Table 2. *The effect of varying the nature of the carbon source on the energetics of* E. coli *during growth in continuous culture*
Cells were grown at the stated pH (± 0.05) under carbon-limited conditions. → $H^+/O$ ratios, $M_{O_2}$ and $Y_{O_2}^{max}$ were determined as described in Table 1 and in the Materials and Methods section. Values of *N* were calculated by the same approach as described in the text for glycerol, with the modifications described in the footnotes to this Table. The theoretical value of $Y_{ATP}^{max}$ for each carbon source was calculated essentially as described by Stouthamer [31], but no allowances were made for the transport of any cell nutrients. Where appropriate, all values are quoted as the average ± S.E.M. with the number of determinations in brackets

| Limiting carbon source | pH | $Y_{O_2}^{max}$ | → $H^+/O$ (endogenous) | *N* | $Y_{ATP}^{max}$ | Theoretical $Y_{ATP}^{max}$ | $Y_{ATP}^{max}$/ theoretical $Y_{ATP}^{max}$ | $M_{O_2}$ | *M* |
|---|---|---|---|---|---|---|---|---|---|
| | | g cells · mol $O_2^{-1}$ | g-ion $H^+$ · g-atom $O^{-1}$ | mol ATP · mol $O_2^{-1}$ | g cells · mol ATP equiv.$^{-1}$ | | % | mol $O_2$ · $h^{-1}$ · g cells$^{-1}$ | mol ATP equiv. · $h^{-1}$ · g cells$^{-1}$ |
| D-Glucose | 6.78 | 59.7 | 3.75 (2) | 4.31[a, b] | 13.9 | 33.9 | 40.9 | 0.00044 | 0.00190 |
| D-Galactose | 6.98 | 58.2 | 3.77 (2) | 4.31[a] | 13.5 | 33.9 | 39.8 | 0.00097 | 0.00418 |
| L-Arabinose | 7.01 | 57.8 | 3.58 (2) | 4.33[c] | 13.4 | 33.9 | 39.5 | 0.00064 | 0.00277 |
| D-Fructose | 6.98 | 56.0 | 3.94 (2) | 4.31[a, b] | 12.9 | 33.9 | 38.1 | 0.00071 | 0.00306 |
| Glycerol | 7.02 | 50.9 | 3.96 ± 0.07 (5) | 4.00 | 12.7 | 29.5 | 43.1 | 0.00058 | 0.00232 |
| Fumarate | 6.90 | 40.4 | 3.45 ± 0.23 (4) | 4.00[d] | 10.1 | 22.6 | 44.7 | 0.00113 | 0.00452 |
| DL-Lactate | 7.27 | 35.0 | 3.67 (2) | 3.67[e] | 9.5 | 18.6 | 51.1 | 0.00073 | 0.00268 |
| Pyruvate | 7.02 | 34.3 | 3.45 (2) | 4.00 | 8.6 | 18.6 | 46.3 | 0.00073 | 0.00292 |
| Acetate | 7.05 | 20.3 | 3.13 ± 0.25 (4) | 2.88[f] | 7.1 | 12.9 | 55.0 | 0.00120 | 0.00346 |

[a] The *N* values for glucose, fructose and galactose were calculated on the basis of 80% oxidation *via* glycolysis and 20% *via* the pentose phosphate pathway [32].

[b] One ATP equivalent was allowed for the combined processes of sugar transport (*via* the phosphotransferase system) and phosphorylation to glucose 6-phosphate and fructose 1-phosphate [33, 34].

[c] *N* was calculated on the basis of 3 mol of arabinose yielding 2 mol of fructose 6-phosphate plus 1 mol of glyceraldehyde 3-phosphate.

[d] The *N* value for fumarate was calculated on the assumption that phosphopyruvate carboxylase and the malic enzyme were used equally.

[e] The initial oxidation of DL-lactate occurs predominantly *via* flavin-linked D- and L-lactate oxidases [35].

[f] The *N* value for acetate was calculated on the basis of ten turns of the Krebs cycle per turn of the glyoxylate cycle; two ATP equivalents were allowed for the activation of acetate *via* acetate thiokinase (H. L. Kornberg, personal communication).