Supplementary Material

Supplementary Table S1

Particle size, surface area and pore characteristics of minerals and PyOM (n = 2 for particle size and n = 1 for surface area and pore characteristics; nd, not determined).

		PZC[a]	pH	D_{mean}[d] (μm)	D_{10}[d] (μm)	D_{90}[d] (μm)	A_{BET}[e] (m^2/g)	V_P[f] (cm^3/g)	D_P[g] (nm)
Mineral	Quartz	2-3[b]	5.7	24.3	2.62	53.2	0.898	0.001	4.95
	Corundum	9.2[b]	8.6	4.2	1.13	8.15	2.62	0.006	8.91
	Goethite	9.2[c]	6.5	39.7	1.04	83.0	35.1	0.033	3.81
	Kaolinite	4-5[b]	7.0	10.7	2.75	21.5	6.90	0.027	15.7
Char	Corn stover	nd	9.0	14.9	2.98	31.8	451	0.187	1.65
	Cellulose	nd	6.5	30.4	8.92	53.9	522	0.211	1.62
	Glucose	nd	8.2	29.2	7.03	53.8	494	0.194	1.57
	Lignin	nd	10.8	25.9	8.01	45.2	304	0.105	1.38
	Arginine	nd	6.3	30.1	7.53	55.9	3.28	0.002	2.02

[a] Point of zero charge; [b] Beak et al. (2006); [c] Kosmulski (2014); [d] mean diameter and diameter at 10% or 90% of accumulated volume; [e] BET specific surface area; [f] pore volume; [g] average pore size.

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Supplementary Table S2

Effect of mineral or organic matter variation on cumulative CO_2-C mineralization ($f_{C,M}$) of charred and uncharred organic matter (n=20).Statistical results are based on the Tukey's HSD test at $P < 0.05$; CS, corn stover; Cel,cellulose; Glu, glucose; Lig,lignin; Arg, arginine; Q, quartz; C, corundum; G, goethite; K, kaolinite.

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			Mineralization			
			mean	SD[e]	%RSD[f]	P[h]
UC[a]	M effect[c]	CS	0.533b[g]	0.067	12.5	
		Cel	0.150 c	0.097	64.8	
		Glu	0.849 a	0.074	8.73	0.001
		Lig	0.097 d	0.009	9.92	
		Arg	0.132 cd	0.071	53.8	
	OM effect[d]	Q	0.339 a	0.315	93.1	
		C	0.344 a	0.327	95.0	
		G	0.394 a	0.297	75.3	0.980
		K	0.334 a	0.314	94.0	
		K+G	0.352 a	0.303	86.1	
C[b]	M effect[c]	CS	0.0529 c	0.006	11.3	
		Cel	0.0461 d	0.007	15.7	
		Glu	0.0472 d	0.004	8.74	0.000
		Lig	0.0598 b	0.006	10.9	
		Arg	0.0677 a	0.007	10.6	
	OM effect[d]	Q	0.0502 b	0.010	19.9	
		C	0.0560 ab	0.010	18.5	
		G	0.0531 ab	0.009	17.9	0.061
		K	0.0550 ab	0.009	17.2	
		K+G	0.0594 a	0.011	17.8	

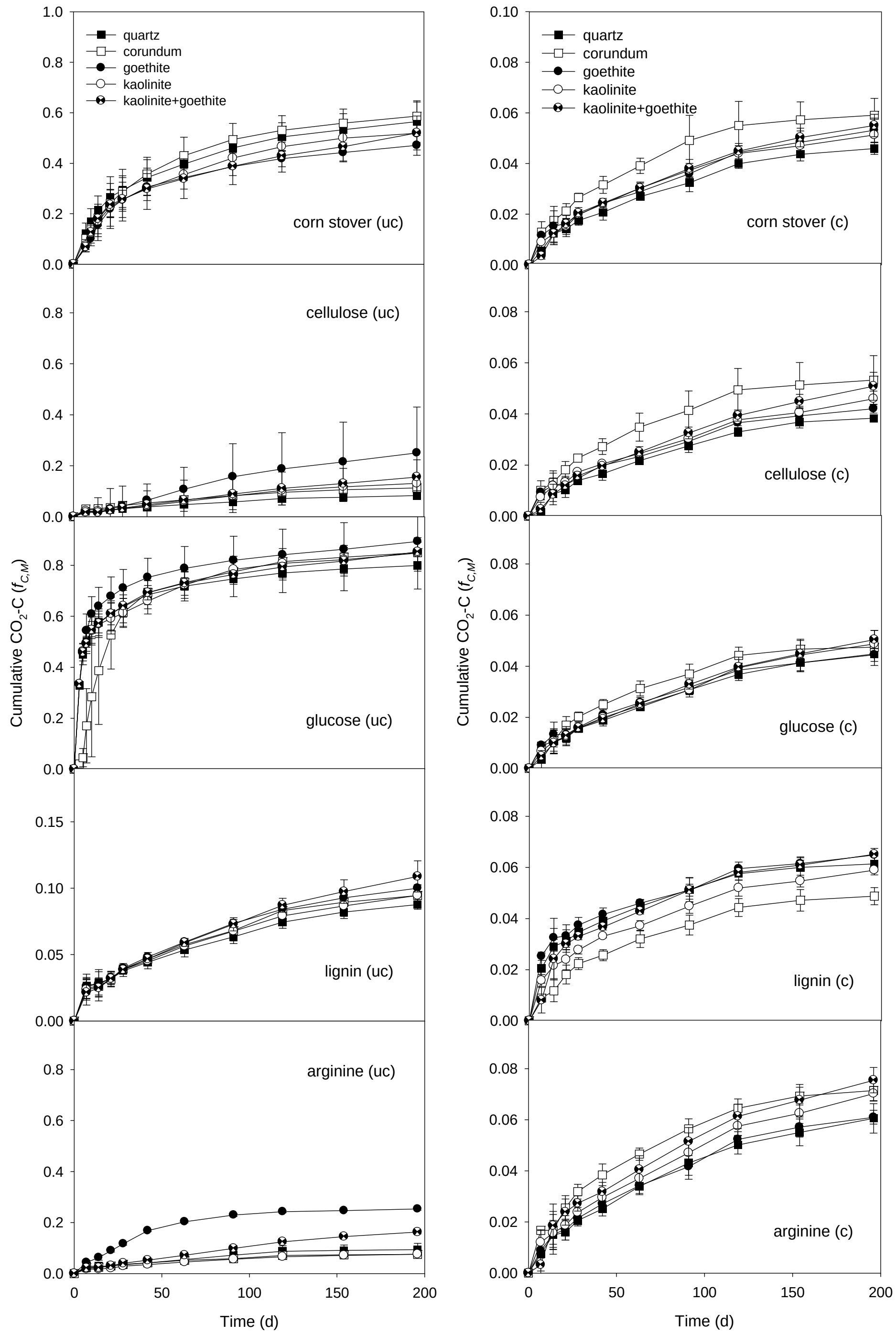
[a] Uncharred; [b] charred; [c] mineral type effect; [d] organic matter type effect; [e]standard deviation;
[f] relative standard deviation, statistical differences for averages of %RSD shown in text;
[g] identical letters indicate no statistical difference, within a given group;
[h] P value of the main M or OM effect.

Supplementary Table S3

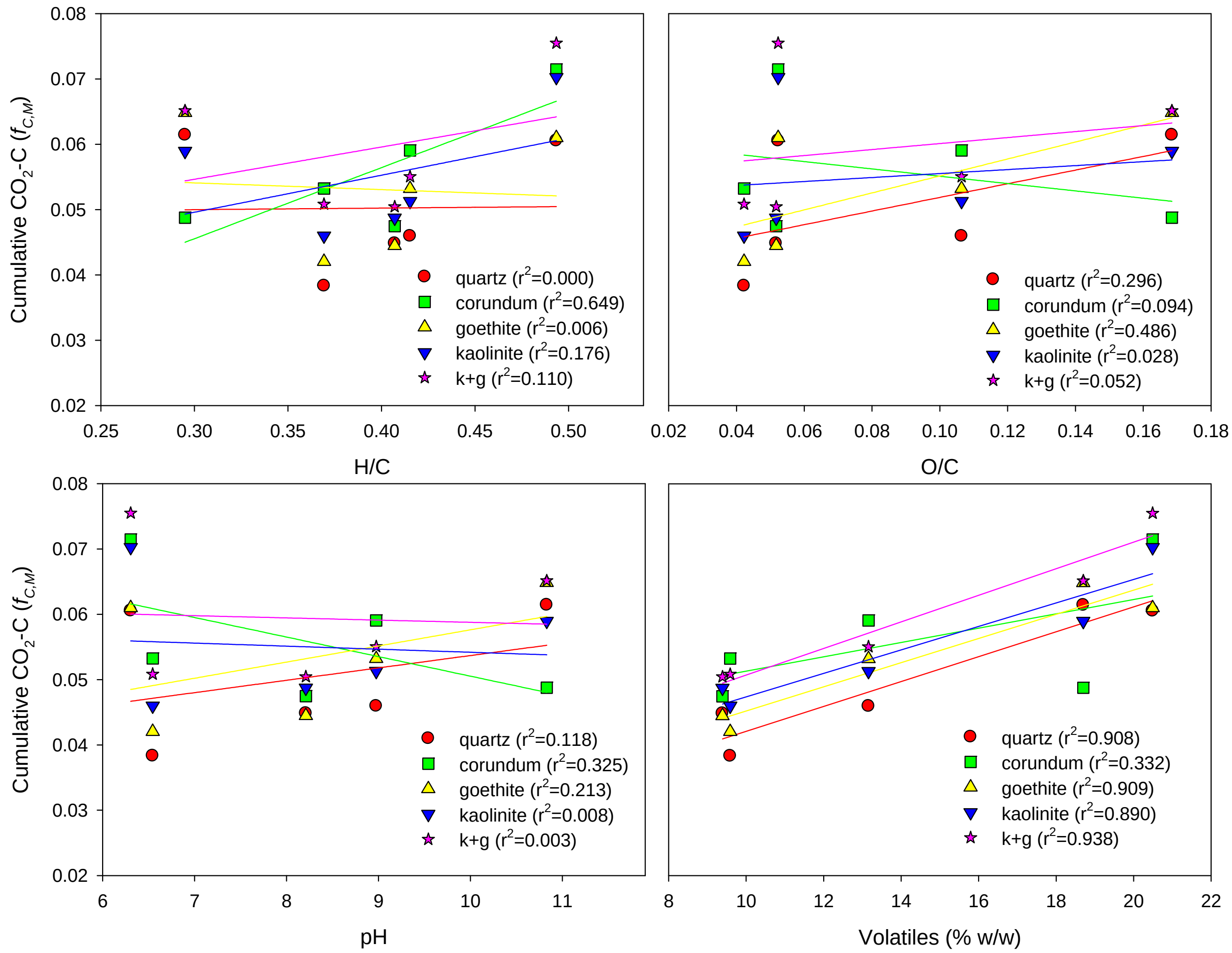
Relative contribution (RSD ratio) of effect of mineralogy on uncharred and charred OM mineralization to C debt or credit ratio calculation (dimensionless; a RSD ratio value of 1 would indicate that the contribution of mineralogy to the sum of mass loss by charring and mineralization are identical for both charred and uncharred OM) with the data sets for the same original feedstock but different mineral types (n=20).

		Corn stover	Cellulose	Glucose	Lignin	Arginine
Uncharred	Average	0.468	0.824	0.163	0.903	0.868
	SD[a]	0.065	0.148	0.0555	0.01	0.071
	%RSD[b]	13.9	18.0	34.1	1.07	8.19
Charred	Average	0.448	0.410	0.244	0.609	0.292
	SD[a]	0.003	0.003	0.001	0.004	0.002
	%RSD[b]	0.631	0.761	0.433	0.693	0.770
	RSD ratio[c]	0.045	0.042	0.013	0.649	0.094

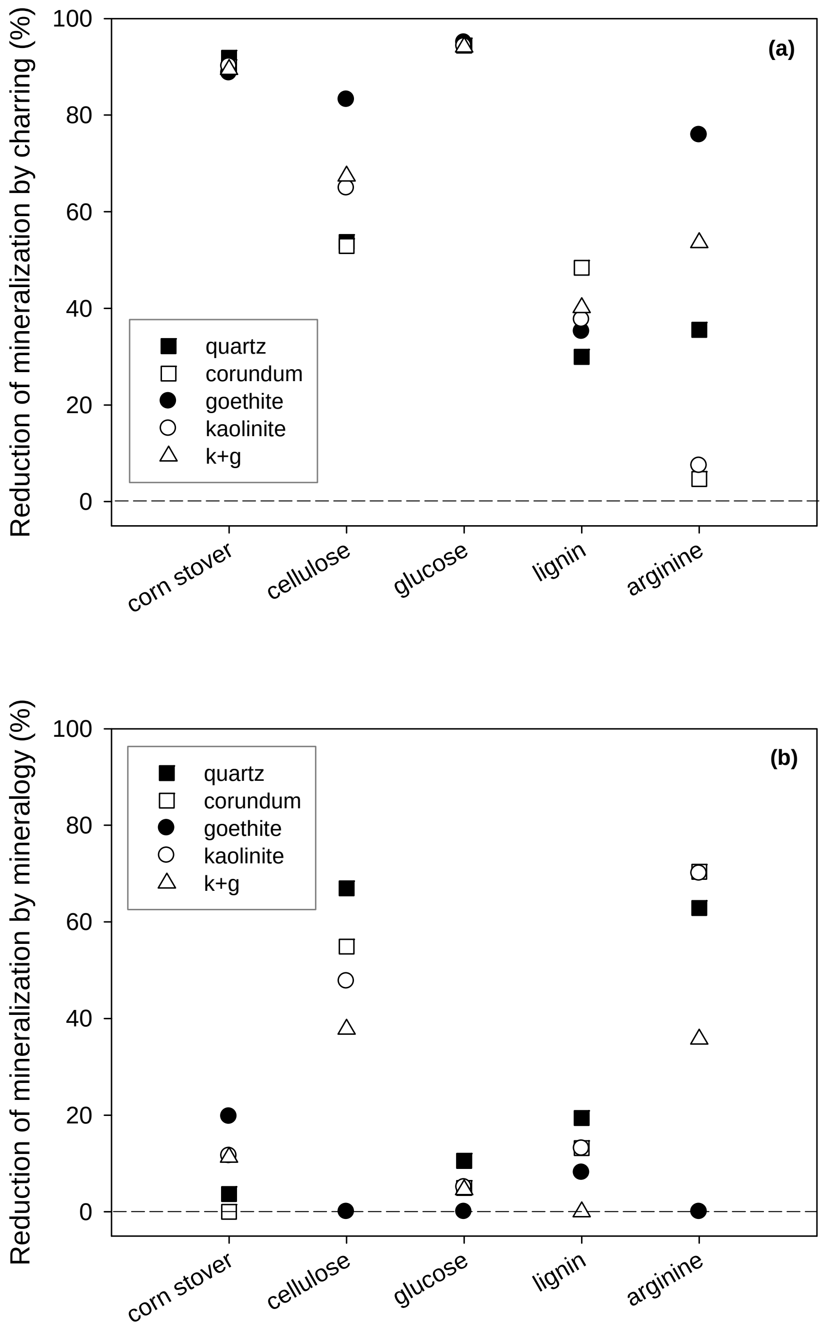
[a] Standard deviation; [b] relative standard deviation; [c] RSD for charred/RSD for uncharred.



Supplementary Fig. S1. Cumulative CO_2 evolution during incubation with various combinations of minerals and charred (c) or uncharred (uc) OM (mean and standard deviation; n = 4).



Supplementary Fig. S2. Relationship between H/C, O/C, pH, volatiles (% w/w of PyOM) of charred organic matter and cumulative CO_2 evolution shown separately for each mineral. Lines indicate linear regressions of 5 data points of different material combinations. Each data point represents the mean of 4 experimental replicates.



Supplementary Fig. S3. Reduction of mineralization of organic matter by charring (a) and by mineralogy (b) after 196 days of incubation (n=20). The values in (b) were calculated on the baseline of the most rapidly mineralized organic material that was set to zero.

References

Beak, D.G., Basta, N.T., Scheckel, K.G., Traina, S.J., 2006. Bioaccessibility of lead sequestered to corundum and ferrihydrite in a simulated gastrointestinal system. Journal of Environmental Quality 35, 2075-2083.

Kosmulski, M., 2014. The pH dependent surface charging and points of zero charge. VI. Update. Journal of Colloid Interface Science 426, 209-212.