

TABLE IV

FREE ENERGY CHANGES OF THE PENTOSE PHOSPHATE CYCLES IN *C. pyrenoidosa*

Reaction	$\Delta G'$ (kcal)	ΔG^s (kcal)
<i>Reductive cycle</i>		
(A) $\text{CO}_2 + \text{Ribul-1,5-}P_2^{4-} + \text{H}_2\text{O} \rightarrow 2 \text{ 3-}P\text{-glycerate}^{3-} + 2 \text{ H}^+$	-8.4	-9.8 R
(B) $\text{H}^+ + \text{3-}P\text{-glycerate}^{3-} + \text{ATP}^{4-} + \text{NADPH} \rightarrow \text{ADP}^{3-} + \text{glyceraldehyde-3-}P^{2-} + \text{NADP}^+ + \text{P}_i^{2-}$	+4.3	-1.6
(C) $\text{Glyceraldehyde-3-}P^{2-} \rightarrow \text{dihydroxyacetone-}P^{2-}$	-1.8	-0.2
(D) $\text{Glyceraldehyde-3-}P^{2-} + \text{dihydroxyacetone-}P^{2-} \rightarrow \text{Fru-1,6-}P_2^{4-}$	-5.2	-0.4
(E) $\text{Fru-1,6-}P_2^{4-} + \text{H}_2\text{O} \rightarrow \text{Fru-6-}P^{2-} + \text{P}_i^{2-}$	-3.4	-6.5 R
(F) $\text{Fru-6-}P^{2-} + \text{glyceraldehyde-3-}P^{2-} \rightarrow \text{Ery-4-}P^{2-} + \text{Xyl-5-}P^{2-}$	+1.5	-0.9
(G) $\text{Ery-4-}P^{2-} + \text{dihydroxyacetone-}P^{2-} \rightarrow \text{Sed-1,7-}P_2^{4-}$	-5.6	-0.2
(H) $\text{Sed-1,7-}P_2^{4-} + \text{H}_2\text{O} \rightarrow \text{Sed-7-}P^{2-} + \text{P}_i^{2-}$	-3.4	-7.1 R
(I) $\text{Sed-7-}P^{2-} + \text{glyceraldehyde-3-}P^{2-} \rightarrow \text{Rib-5-}P^{2-} + \text{Xyl-5-}P^{2-}$	+0.1	-1.4
(J) $\text{Rib-5-}P^{2-} \rightarrow \text{Ribul-5-}P^{2-}$	+0.5	-0.1
(K) $\text{Xyl-5-}P^{2-} \rightarrow \text{Ribul-5-}P^{2-}$	+0.2	-0.1
(L) $\text{Ribul-5-}P^{2-} + \text{ATP}^{4-} \rightarrow \text{Ribul-1,5-}P_2^{4-} + \text{ADP}^{3-} + \text{H}^+$	-5.2	-3.8 R'
(M) $\text{Fru-6-}P^{2-} \rightarrow \text{Glc-6-}P^{2-}$	-0.5	-0.3
(N) $\text{Glc-6-}P^{2-} + \text{H}_2\text{O} \rightarrow \alpha\text{-D-Glc} + \text{P}_i^{2-}$	-3.3	(-7.2)*
<i>Oxidative cycle</i>		
(X) $\text{Glc-6-}P^{2-} + \text{NADP}^+ + \text{H}_2\text{O} \rightarrow \text{6-}P\text{-gluconate}^{3-} + \text{NADPH} + 2 \text{ H}^+$	-8.4	-11.4 R
(Y) $\text{6-}P\text{-Gluconate}^{3-} + \text{NADP}^+ \rightarrow \text{CO}_2 + \text{Ribul-5-}P^{2-} + \text{NADPH}$	+1.6	-2.1

Abbreviations: see Table I; R, probable sites of metabolic regulation; R', possible site of metabolic regulation. All other sites are probably unregulated and freely "reversible".

* Not a reaction that occurs to any significant extent in photosynthesis. It is included for purposes of energy balance (see Table V).