Supplementary Material

Overcoming the HHV–Energy Recovery Tradeoff in Hydrothermal Carbonization of Water Hyacinth via Co-Biomass Selection and Citric Acid Catalysis

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Table S1. Atomic ratios of H/C, O/C, and N/C for biomass and derived hydrochar under various hydrothermal carbonization conditions.

	Sample	Atomic ratio		
		O/C	H/C	N/C
Biomass	WH	0.85	1.47	0.05
	WS	0.75	1.54	0.01
	RH	0.77	1.38	0.01
	CM	0.79	1.21	0.11
Hydrochar	WH_240	0.42	0.97	0.04
	WS_240	0.36	0.77	0.01
	RH_240	0.38	0.66	0.01
	CM_240	0.50	0.81	0.08
	WH-WS_240	0.47	0.95	0.03
	WH-RH_240	0.38	0.82	0.03
	WH-CM_240	0.59	1.01	0.06
	WH_270	0.41	0.89	0.05
	WS_270	0.31	0.78	0.01
	RH_270	0.23	0.91	0.05
	CM_270	0.68	0.79	0.07
	WH-WS_270	0.36	0.78	0.03
	WH-RH_270	0.32	0.78	0.03
	WH-CM_270	0.42	0.76	0.06
	WH-CA_240	0.42	0.81	0.04
	WH-WS-CA_240	0.50	0.93	0.03
	WH-RH-CA_240	0.43	0.80	0.02
	WH-CM-CA_240	0.42	0.91	0.05

C: carbon, H: hydrogen, N: nitrogen, O: oxygen

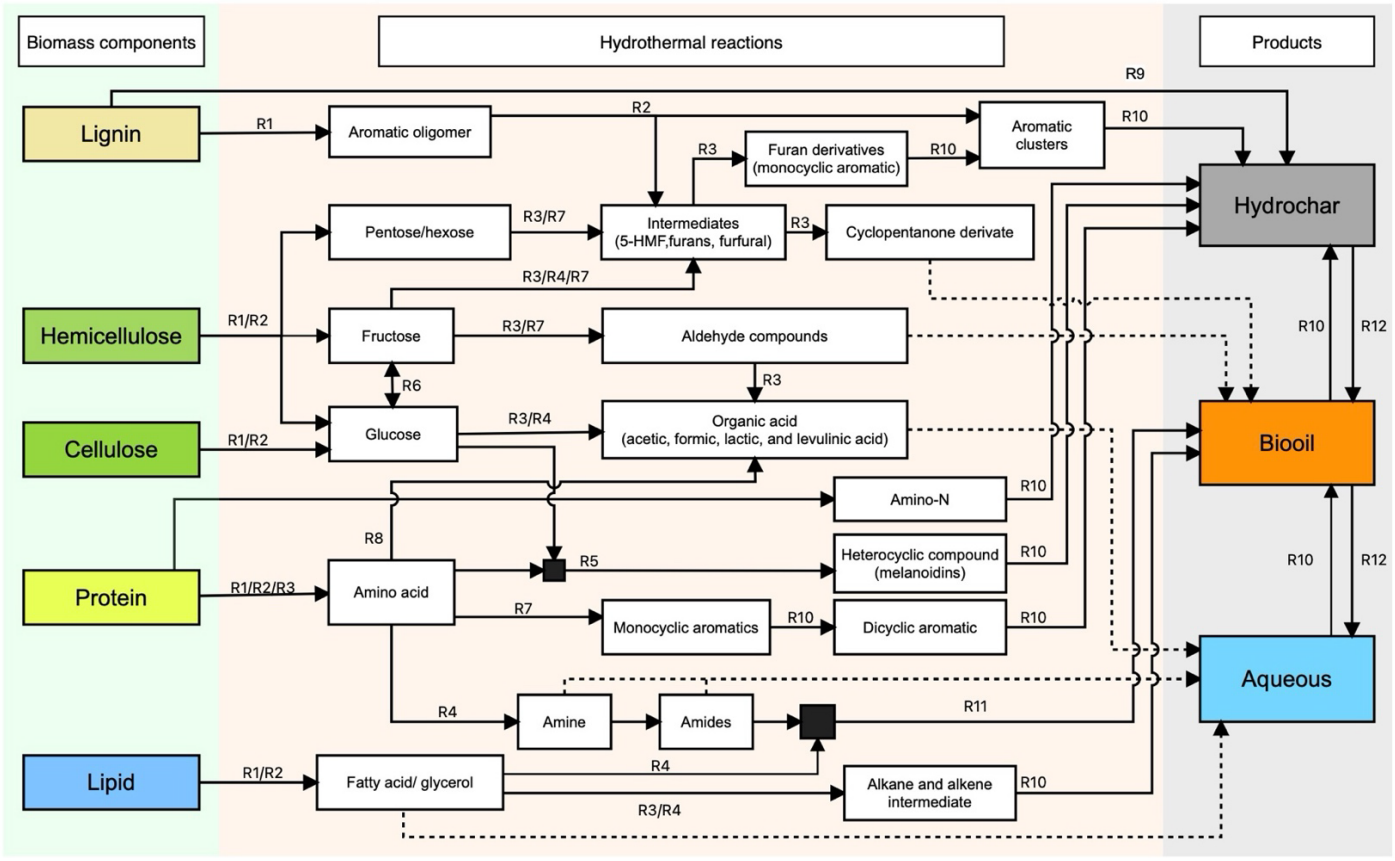


Figure S1. Proposed reaction pathways during hydrothermal carbonization of biomass components. The conceptual scheme is adapted and refined from previous studies [1–7]. R1: Depolymerization R2: Hydrolysis R3: Dehydration R4: Decarboxylation R5: Maillard reaction R6: Isomerization R7: Rearrangement R8: Deamination R9: Solid to solid conversion R10: Polymerization R11: Amination R12: Degradation (—): Reaction (---): By product

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