

Additional file 3

Supplementary table

Smart sustainable bottle (SSB) system for *E. coli* based recombinant protein production

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Table S1 Literature survey of oxygen transfer capacities (k_La values) in shake flasks, single use culture vessels, and conventional bioreactors

Cultivation vessel	Working volume	Oxygenation condition	Baffled	k_La	Reference
250 mL Shake Flask	40 %	250 rpm (orbital shaking) in a shaker with amplitude of 1.6 cm	No	31 h ⁻¹	[1]
250 mL Shake Flask	40 %	250 rpm (orbital shaking) in a shaker with amplitude of 1.6 cm	Yes	59 h ⁻¹	[1]
10 L BIOSTAT® CultiBag RM system	10 %	Air flow was regulated between 0.1 and 0.6 vvm, 42 rpm rocking (10 ° angle)	No	55 h ⁻¹	[2]
10 L Wave Bioreactor® Cellbag	50 %	Air flow rate 0.1 vvm (with sparger), 40 rpm rocking (10 ° angle)	No	60 h ⁻¹	[3]
20 L Cylindrical Disposable Bioreactor	20 %	220 rpm (orbital shaking) in a shaker with amplitude of 5 cm	No	~ 80 h ⁻¹	[4]
500 mL Shake Flask	10 %	160 rpm (orbital shaking) in a shaker with amplitude of 5 cm	No	127 h ⁻¹	This work
500 mL Shake Flask	10 %	160 rpm (orbital shaking) in a shaker with amplitude of 5 cm	Yes	146 h ⁻¹	This work
250 mL Shake Flask	20 %	300 rpm in a shaker. Shaking amplitude was not specified	Yes	150 h ⁻¹	[5]
50 L BIOSTAT® CultiBag STR plus MO (Stirred Single-Use Bioreactor)	not specified	Oxygenation conditions for k_La measurement were not specified. Cultivation conditions are air flow rate of 5 to 20 L min ⁻¹ , agitation rate of 250 to 370 rpm with a 6-blade disk impeller (bottom) and a 3-blade-segment impeller (top).	Yes	163 h ⁻¹	[6]
2 L Bioreactor (glass)	100 %	Air flow rate 1 vvm, 500 rpm with two Rushton 6-blade impellers	No	162 h ⁻¹	This work
2 L SSB system	100 %	Air flow rate 1 vvm, 1100 rpm using a magnetic stirrer bar (Ø 20 mm, L 50 mm)	No	208 h⁻¹	This work
10-L Stainless Steel Bioreactor	not specified	Oxygenation conditions for k_La measurement were not specified.	not specified	392 h ⁻¹	[6]
2 L Bioreactor (glass)	100 %	Air flow rate 1 vvm, 1000 rpm with two Rushton 6-blade impellers	No	701 h ⁻¹	This work
Stainless Steel Bioreactor	not specified	Superficial gas velocity (U_G) of 0.81 10 ⁻³ m/s, 300 to 800 rpm with a Rushton 6-blade impeller	Yes	~360 h ⁻¹ to ~1000 h ⁻¹	[7]

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