

Electronic Supplementary Information

Solar-driven alumina calcination for CO₂ mitigation and improved product quality

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1 Table of Results

Table 1: Summary of operational conditions and the measurements taken during the 19 nominally steady-state experimental runs.

#	\dot{Q}_s	$\dot{V}_{\text{air,n}}$	\dot{m}_{trans}	\dot{m}_{steam}	$\dot{m}_{\text{Al(OH)3}}$	T_{reactor}	T_{wall}	ϕ	τ	X	η	LoI _{lads}	LoI ₅₇₃ (298 – 573 K)	LoI ₁₂₇₃ (573 – 1273 K)	SSA	d_{pore}
	[W]	[L _n /min]	[g/min]	[g/min]	[g/min]	[K]	[K]	[-]	[s]	[mol. %]	[%]	[wt. %]	[wt. %]	[wt. %]	[m ² /g]	[nm]
1	2285	20.03	25.88	-	1.12	1259	1114	0.57×10 ⁻⁵	1.74	88.1	19.8	7.23	9.76	2.96	184.8	3.71
2	2108	20.03	25.88	-	0.73	1213	1020	0.40×10 ⁻⁵	1.91	86.2	20.4	9.25	11.96	3.47	179.2	3.69
3	3642	20.03	25.88	-	0.95	1479	1246	0.43×10 ⁻⁵	1.56	90.5	15.6	6.00	8.32	2.20	178.4	3.94
4	2132	20.03	25.88	-	0.84	1226	934	0.51×10 ⁻⁵	2.08	84.8	20.4	7.84	11.54	3.20	170.1	3.71
5	2316	12.03	15.54	-	1.35	1258	1122	1.13×10 ⁻⁵	2.81	89.4	11.7	11.72	13.65	2.74	189.5	3.45
6	2117	12.03	15.54	-	1.39	1161	928	1.40×10 ⁻⁵	3.40	85.3	11.4	13.88	16.67	3.46	226.6	2.54
7	3773	12.03	15.54	-	1.45	1454	1272	1.07×10 ⁻⁵	2.47	93.5	8.8	8.42	9.68	1.81	162.1	4.52
8	2291	20.03	25.88	-	2.07	1230	1106	1.06×10 ⁻⁵	1.72	87.4	19.1	9.74	12.22	3.19	172.3	3.87
9	2211	20.03	25.88	-	1.33	1216	977	0.77×10 ⁻⁵	1.97	87.9	19.5	8.35	10.74	3.14	180.5	3.78
10	4224	20.03	25.88	-	1.98	1421	1258	0.89×10 ⁻⁵	1.51	92.4	12.7	6.22	7.64	2.17	170.9	4.30
11	3730	12.03	15.54	-	2.32	1480	1311	1.66×10 ⁻⁵	2.33	93.9	9.1	13.89	14.98	1.60	157.0	5.01
12	3383	17.03	22.00	-	1.26	1414	1227	0.68×10 ⁻⁵	1.84	92.0	13.4	8.16	9.85	2.06	180.6	4.32
13	3492	12.03	15.54	-	1.75	1408	1219	1.35×10 ⁻⁵	2.55	91.7	9.1	14.14	15.50	2.25	213.7	3.63
14	4262	19.85	25.65	-	2.53	1551	1371	1.05×10 ⁻⁵	1.38	95.8	14.1	8.56	9.38	1.20	132.7	5.75
15	3766	16.03	20.71	-	1.06	1456	1254	0.60×10 ⁻⁵	1.92	93.3	11.8	6.40	7.72	1.88	167.4	4.47
16	2362	16.03	20.71	-	1.14	1208	1051	0.76×10 ⁻⁵	2.29	89.1	14.5	8.30	10.37	2.96	168.5	4.36
17	2198	16.03	20.71	-	0.55	1179	943	0.41×10 ⁻⁵	2.58	90.1	15.0	6.20	7.91	2.98	168.7	3.78
18	3965	20.03	25.88	-	1.35	1459	1284	0.59×10 ⁻⁵	1.50	94.5	14.0	5.91	6.875	1.67	135.9	4.93
19	3832	20.03	25.88	1.17	0.85	1439	1262	0.35×10 ⁻⁵	1.43	94.0	14.2	7.99	9.10	1.75	164.3	4.58

2 Results of Nitrogen Porosimetry Measurements

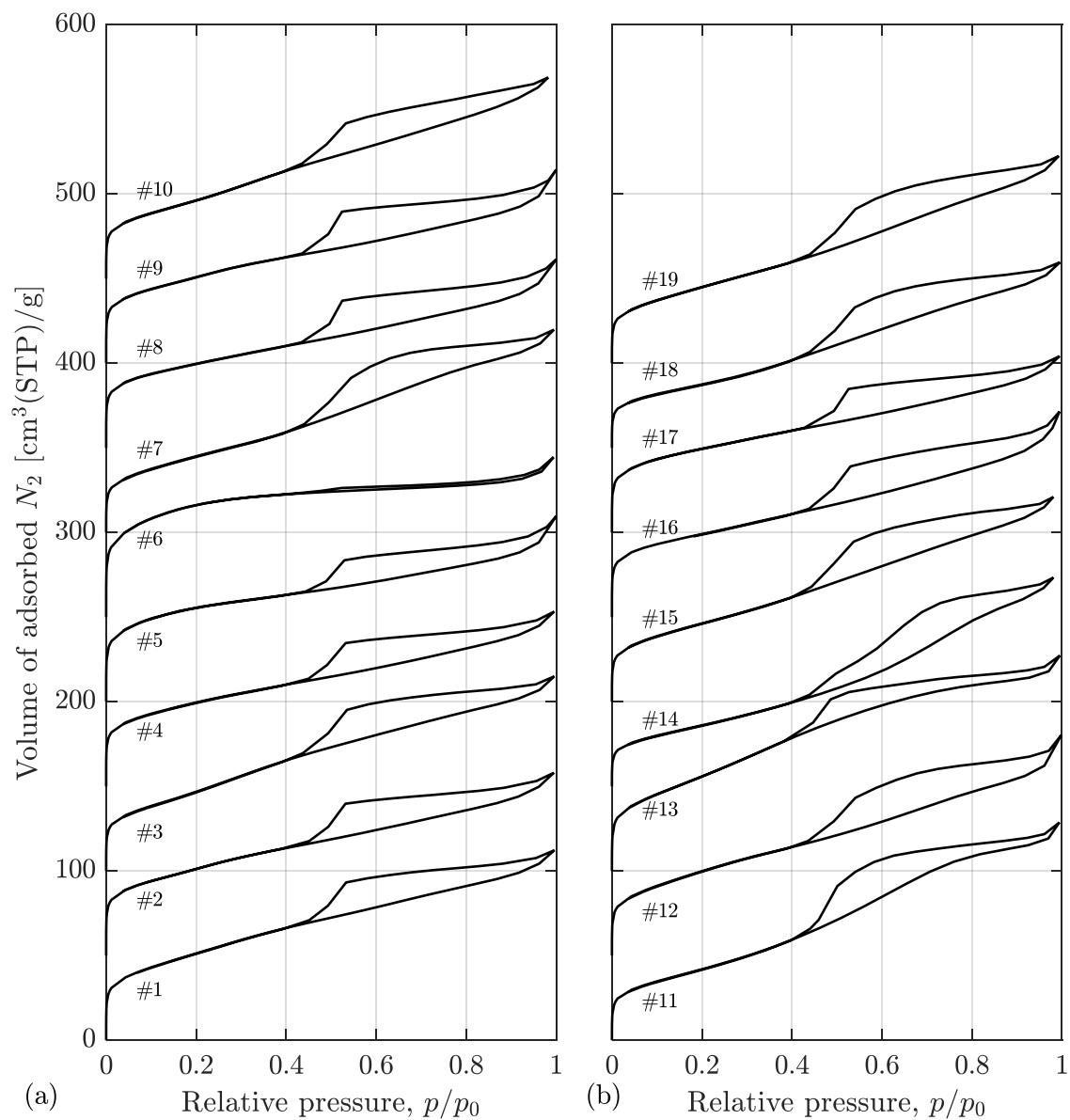


Figure 1: Nitrogen gas adsorption and desorption isotherms for the 19 solar-processed aluminas of the present study. Each successive isotherm has been adjusted on the y-axis by $50 \text{ cm}^3/\text{g}$ from the previous isotherm.