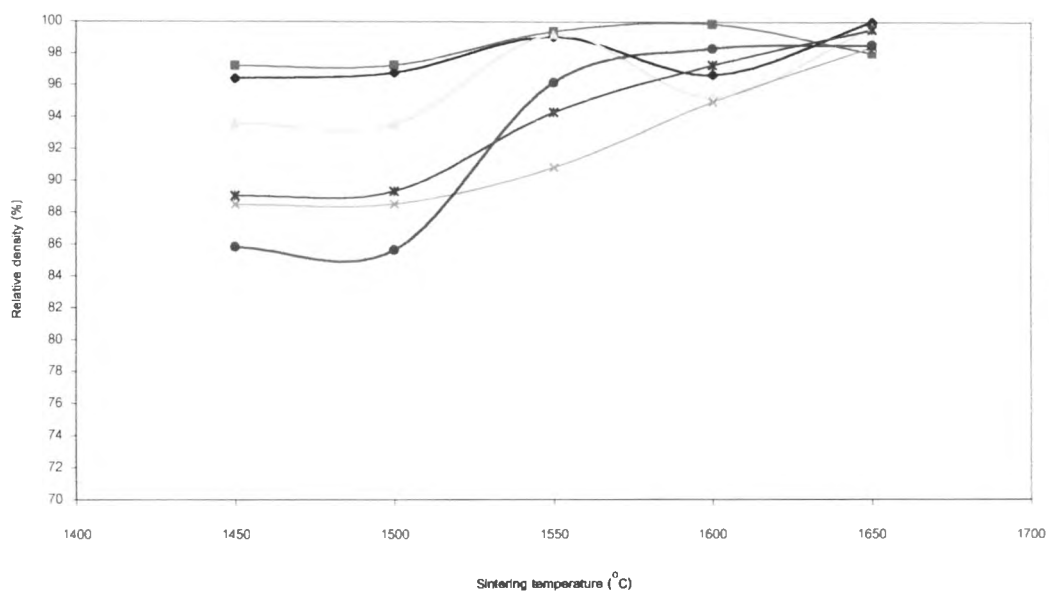
Specific gravity, Water absorption and Relative density of both additives						
Specimen No.2/Second measurement						
Firing temperature : 1450 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	2.9190	3.0088	2.1626	3.45	3.1	86.5
1-2.	2.8862	2.9591	2.1406	3.53	2.5	88.0
1-3.	2.8770	2.9790	2.1583	3.50	3.5	86.1
1-4.	2.9044	3.1360	2.1848	3.05	8.0	76.6
1-5.	2.8817	3.1099	2.1780	3.09	7.9	77.1
1-6.	2.7684	2.9882	2.0741	3.03	7.9	74.4
Firing temperature : 1500 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	2.8780	2.8989	2.1331	3.76	0.73	94.2
1-2.	2.8926	2.8983	2.1440	3.83	0.20	95.7
1-3.	2.8564	2.8880	2.1314	3.78	1.1	92.7
1-4.	2.8956	2.9851	2.1689	3.55	3.1	88.9
1-5.	2.9031	2.9826	2.1788	3.61	2.7	90.1
1-6.	2.9056	3.0240	2.1890	3.48	4.1	85.4
Firing temperature : 1550 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	2.8752	2.8786	2.1470	3.93	0.12	98.5
1-2.	2.8433	2.8656	2.1270	3.85	0.78	96.0
1-3.	2.8528	2.8780	2.1456	3.90	0.88	95.6
1-4.	2.9020	2.9416	2.1562	3.69	1.4	92.6
1-5.	2.8831	2.9191	2.1518	3.76	1.2	93.7
1-6.	2.8880	2.9265	2.1610	3.77	1.3	92.6

Specific gravity, Water absorption and Relative density of both additives						
Specimen No.2/Second measurement						
Firing temperature : 1600 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	2.9086	2.9119	2.1733	3.94	0.11	98.7
1-2.	2.8885	2.8973	2.1618	3.93	0.30	98.0
1-3.	2.8835	2.9113	2.1677	3.88	0.96	95.2
1-4.	2.8831	2.8987	2.1458	3.83	0.54	96.0
1-5.	2.8059	2.8302	2.0989	3.84	0.87	95.7
1-6.	2.8823	2.8914	2.1592	3.94	0.32	96.7
Firing temperature : 1650 °C						
No.	Dry weight	Saturated weight	Suspension weight	Specific gravity	Water absorption(%)	Relative density(%)
1-1.	2.9170	2.9432	2.1846	3.85	0.90	96.4
1-2.	2.8869	2.8892	2.1640	3.98	0.08	99.3
1-3.	2.8542	2.8955	2.1511	3.83	1.4	94.2
1-4.	2.8904	2.9027	2.1584	3.88	0.43	97.4
1-5.	2.7636	2.7643	2.0652	3.95	0.03	98.6
1-6.	2.8802	2.8918	2.1650	3.96	0.40	97.3

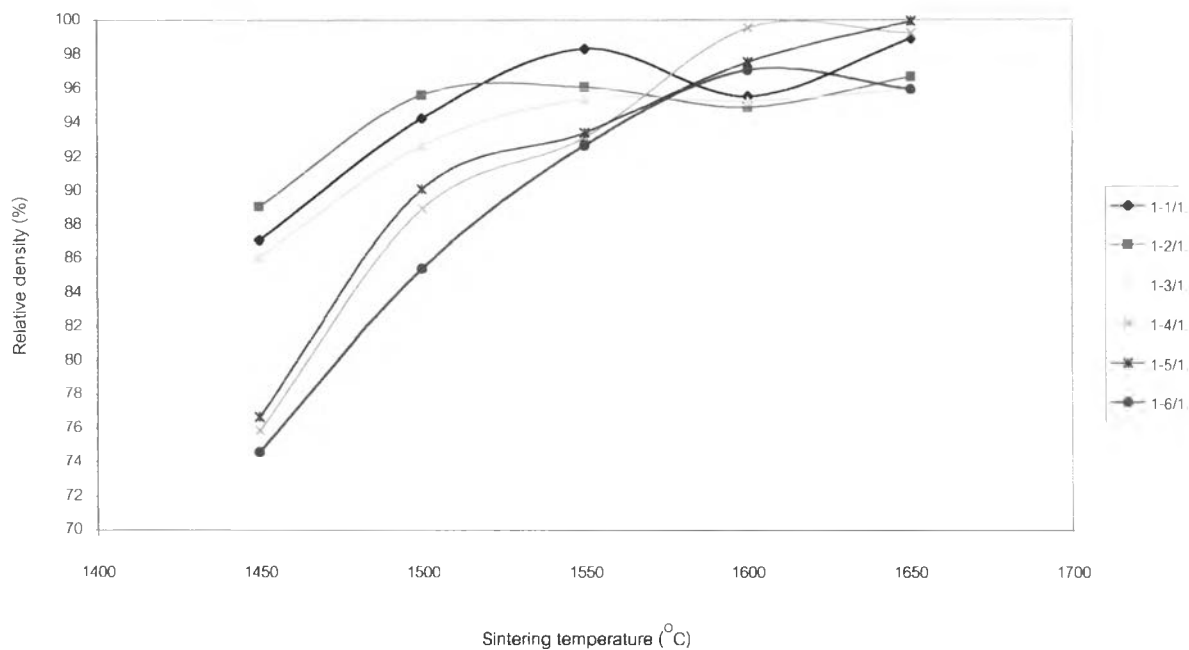
Appendix 16



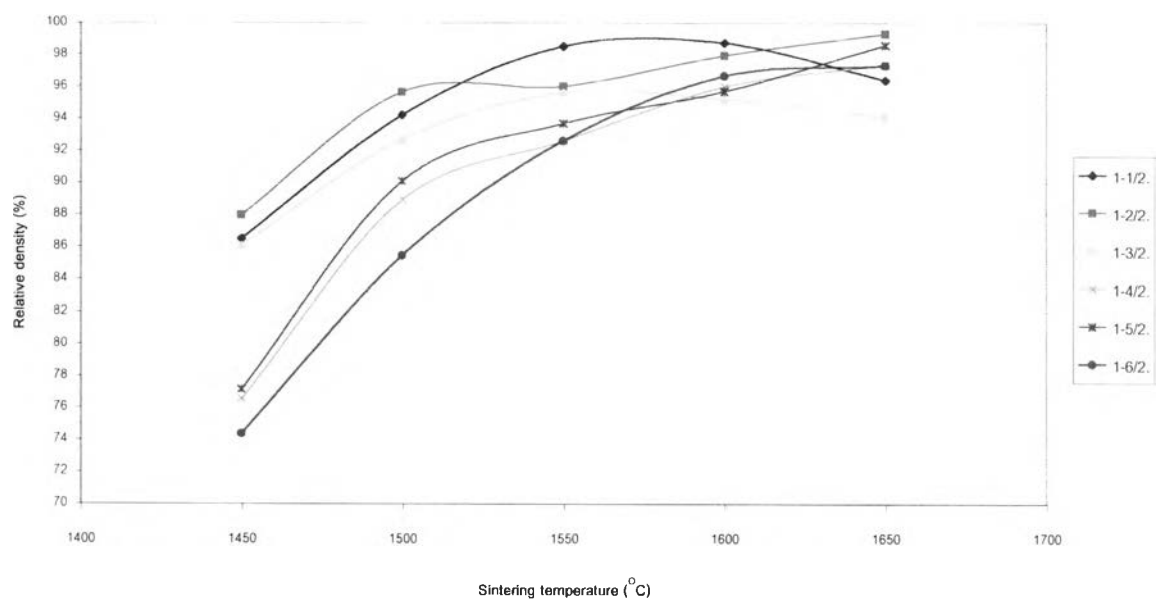
(a) First measurement of specimen no.1



(b) Second measurement of specimen no.1



(c) First measurement of specimen no.2

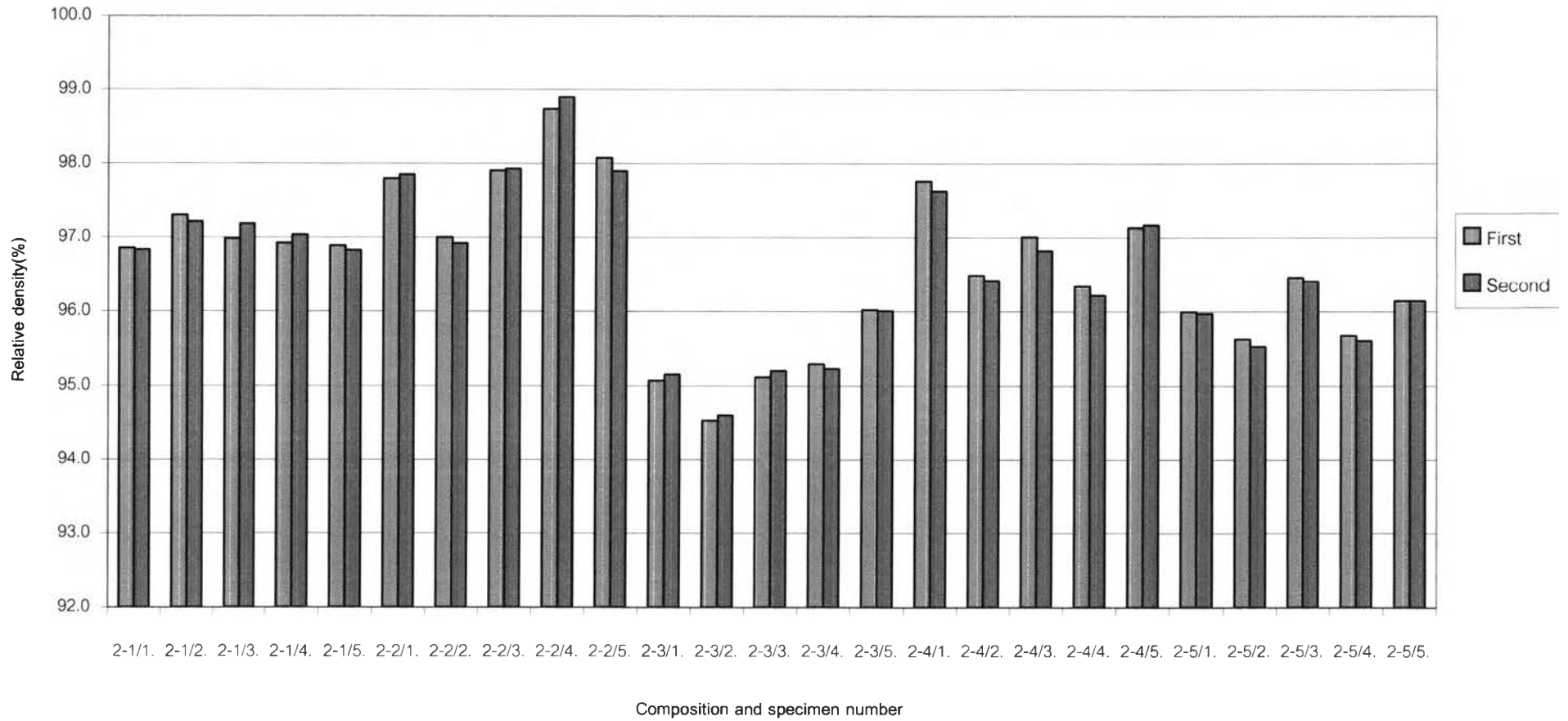


(d) Second measurement of specimen no.2

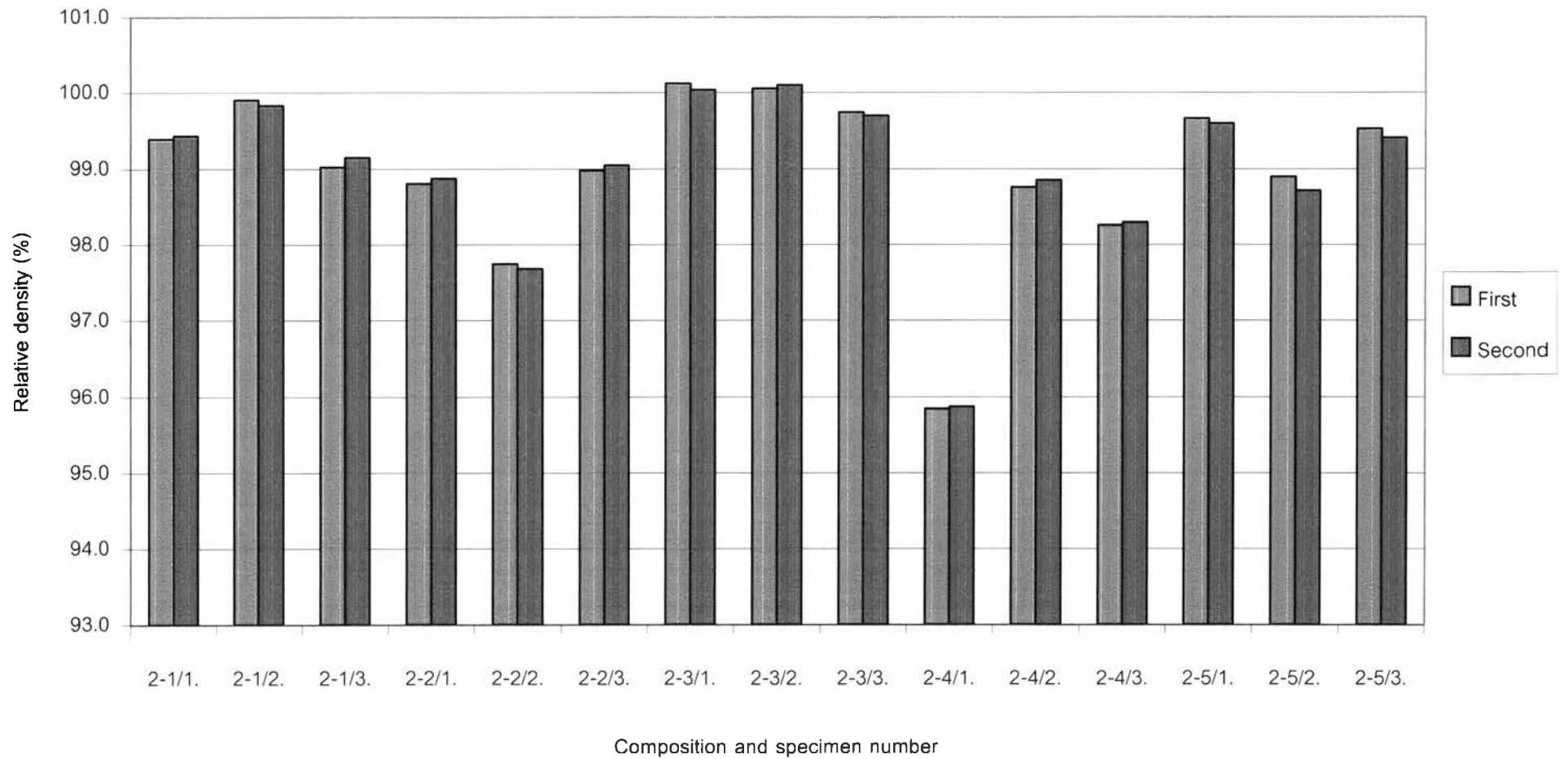
Appendix 17

Specific gravity, water absorption and relative density of AKP-30						
Second measurement : 1650 °C						
composition	Suspension weight	Saturated weight	Dry weight	Sp.gr	water absorption(%)	Relative density (%)
2-1/1.	0.6250	0.8444	0.8434	3.84	0.12	96.8
2-1/2.	0.6385	0.8616	0.8610	3.86	0.07	97.2
2-1/3.	0.6245	0.8430	0.8430	3.86	0.00	97.2
2-1/4.	0.6005	0.8110	0.8109	3.85	0.01	97.0
2-1/5.	0.6345	0.8573	0.8564	3.84	0.11	96.8
2-2/1.	0.6121	0.8240	0.8228	3.88	0.15	97.8
2-2/2.	0.5775	0.7800	0.7788	3.85	0.15	96.9
2-2/3.	0.6048	0.8142	0.8137	3.89	0.06	97.9
2-2/4.	0.6228	0.8357	0.8355	3.92	0.02	98.9
2-2/5.	0.6070	0.8170	0.8158	3.89	0.15	97.9
2-3/1.	0.6288	0.8520	0.8475	3.80	0.53	95.2
2-3/2.	0.5863	0.7960	0.7916	3.77	0.56	94.6
2-3/3.	0.6101	0.8270	0.8240	3.80	0.36	95.2
2-3/4.	0.6305	0.8551	0.8535	3.80	0.19	95.2
2-3/5.	0.5950	0.8050	0.8045	3.83	0.06	96.0
2-4/1.	0.6234	0.8367	0.8352	3.92	0.18	97.6
2-4/2.	0.6210	0.8369	0.8349	3.87	0.24	96.4
2-4/3.	0.5975	0.8042	0.8027	3.88	0.19	96.8
2-4/4.	0.6098	0.8228	0.8220	3.86	0.10	96.2
2-4/5.	0.6393	0.8597	0.8590	3.90	0.08	97.2
2-5/1.	0.6143	0.8252	0.8246	3.91	0.07	96.0
2-5/2.	0.6267	0.8426	0.8403	3.89	0.27	95.5
2-5/3.	0.6286	0.8430	0.8421	3.93	0.11	96.4
2-5/4.	0.6158	0.8278	0.8258	3.90	0.24	95.6
2-5/5.	0.6194	0.8313	0.8300	3.92	0.16	96.1

Specific gravity, water absorption and relative density of AES-11						
Second measurement : 1650 °C						
composition	Suspension weight	Saturated weight	Dry weight	Sp.gr	water absorption(%)	Relative density (%)
2-1/1.	0.5161	0.6911	0.6908	3.95	0.04	99.4
2-1/2.	0.5010	0.6698	0.6690	3.96	0.12	99.8
2-1/3.	0.5160	0.6913	0.6900	3.94	0.19	99.1
2-2/1.	0.5026	0.6740	0.6725	3.92	0.22	98.9
2-2/2.	0.4547	0.6122	0.6105	3.88	0.28	97.7
2-2/3.	0.5020	0.6730	0.6721	3.93	0.13	99.0
2-3/1.	0.5152	0.6871	0.6862	3.99	0.13	100.0
2-3/2.	0.5197	0.6930	0.6922	3.99	0.12	100.1
2-3/3.	0.5198	0.6940	0.6930	3.98	0.14	99.7
2-4/1.	0.4758	0.6429	0.6426	3.85	0.05	95.9
2-4/2.	0.4806	0.6427	0.6427	3.96	0.00	98.8
2-4/3.	0.5200	0.6960	0.6939	3.94	0.30	98.3
2-5/1.	0.5137	0.6814	0.6805	4.06	0.13	99.6
2-5/2.	0.5000	0.6651	0.6640	4.02	0.17	98.7
2-5/3.	0.5122	0.6797	0.6784	4.05	0.19	99.4



Comparison of relative density of AKP-30 between first and second measurement



Comparison of relative density of AES-11 between first and second measurement

Biography

Miss. Bongkoch Piempemphoon was born on the 6th of February 1978. She was born in Sukhothai. After graduating with a Bachelor Degree in Industrial chemistry in Ceramic Technology from Faculty of Science, Chiangmai University in 2000. She continued a further study in Master Degree in the field of Ceramic Technology at Chulalongkorn University and graduated in June 2002.

