

Table 1. *Some quantitative aspects of 'model' freshwater micro-algal cells*

| | Cell of 5 μm radius | Cell of 10 μm radius |
|---|--------------------------------|---------------------------------|
| Cell surface area (m^2) | 314×10^{-12} | 1257×10^{-12} |
| Cell volume (m^3) | 524×10^{-18} | 4189×10^{-18} |
| Cell wet wt (g) | 524×10^{-12} | 4189×10^{-12} |
| Cell organic wt (g) | 131×10^{-12} | 1047×10^{-12} |
| Cell C content (g) | 65×10^{-12} | 524×10^{-12} |
| Cell C content (mol) | 5.45×10^{-12} | 43.6×10^{-12} |
| Cell N content (mol) | 0.78×10^{-12} | 6.23×10^{-12} |
| Specific growth rate ($\log_e 2$ /generation time) (s^{-1}) assuming specific growth rate \propto (cell C content) $^{-0.33}$ [equation (1)] | 8×10^{-6} | 4×10^{-6} |
| Specific growth rate ($\log_e 2$ /generation time) (s^{-1}), assuming specific growth rate \propto (cell C content) $^{-0.25}$ [equation (2)] | 8×10^{-6} | 4.75×10^{-6} |
| Specific maintenance rate (s^{-1}) assuming specific maintenance rate \propto (cell C content) $^{-0.33}$ [equation (1)] | 3×10^{-8} | 1.5×10^{-8} |
| Specific maintenance rate (s^{-1}) assuming specific maintenance rate \propto (cell C content) $^{-0.25}$ [equation (1)] | 3×10^{-8} | 1.77×10^{-8} |
| Minimum mechanistic power consumption for growth (W) [equation (1)] | 39.1×10^{-12} | 156×10^{-12} |
| Minimum mechanistic power consumption of growth (W) [equation (2)] | 39.1×10^{-12} | 186×10^{-12} |
| Minimum mechanistic power output for maintenance (W) [equation (1)] | 5.4×10^{-14} | 21.6×10^{-14} |
| Minimum mechanistic power output for maintenance (W) [equation (2)] | 5.4×10^{-14} | 25.5×10^{-14} |
| Minimum mechanistic power required for flagellar motion at frequency of 100 s^{-1} (W) | 2.2×10^{-13} | 2.2×10^{-13} |
| Minimum mechanistic power required for flagellar motion at frequency of 10 s^{-1} (W) | 2.2×10^{-14} | 2.2×10^{-14} |
| Minimum thermodynamic power required for swimming at $50 \mu\text{m s}^{-1}$ (W) | 2.38×10^{-16} | 4.7×10^{-16} |