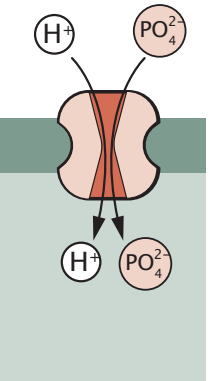
phosphorus transport



$m_P^{(cell)} \approx 0.03 \times m_{dry} \approx 10$ fg BNID: 100653

cellular phosphorus mass

$am_P \approx 30$ Da $\approx 6 \times 10^{-8}$ fg

atomic weight

$$N_P^{(cell)} \approx \frac{10 \text{ fg}}{\text{cell}} \times \frac{1 \text{ P}}{6 \times 10^{-8} \text{ fg}} \approx 2 \times 10^8 \text{ P / cell}$$

phosphorus atoms per cell

$$N_P^{(phosphate)} = 1 \text{ P / phosphate}$$

phosphorus atoms per phosphate

$$r_{transport} \approx \frac{300 \text{ phosphate / sec}}{\text{transporter}}$$

phosphate transport rate

$$N_{transporters} \approx \frac{N_P^{(cell)}}{N_P^{(phosphate)} \times r_{transport} \times t_{division}} \approx \frac{2 \times 10^8 \frac{P}{cell}}{1 \frac{P}{phosphate} \times 300 \frac{phosphate}{sec \times transporter} \times 5000 \frac{sec}{cell}}$$

$$\approx 150 \text{ transporters}$$

number of phosphate transporter complexes