

Table 1. Summary of the quantitative comparison of energy transformation in a typical thylakoid membrane and in a purple membrane with half the area occupied by ion-pumping rhodopsin

Characteristics compared	Thylakoid membrane	Rhodopsin-containing membrane
Density of sites	PSII 5 nmol m^{-2}	Rhodopsin 135 nmol m^{-2}
Turnover at light saturation	$300 \text{ e-PSII}^{-1} \text{ s}^{-1}$ (limited by electron flow from PSII to PSI)	$7 \text{ H}^+ \text{ s}^{-1}$
Non-cyclic electron transport from water to NADP^+	$1.5 \text{ } \mu\text{mol m}^{-2} \text{ s}^{-1}$	0
H^+ flux across the photochemically active membrane	$4.5 \text{ } \mu\text{mol m}^{-2} \text{ s}^{-1}$ (in non-cyclic electron transport)	$0.95 \text{ } \mu\text{mol m}^{-2} \text{ s}^{-1}$
Required rate of photon absorption	$3 \text{ } \mu\text{mol m}^{-2} \text{ s}^{-1}$	$0.95 \text{ } \mu\text{mol m}^{-2} \text{ s}^{-1}$
Efficiency of photon energy use; percentage of absorbed excitation energy stored in the specified end products	47% in redox difference between $\text{H}_2\text{O}/\text{O}_2$ and $\text{NADPH}/\text{NADP}^+$ and in transmembrane H^+ electrochemical potential difference	8% in trans-membrane H^+ electrochemical potential difference