

Supplementary Table I. Stoichiometric matrix for microbial reactions

Process	Solute species						Particulate species												
	S_{NH_4} [g _N m ⁻³]	S_{NO_2} [g _N m ⁻³]	S_{NO_3} [g _N m ⁻³]	S_{F} [g _{COD} m ⁻³]	S_{A} [g _{COD} m ⁻³]	S_{PO_4} [g _P m ⁻³]	S_{O_2} [g _{O_2} m ⁻³]	X_{AOB} [g _{COD,X} m ⁻³]	X_{NOB} [g _{COD,X} m ⁻³]	X_{Het} [g _{COD,X} m ⁻³]	X_{PAO} [g _{COD,X} m ⁻³]	X_{GAO} [g _{COD,X} m ⁻³]	X_{PP} [g _{COD,X} m ⁻³]	$X_{\text{PHA,P}}$ [g _{COD,X} m ⁻³]	$X_{\text{GLY,P}}$ [g _{COD,X} m ⁻³]	$X_{\text{PHA,G}}$ [g _{COD,X} m ⁻³]	$X_{\text{GLY,G}}$ [g _{COD,X} m ⁻³]	X_{S} [g _{COD,X} m ⁻³]	X_{I} [g _{COD,X} m ⁻³]
<i>Autotrophic (AOB)</i>																			
1. Aerobic growth	$-\frac{1}{Y_{\text{AOB}}}$	$\frac{1}{Y_{\text{AOB}}}$					$-\frac{3.43 - Y_{\text{AOB}}}{Y_{\text{AOB}}}$	1											
2. Lysis								-1										$1 - f_{\text{XI}}$	f_{XI}
<i>Autotrophic (NOB)</i>																			
3. Aerobic growth		$-\frac{1}{Y_{\text{NOB}}}$	$\frac{1}{Y_{\text{NOB}}}$				$-\frac{1.14 - Y_{\text{NOB}}}{Y_{\text{NOB}}}$		1										
4. Lysis									-1									$1 - f_{\text{XI}}$	f_{XI}
<i>Heterotrophic (Het)</i>																			
5. Aerobic growth on S_{F}				$-\frac{1}{Y_{\text{Het}}}$			$1 - \frac{1}{Y_{\text{Het}}}$		1										
6. Aerobic growth on S_{A}					$-\frac{1}{Y_{\text{Het}}}$		$1 - \frac{1}{Y_{\text{Het}}}$		1										
7. Anoxic (NO ₂) growth on S_{F}		$-\frac{1 - Y_{\text{Het}}}{1.71Y_{\text{Het}}}$		$-\frac{1}{Y_{\text{Het}}}$					1										
8. Anoxic (NO ₂) growth on S_{A}		$-\frac{1 - Y_{\text{Het}}}{1.71Y_{\text{Het}}}$			$-\frac{1}{Y_{\text{Het}}}$				1										
9. Anoxic (NO ₃) growth on S_{F}			$-\frac{1 - Y_{\text{Het}}}{2.86Y_{\text{Het}}}$	$-\frac{1}{Y_{\text{Het}}}$					1										
10. Anoxic (NO ₃) growth on S_{A}			$-\frac{1 - Y_{\text{Het}}}{2.86Y_{\text{Het}}}$		$-\frac{1}{Y_{\text{Het}}}$				1										
11. Fermentation				-1	1														
12. Lysis										-1								$1 - f_{\text{XI}}$	f_{XI}
<i>PAO</i>																			
13. Anaerobic storage of PHA					$Y_{\text{S,A}}^{\text{PAO}}$	$Y_{\text{PO}_4}^{\text{PAO}}$						$-Y_{\text{PO}_4}^{\text{PAO}}$	1		$-(1 - Y_{\text{S,A}}^{\text{PAO}})$				
14. Aerobic storage of PP						-1	$-Y_{\text{PHA}}^{\text{PAO}}$					1	$-Y_{\text{PHA}}^{\text{PAO}}$						
15. Aerobic growth							$\frac{1 - Y_{\text{PAO}}}{Y_{\text{PAO}}}$			1			$-\frac{1}{Y_{\text{PAO}}}$						
16. Aerobic storage of GLY							$\frac{1 - Y_{\text{GLY}}^{\text{PAO}}}{Y_{\text{GLY}}^{\text{PAO}}}$						$-\frac{1}{Y_{\text{GLY}}^{\text{PAO}}}$		1				
17. Anoxic (NO ₂) storage of PP		$-\frac{Y_{\text{PHA}}^{\text{PAO}}}{1.71}$				-1						1	$-Y_{\text{PHA}}^{\text{PAO}}$						