

Table S1. Components used in Aspen Plus (13) simulation of chitin fermentation

Component		Component	
Conventional	Formula	User-defined	Formula
Ammonia	NH ₃	Alanine peptide	C ₆ H ₁₂ N ₂ O ₃
Astaxanthin	C ₄₀ H ₅₂ O ₄	Biomass	C ₁₀ H ₁₈ O ₅ N ₂
Calcium carbonate	CaCO ₃	Glutamate peptide	C ₁₀ H ₁₆ N ₂ O ₇
Calcium hydrogenphosphate	CaHPO ₄	Lysine peptide	C ₁₂ H ₂₆ N ₄ O ₃
Calcium hydroxide	Ca(OH) ₂	Methionine peptide	C ₁₀ H ₂₀ N ₂ O ₃ S ₂
Calcium phosphate	Ca ₃ (PO ₄) ₂	Phenylalanine peptide	C ₁₈ H ₂₀ N ₂ O ₃
Carbon dioxide	CO ₂	Ionic species	
Dextrose	C ₆ H ₁₂ O ₆	Ammonium ion	NH ₄ ⁺
D-Lactic acid	C ₃ H ₆ O ₃	Calcium ion	Ca ²⁺
D-N-Acetylglucosamine	C ₈ H ₁₅ NO ₆	Carbonate ion	CO ₃ ²⁻
L-Alanine	C ₃ H ₇ NO ₂	Dihydrogenphosphate ion	H ₂ PO ₄ ⁻
L-Glutamic acid	C ₅ H ₉ NO ₄	Hydrogencarbonate ion	HCO ₃ ⁻
L-Methionine	C ₅ H ₁₁ NO ₂ S	Hydrogenphosphate ion	HPO ₄ ²⁻
L-Phenylalanine	C ₉ H ₁₁ NO ₂	Hydronium ion	H ₃ O ⁺
Magnesium carbonate	MgCO ₃	Hydroxide ion	OH ⁻
Magnesium hydroxide	Mg(OH) ₂	Hydroxocalcium ion	CaOH ⁺
Methyl palmitate	C ₁₇ H ₃₄ O ₂	Hydroxomagnesium ion	MgOH ⁺
Phosphoric acid	H ₃ PO ₄	Lactate ion	C ₃ H ₅ O ₃ ⁻
Sodium carbonate	Na ₂ CO ₃	Magnesium ion	Mg ²⁺
Sodium dihydrogenphosphate	NaH ₂ PO ₄	Phosphate ion	PO ₄ ³⁻
Sodium hydrogenphosphate	Na ₂ HPO ₄	Sodium hydrogencarbonate ion	NaHCO ₃
Sodium hydroxide	NaOH	Sodium ion	Na ⁺
Water	H ₂ O		

Table S2. Results of the design of experiments for deproteinization (DP) and demineralization (DM) with standard deviations (S.D.) for shrimp waste treatment with lactic acid bacteria

Temperature/°C	(m(solid)/V(liquid))/(kg/m ³)	w(glucose)/%	w(DP)/%	S.D./%	w(DM)/%	S.D./%
40	1:15	1.6	40.9	4.6	85.7	1.1
40	1:15	10.3	67.9	3.9	76.9	2.1
43	1:20	15.0	48.5	3.3	81.6	1.5
45	1:15	10.3	59.1	2.3	80.9	1.7
37	1:20	5.0	40.5	4.1	84.6	2.0
40	1:15	18.4	50.9	3.4	85.4	1.7
37	1:10	15.0	65.4	2.3	87.5	1.5
40	1:7	10.3	78.1	5.5	90.2	1.5
37	1:20	15.0	38.6	5.8	78.7	1.8
40	1:23	10.3	34.7	3.4	78.2	2.4
40	1:15	10.3	65.9	2.5	78.3	1.9
43	1:10	15.0	54.3	4.0	84.2	1.7
35	1:15	10.3	70.2	3.3	90.6	1.6
43	1:20	5.0	46.8	3.9	87.6	1.9
43	1:10	5.0	50.5	1.3	78.6	1.8
37	1:10	5.0	56.6	4.2	93.0	2.8
Optimal						
40	1:10	10.3	92.7		97.8	

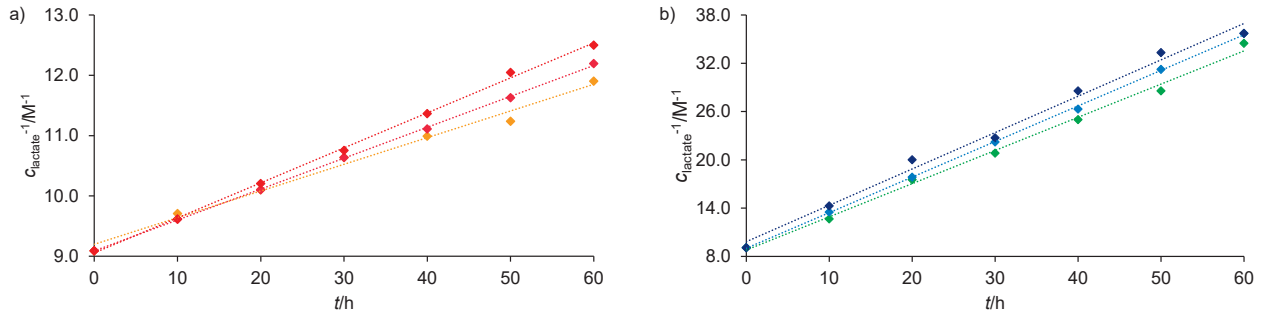


Fig. S1. Plot of the reciprocal value of lactic acid concentrations for determination of kinetic parameters: a) demineralization at 37 °C (orange), 40 °C (red) and 43 °C (dark red), and b) deproteinization at 37 °C (green), 40 °C (light blue) and 43 °C (dark blue)

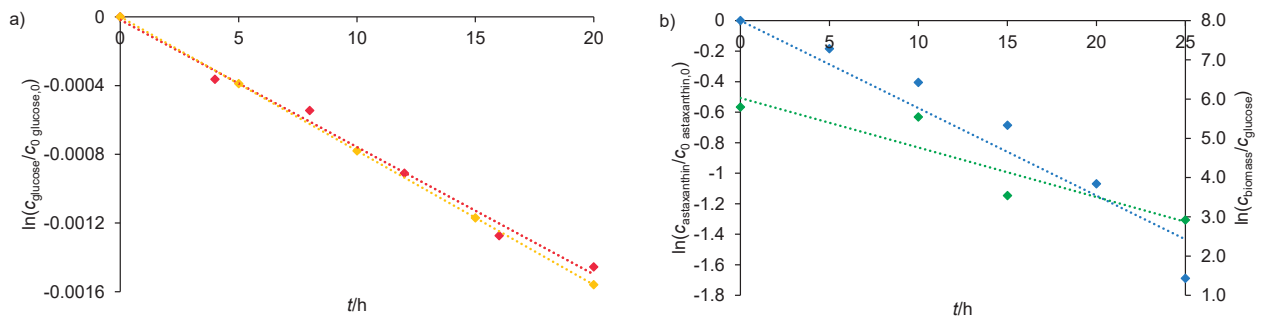


Fig. S2. Semi-log plot of relative concentrations for determination of kinetic parameters: a) glucose at 37 °C (red) and 40 °C (orange), b) astaxanthin (blue) and biomass (green) at 40 °C

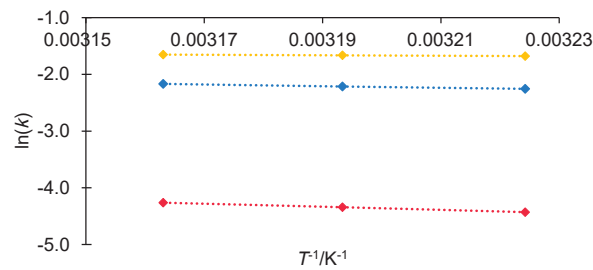


Fig. S3. Arrhenius plot for determination of kinetic parameters of reaction. Glucose uptake (orange), demineralization (red) and deproteinization (blue), k =reaction rate constant (in $\text{m}^3/(\text{kmol}\cdot\text{s})$)