

COMPARISON OF SINGLE-USE AND STEEL FERMENTERS FOR K_LA AND AGGRESSIVE MICROBIAL CULTURES

Jason Brown, Thermo Fisher Scientific
 jason.brown@thermo.com
 Nephi Jones, Thermo Fisher Scientific
 Christopher Brau, Thermo Fisher Scientific

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Purpose built single-use fermenters enable production facilities to utilize the single-use technologies instead of traditional stainless steel fermentor vessels without modifying their existing procedures. The manufacture lead time of the single-use fermentor hardware is a fraction of traditional vessels. As each single-use bioprocess container ships sterile and validated, reducing down time between cultures and allowing for more production volume in less space. Here we demonstrate k_La studies and aerobic cultivations with up to 2vvm gas flow in comparison of the single-use fermentors to traditional stainless steel fermenters. These single-use fermentors covering 6L-300L working volumes are specifically designed to meet the performance requirements of dense, rapidly growing microbial cultures while offering the benefits of quick process setup, reduced contamination risk, and high production quality of the original single-use bioreactor.

Study	Results	316ss	SUF
Rapid growth and high protein expression (<i>E. coli</i> , 120 OD ₆₀₀ by 12 hrs, IPTG induction)	Equivalent titer and yields 200 g/L WCW	100 L	30 L, 300 L
Hi density growth and protein expression (<i>E. coli</i> , 240 OD ₆₀₀ , IPTG induction)	Equivalent yields 9 g/L titer scale-up pre clinical production	1 L, 5 L, 100 L	30 L, 300 L
T7 RNA polymerase (<i>E. coli</i> , IPTG induction, constant temperature)	Yielded higher DNA modifying enzyme activity	10 L, 300 L	30 L, 300 L
RNase inhibitor (<i>E. coli</i> , difficult-to-fold protein)	Identical protein folding conditions created. Higher activity in S.U.F.	10 L	30 L
<i>E. coli</i> plasmid production (32 shift to 43°C for induction in 20min)	Equivalent plasmid yields and ~70 OD.	10 L	30 L
<i>B.subtilis</i> Protein A/G (secreted protein)	Equivalent yields, ~37 OD with 1.5 g/L target protein.	10 L, 300 L	30 L, 300 L
<i>P. pastoris</i> / FastAP (yeast, secreted protein)	90g/l DCW, 300 g/L WCW, 600 OD, Equivalent protein yields, higher activity in SUF	7 L	30 L, 60 L 300 L
<i>S. Cerevisiae</i> (yeast, secreted)	2X protein yield in S.U.F., Same 160 OD	10 L, 300 L	30 L, 300 L
<i>T. album</i> / Proteinase K (fungus, secreted native protein)	11 day process. Identical protein yield per substrate.	10 L, 300 L	30 L, 300 L
Thermoinducible expression (<i>E. coli</i> , induction by increasing temp to 42°C)	TCU causes slower heat induction than steam. Equivalent product yield and solubility.	10 L, 300 L	30 L, 300 L

Table 1 – Summary of tech transfer results from steel fermentor into single-use fermentor.

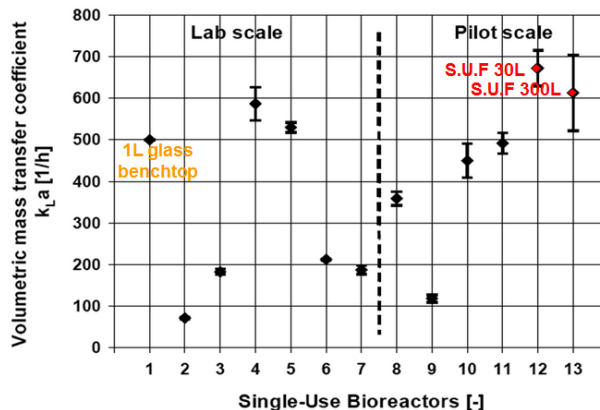


Figure 1 – k_La in different single-use bioreactors at laboratory and pilot scale (ISBN: 978-3-89746-171-0).