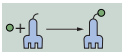


## tRNA charging



$$N_{\text{amino-acyl tRNA}} \approx 3 \times 10^6 \text{ proteins} \times \frac{300 \text{ amino acids}}{1 \text{ protein}} \times \frac{1 \text{ amino-acyl tRNA}}{1 \text{ amino acid}}$$

$$\approx 1 \times 10^9 \text{ amino-acyl tRNAs/cell}$$

minimum number of charged tRNA per cell

$$r_{\text{tRNA supply}} \approx \frac{N_{\text{amino-acyl tRNA}}}{t_{\text{division}}} = \frac{10^9 \text{ amino-acyl tRNAs / cell}}{5000 \text{ sec}}$$

$$\approx 2 \times 10^5 \frac{\text{amino-acyl tRNAs}}{1 \text{ sec}}$$

rate of charged tRNA consumption/supply to ribosomes

$$r_{\text{tRNA charging}} \approx \frac{20 \text{ amino-acyl tRNA}}{\text{tRNA synthetase} \times \text{sec}}$$

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rate of tRNA charging

$$N_{\text{tRNA synthetase}} \approx \frac{r_{\text{tRNA supply}}}{r_{\text{tRNA charging}}}$$

$$\approx 1 \times 10^4 \text{ tRNA synthetases / cell}$$

number of tRNA synthetase complexes