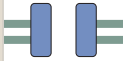
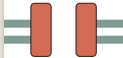
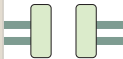




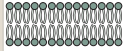




			amount	rate	minimum number (per cell)	observed number (per cell)
transport	CARBON		10^{10} carbon atoms	200 sugars per second	3×10^3 glucose transporters	$\sim 1-3 \times 10^4$ glucose transporters
	WATER				0 (membrane is sufficient)	$\sim 1-40 \times 10^3$ water channels
	ION					
synthesis	DNA		5×10^6 bp	600 nucleotides per second	~ 50 DNA polymerases	$\sim 10^2$ DNA polymerases
	RNA		2×10^3 mRNAs 6×10^4 rRNAs	40 nucleotides per second	$3-5 \times 10^3$ RNA polymerases	
	dNTP		5×10^6 dNTPs			~ 20 ribonucleo reductases
	ATP		10^{10} ATP per cell cycle	10^3 molecules per second	$3-5 \times 10^3$ F_1F_0 ATP synthases	
	CELL WALL					
	LIPID		5×10^7 lipids	~ 1 per second per synthase	$1-2 \times 10^3$ fatty acid synthases	
	PROTEIN		3×10^6 proteins	10 – 20 amino acids per second	$1-2 \times 10^4$ ribosomes	
	tRNA		3×10^8 amino acids			