

Supplementary Material

Effect of sodium hydroxide-treated sawdust microparticles incorporated in geopolymer matrix on compressive strength and porosity

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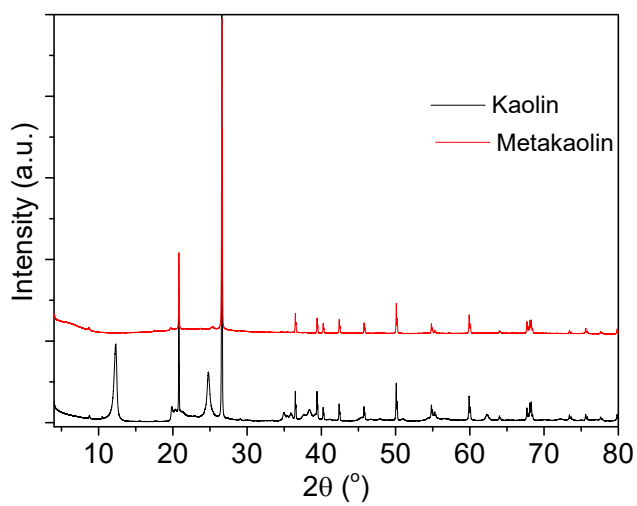


Figure S1. XRD patterns of kaolin and metakaolin

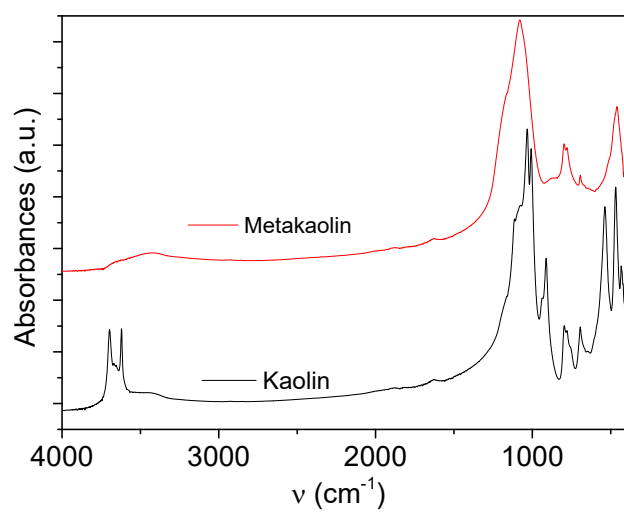


Figure S2. FTIR spectra of kaolin and metakaolin

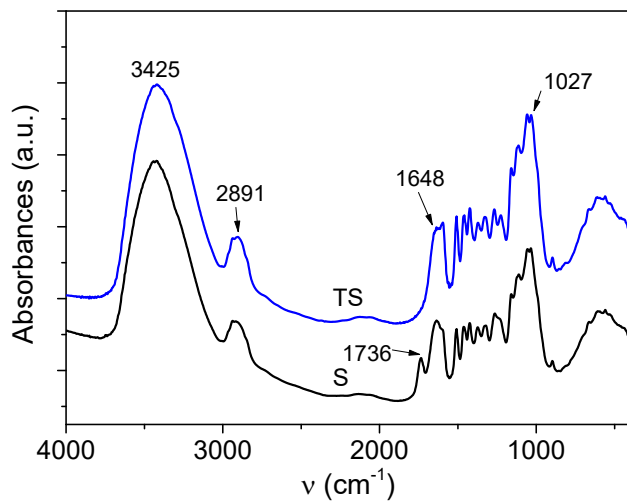


Figure S3. FTIR spectra of pristine and sodium hydroxide treated sawdust

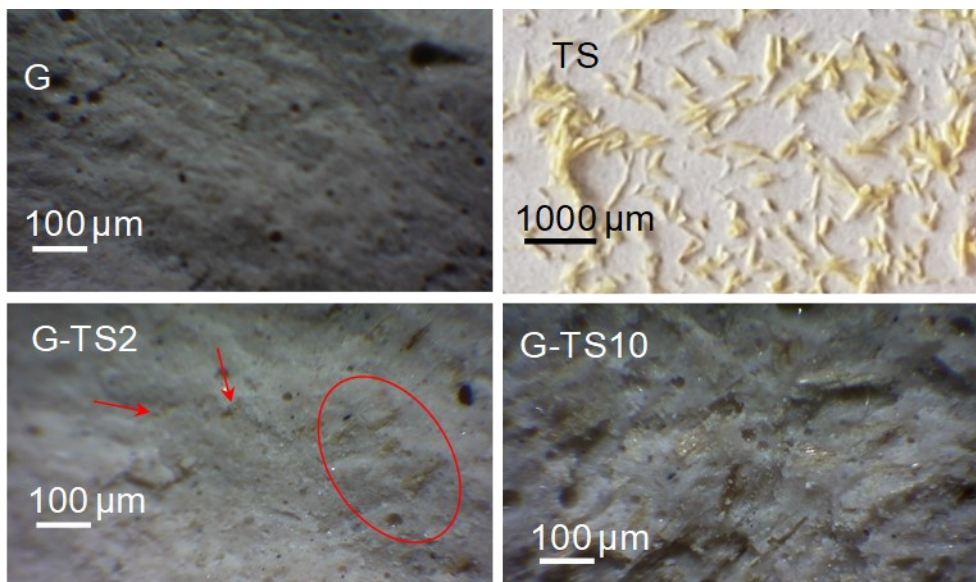


Figure S4. Optical microscope images of sodium hydroxide treated sawdust and composite materials

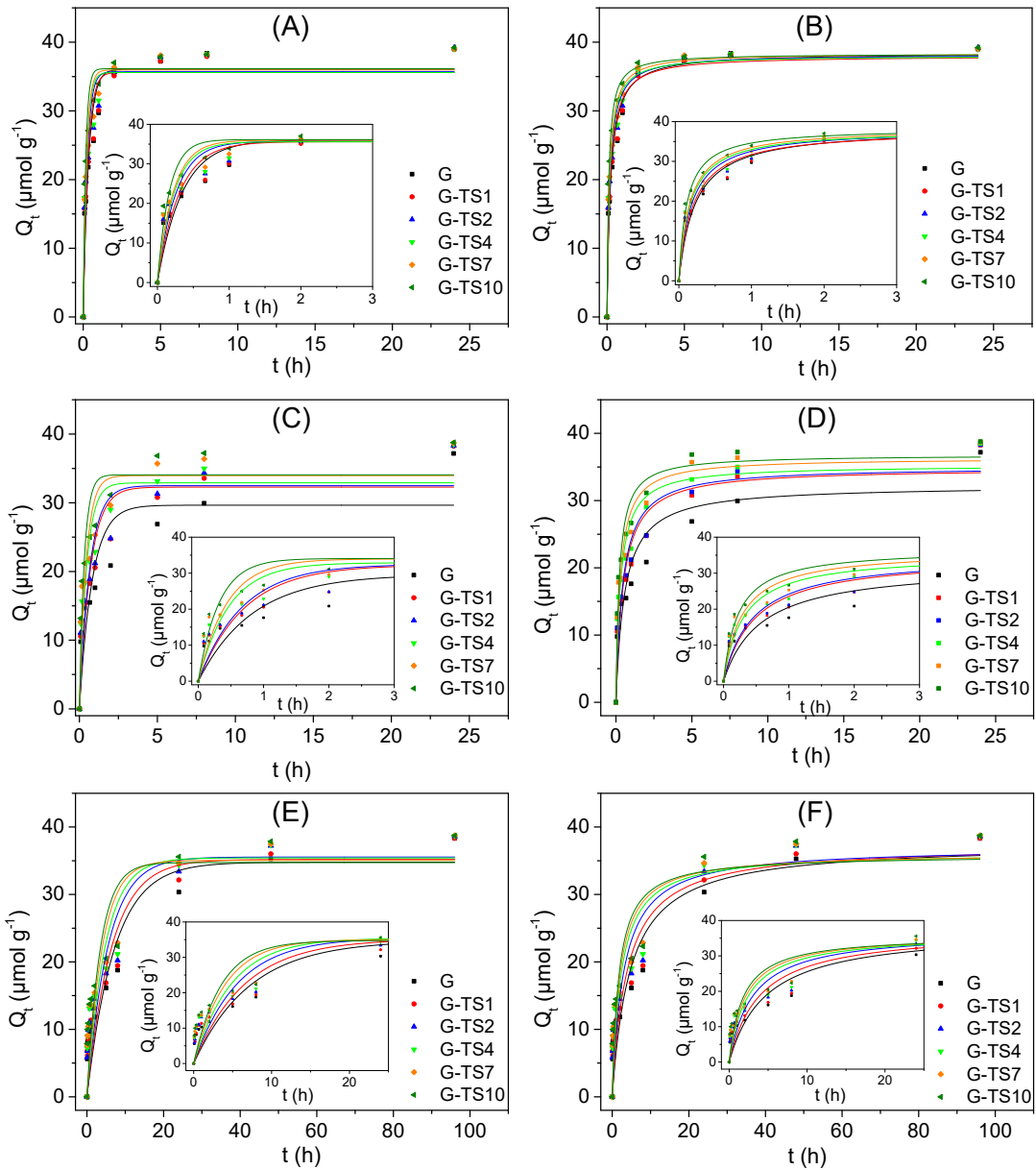


Figure S5. Non-linear fittings following pseudo-first order model for geopolymer-sawdust composites with particle sizes (A) 400 μm -250 μm , (C) 1000 μm – 400 μm and (E) 2000 μm – 1000 μm . Non-linear fittings following pseudo-second order model for geopolymer-sawdust composites with particle sizes (B) 400 μm -250 μm , (D) 1000 μm – 400 μm and (F) 2000 μm – 1000 μm .

Table S1. Pseudo-first and pseudo-second order kinetic model constants obtained from non-linear fittings of experimental data.

Composites	Pseudo-first order				Pseudo-second order			
	Q_e (exp)	Q_e (th)	K_1	R^2	Q_e	$10^1 \times K_2$	h	R^2
400 μm -250 μm								
G	37.19	36.05	2.88	0.77	38.43	1.17	173	0.97
G-TS1	37.25	35.59	3.28	0.83	38.02	1.32	191	0.97
G-TS2	37.84	35.70	3.87	0.83	38.22	1.51	221	0.97
G-TS4	37.89	35.59	4.37	0.83	38.04	1.71	252	0.97
G-TS7	38.08	35.96	4.57	0.83	38.38	1.78	262	0.98
G-TS10	37.89	36.14	6.05	0.87	38.34	2.41	351	0.99
1000 μm – 400 μm								
G	37.40	29.65	1.21	0.77	32.24	0.54	56	0.87
G-TS1	38.25	32.29	1.40	0.83	34.83	0.60	73	0.92
G-TS2	38.32	32.50	1.49	0.83	35.03	0.64	79	0.92
G-TS4	38.52	32.90	2.14	0.83	35.26	0.94	117	0.93
G-TS7	38.72	33.95	2.31	0.84	36.33	0.99	145	0.93
G-TS10	38.79	34.07	3.19	0.87	36.81	1.23	167	0.96
2000 μm – 1000 μm								
G	38.3	34.78	0.14	0.83	37.53	0.06	8	0.88
G-TS1	38.32	35.18	0.15	0.83	37.33	0.07	10	0.88
G-TS2	37.23	35.55	0.18	0.81	37.01	0.09	12	0.88
G-TS4	37.35	35.41	0.20	0.76	36.27	0.12	16	0.84
G-TS7	37.49	35.02	0.25	0.76	36.14	0.14	18	0.86
G-TS10	37.86	34.73	0.29	0.73	35.84	0.16	20	0.84
TS	308.98	299.37	18.41	0.95	318.58	0.86	8789	0.99

Q_e (exp) and Q_e (th) ($\mu\text{mol}^{-1} \text{g}$), K_1 (h^{-1}), K_2 ($\text{g} \mu\text{mol}^{-1} \text{h}^{-1}$), h ($\mu\text{mol} \text{g}^{-1} \text{h}^{-1}$).

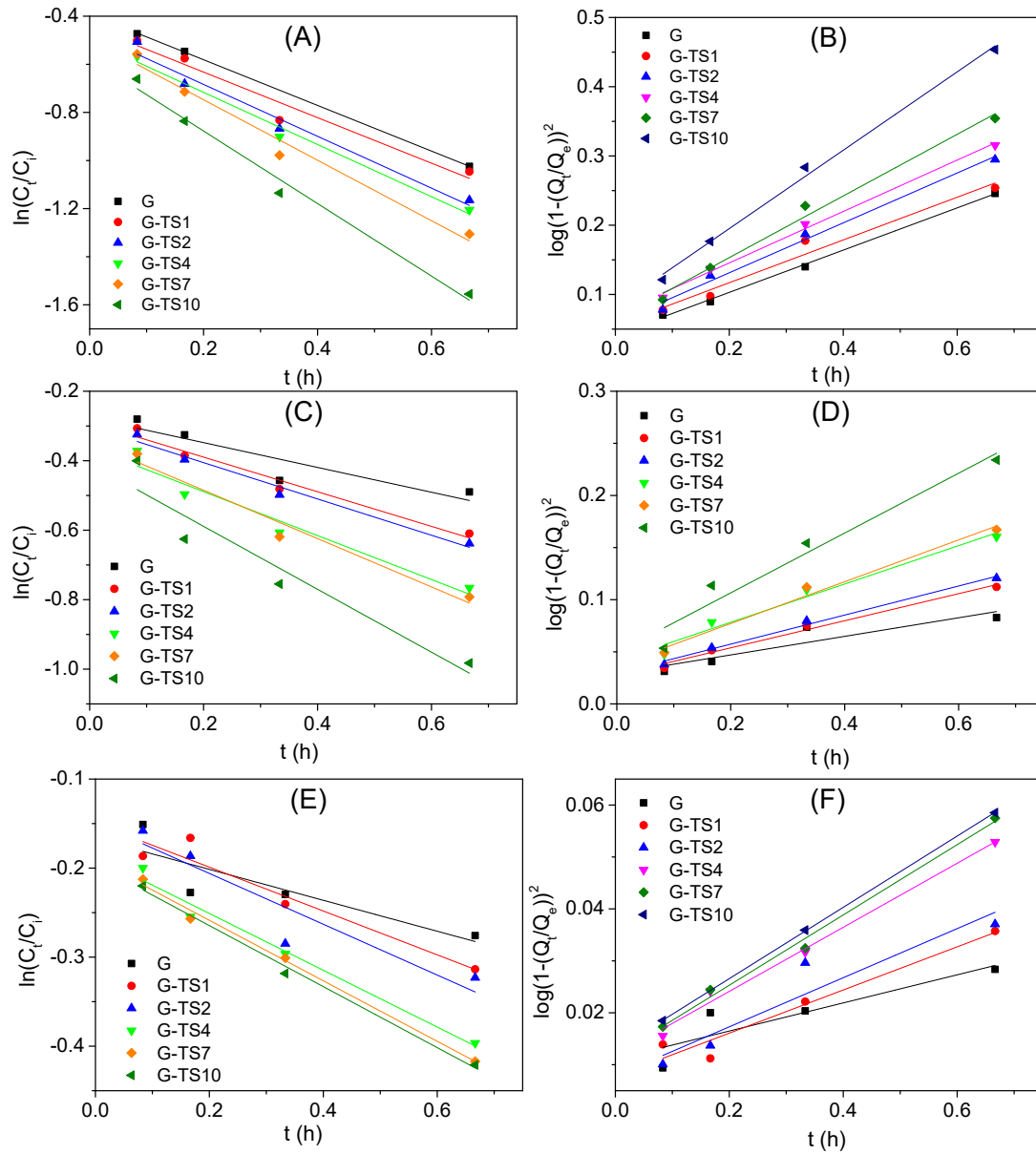


Figure S6. Plots of linear transformation of the external surface diffusion kinetic model for geopolymer-sawdust composites with particle sizes (A) 400 μm -250 μm , (C) 1000 μm – 400 μm and (E) 2000 μm – 1000 μm . Plots of linear transformation of the surface and internal diffusion model for geopolymer-sawdust with particle sizes (B) 400 μm -250 μm , (D) 1000 μm – 400 μm and (F) 2000 μm – 1000 μm .

Table S2. External surface diffusion model and surface and internal diffusion model constants obtained from fittings of experimental data.

	400-250 μm					1000-400 μm					2000-1000 μm				
	k_f	R^2	D	R^2	B_N	k_f	R^2	D	R^2	B_N	k_f	R^2	D	R^2	B_N
G	3.79	0.99	5.22	0.99	25391	3.07	0.74	7.08	0.76	30335	3.20	0.62	9.86	0.70	48652
G-TS1	3.58	0.94	5.28	0.95	23729	4.06	0.95	10.31	0.98	27544	4.30	0.89	15.14	0.91	42577
G-TS2	3.87	0.96	6.17	0.98	22006	4.04	0.96	11.07	0.98	25578	4.73	0.81	17.23	0.85	41201
G-TS4	3.55	0.97	6.35	0.99	19554	4.46	0.92	14.60	0.96	21380	4.82	0.97	22.48	0.98	32140
G-TS7	3.62	0.96	7.61	0.98	16667	4.32	0.93	15.91	0.97	19010	4.52	0.99	24.66	0.99	27511
G-TS10	3.89	0.98	9.68	0.99	14061	5.03	0.88	22.78	0.93	15453	4.08	0.99	25.01	0.99	24461
TS	17.64	0.93	59.46	0.94	4452										

D ($10^{-9} \text{ cm}^2 \text{ s}^{-1}$) and k_f ($10^{-3} \text{ cm s}^{-1}$)

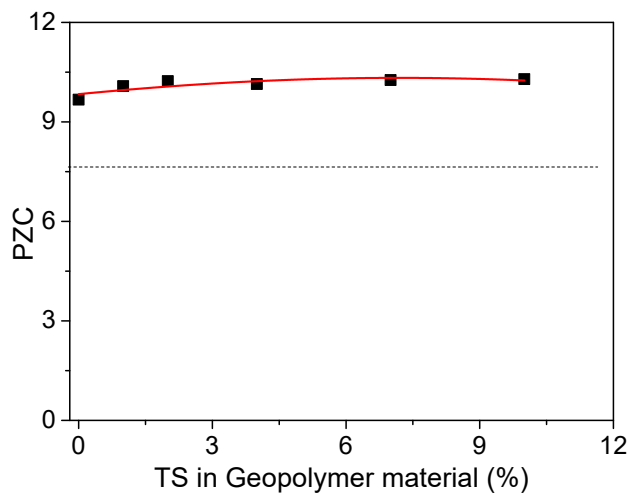


Figure S7. Point of zero charges of treated sawdust (Dotted line), Geopolymer and geopolymer-sawdust composites.