

Supplementary Information

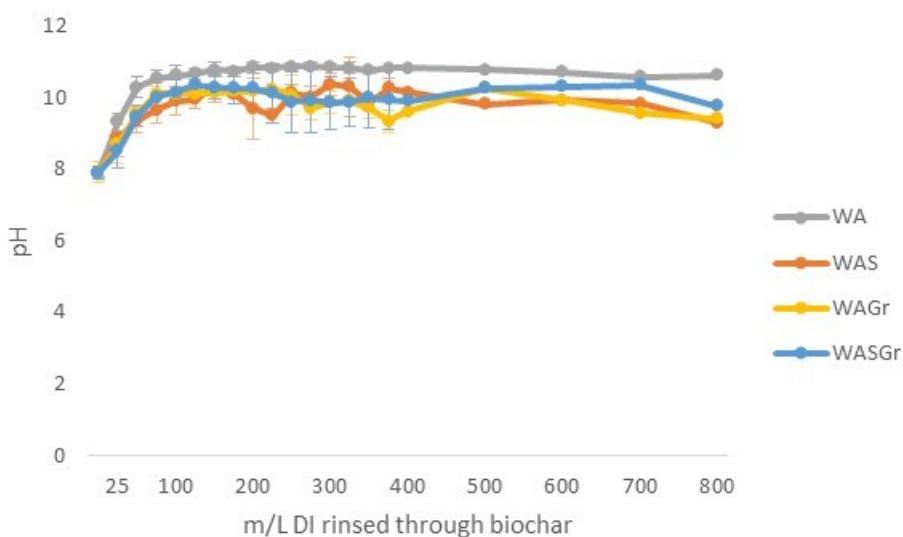
Metal	Sorbent	Sorbent Weight (mg)	Volume of solution (mL)	Volume of sample (mL)	Total volume (mL)	Dilution factor (-)	Measured Concentration (mg/L)	Actual concentration (mg/L)	Absolute concentration (mg)	Mass per unit mass of sorbent (g/kg)
Ca	WA	24.5	50	0.5	5	10.0000	8.5029	85.0290	4.2515	173.53
Ca	WAS	25.6	50	0.5	5	10.0000	10.7394	107.3940	5.3697	209.75
Ca	WA	24.5	50	5	5	1.0000	87.1714	87.1714	4.3586	177.90
Ca	WAS	25.6	50	5	5	1.0000	110.0713	110.0713	5.5036	214.98
K	WA	24.5	50	0.5	5	10.0000	1.3109	13.1090	0.6555	26.75
K	WAS	25.6	50	0.5	5	10.0000	0.6175	6.1750	0.3088	12.06
K	WA	24.5	50	5	5	1.0000	14.4912	14.4912	0.7246	29.57
K	WAS	25.6	50	5	5	1.0000	6.9154	6.9154	0.3458	13.51
Mg	WA	24.5	50	0.5	5	10.0000	0.2333	2.3330	0.1167	4.76
Mg	WAS	25.6	50	0.5	5	10.0000	0.2799	2.7990	0.1400	5.47
Mg	WA	24.5	50	5	5	1.0000	2.2021	2.2021	0.1101	4.49
Mg	WAS	25.6	50	5	5	1.0000	2.6098	2.6098	0.1305	5.10
Na	WA	24.5	50	0.5	5	10.0000	1.5021	15.0210	0.7511	30.66
Na	WAS	25.6	50	0.5	5	10.0000	0.8771	8.7710	0.4386	17.13
Na	WA	24.5	50	5	5	1.0000	15.7663	15.7663	0.7883	32.18
Na	WAS	25.6	50	5	5	1.0000	9.7352	9.7352	0.4868	19.01
P	WA	24.5	50	0.5	5	10.0000	2.7389	27.3890	1.3695	55.90
P	WAS	25.6	50	0.5	5	10.0000	3.6416	36.4160	1.8208	71.13
P	WA	24.5	50	5	5	1.0000	23.3966	23.3966	1.1698	47.75
P	WAS	25.6	50	5	5	1.0000	31.7259	31.7259	1.5863	61.96
Si	WA	24.5	50	0.5	5	10.0000	2.0630	20.6300	1.0315	42.10
Si	WAS	25.6	50	0.5	5	10.0000	2.3067	23.0670	1.1534	45.05
Si	WA	24.5	50	5	5	1.0000	18.6533	18.6533	0.9327	38.07
Si	WAS	25.6	50	5	5	1.0000	20.6861	20.6861	1.0343	40.40

SI 1 – concentrations of alkali and alkaline earths, phosphorus and silicates for larch biochar mixed cold with wood ash (WA) and sintered with wood ash (WAS)

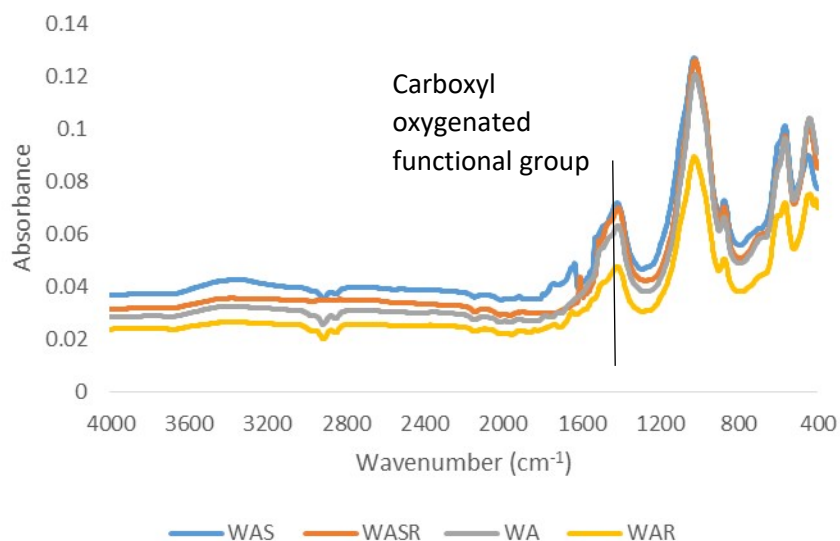
Peak Position	Peak Intensity	Mineral Form
10.767	202.578	Hydroxylapatite
22.959	245.07	Calcite
24.178	82.342	Kalcanite
25.776	457.372	Hydroxylapatite
28.833	160.632	Hydroxylapatite
29.303	1562.754	Calcite
30.314	379.947	Kalcanite
31.64	1906.377	Hydroxylapatite
32.082	744.38	Hydroxylapatite
32.767	750.094	Hydroxylapatite

33.954	309.787	Hydroxylapatite
38.107	75.415	Hydroxylapatite
39.333	264	Calcite
39.666	237.138	Hydroxylapatite
43.064	234.498	Calcite
44.263	127.316	Kalcanite
46.578	304.19	Hydroxylapatite
47.392	160.475	Calcite
48.425	256.86	Calcite
49.371	407.789	Hydroxylapatite
50.345	127.41	Hydroxylapatite
53.131	111.245	Hydroxylapatite
56.435	65.076	Calcite
57.347	76.356	Calcite

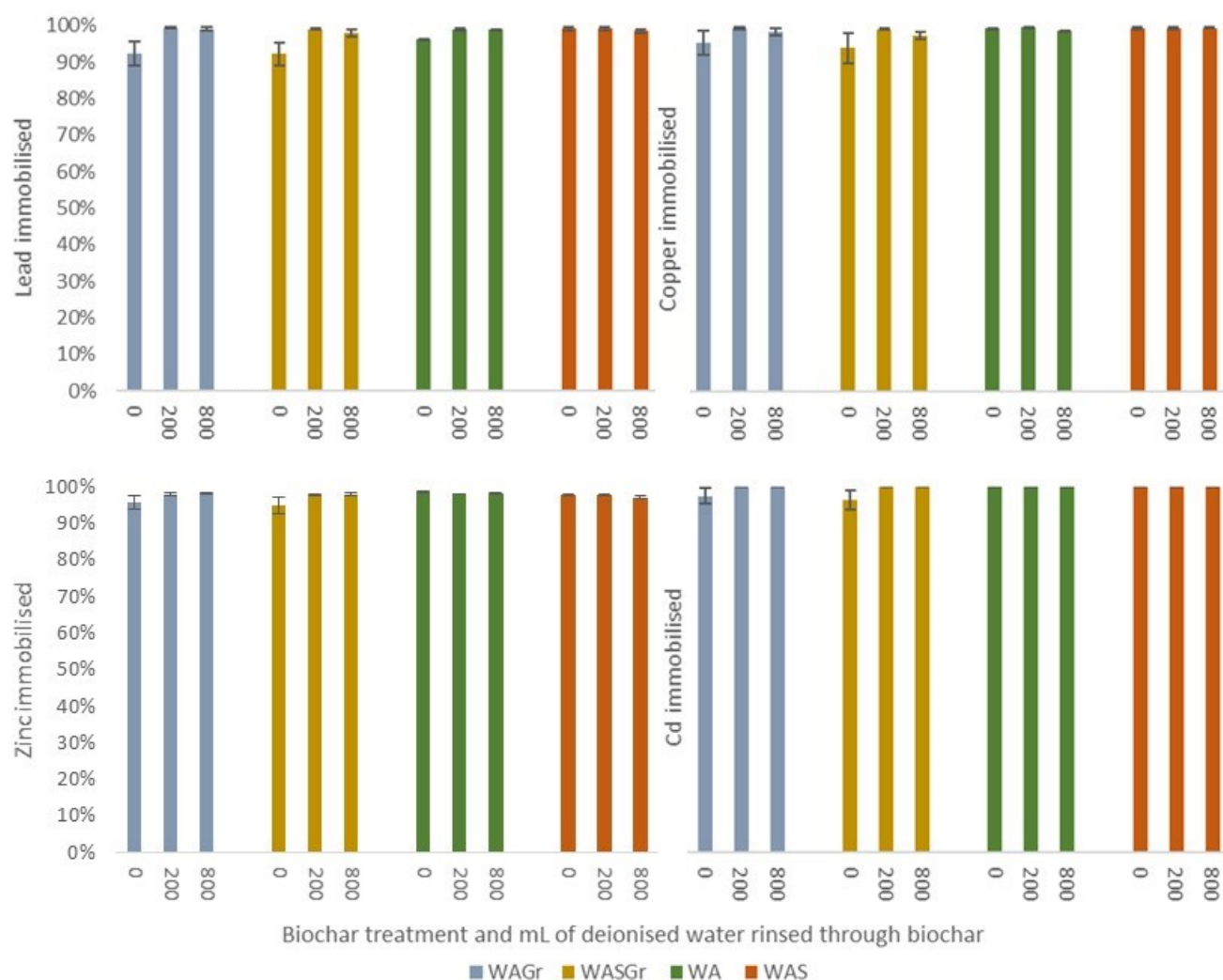
SI 2 - XRD peaks and intensities of hydroxylapatite, calcite and kalcinite for larch biochar sintered with wood ash (WAS)



SI 3 – Eluate pH measurements for wood ash mixed cold with larch biochar (WA), wood ash mixed cold and granulated to <3mm (WAGr), wood ash sintered to larch biochar (WAS) and wood ash sintered to larch biochar and granulated to <3mm (WASGr) mg/L when rinsed by 0mL to 800mL of deionised water



SI 4 – FTIR spectra of larch biochar sintered with wood ash before rinsing with deionised water (WAS) and after rinsing with 800mL of deionised water (WASR) and larch biochar mixed cold with wood ash before rinsing with deionised water (WA) and after rinsing with deionised water (WAR)



SI 5 - Immobilisation by wood ash mixed cold with larch biochar (WA), wood ash mixed cold and granulated to <3mm (WAGr), wood ash sintered to larch biochar (WAS) and wood ash sintered to larch biochar and granulated to <3mm (WASGr) mg/L when rinsed by 0mL, 200mL and 800mL of (A) lead, (B) copper, (C) zinc and (D) cadmium. The concentration of metals in solution was 10 mg/L.