IOSR Journal of Pharmacy and Biological Sciences (IOSR-JPBS)
e-ISSN: 2278-3008, p-ISSN:2319-7676. Volume 7, Issue 2 (Jul. – Aug. 2013), PP 29-30
www.iosrjournals.org

Proposal of Reaction-Steps of $NADPH+H^+$ Formation in Photosynthesis

Umasankar Dolai
Assistant teacher, Dwarigeria Pry. School, Garhbeta South C.L.R.C., Satbankura – 721253
Dist.-Paschim Medinipur, West Bengal, India

Abstract: *The complete procedure of $NADPH+H^+$ formation in photosynthesis is proposed. Here it is expressed that $NADPH+H^+$ formation process is not a single-step reaction process, rather it is a multi-steps reaction process occured in photosynthetic cells.*

Keywords: *Light Phase of Photosynthesis, Structural Analysis of $NADP^+$ and $NADPH+H^+$, $NADPH+H^+$ Formation System.*

I. Introduction

In light phase of photosynthesis, $NADPH_2$ is formed by reaction of NADP exist in photosynthetic cells, active(Photon absorbing) electrons(2e) emitted from PS-I (chl-a) and $2H^+$ originated from photolysis. However chemical analysis reveals actual form of $NADPH_2$ as $NADPH+H^+$ and NADP can exist in photosynthetic cells as $NADP^+$. Here it be stated that the form of $NADPH_2$ i.e. $NADPH+H^+$ proves that in the above reaction, $2H^+$ ions cannot be joined with $NADP^+$ by single-reaction step, rather it can be occured by two specific reaction steps. Moreover for this joining, at first addition of 2e with $NADP^+$ must be occured by two specific reaction steps also.

II. Reaction Steps

Actually $NADPH+H^+$ formation is occured through four specific reaction steps; in which $NADP^+$ can react with $2H^+$ and 2e in alternative ways. The reaction steps are given below :

(i) At first $NADP^+$ accepts an active electron(e) to form active NADP.

$NADP^+ + e \text{----------} \rightarrow NADP$

(ii) Next active NADP attracts a hydrogen ion(H^+) to form $NADPH^+$.

$NADP + H^+ \text{----------} \rightarrow NADPH^+$

(iii) After that $NADPH^+$ accepts another active electron(e) to form active NADPH.

$NADPH^+ + e \text{----------} \rightarrow NADPH$

(iv) Finally active NADPH attracts another hydrogen ion(H^+) to form $NADPH+H^+$.

$NADPH + H^+ \text{----------} \rightarrow [\ NADPH+H^+]$

III. Reaction Place

All the reaction steps can be occured in specific reaction centres, which are situated in phosynthetic cells. The ending parts of the electron carriers (Fd, Rf etc.) emerged from PS-I (chl-a) are opened in those specific reaction centres to carry active electrons(e) emitted from PS-I (chl-a) by absorption of photons(hv) into the reaction centres.H^+ ions can also come to those reaction centres to maintain $NADPH+H^+$ formation process.

In each reaction centre a $NADP^+$ can enter, can react with 2e and $2H^+$ to form $NADPH+H^+$ and finally can remove from the reaction centre as $NADPH+H^+$. Then again a $NADP^+$ can enter into the reaction centre and the process will go on in the above way.

IV. Reaction Ways

Here the total system can be express in the following three ways with respect to active electron(e), hydrogen ion(H^+) and $NADP^+$:

(a) PS-I (chl-a)--→e--→Electron carriers(Fd,Rf etc.)--→Specific Reaction Centre.

(b) Specific Reaction Centre←---H^+←---Photolysis by PS-II (chl-b).

(c) $NADP^+$----------→Specific Reaction Centre(Via NADP, $NADPH^+$ and NADPH)----------→$NADPH+H^+$.

V. Conclusion

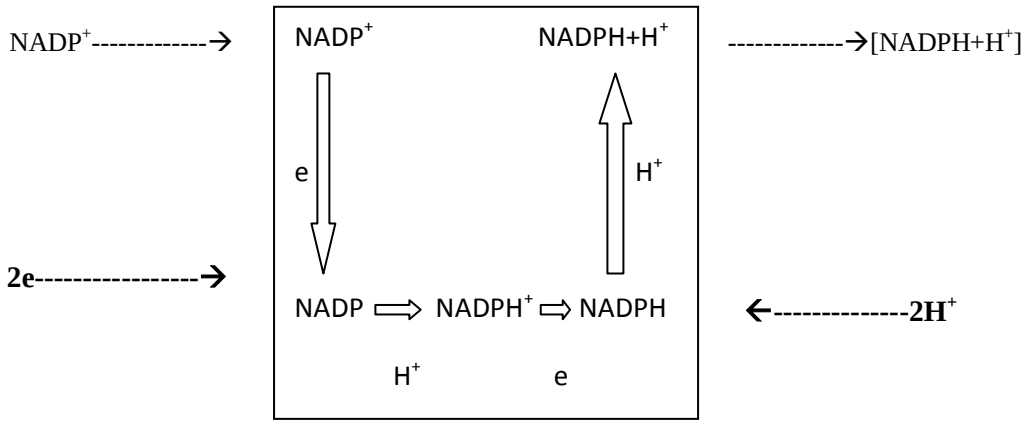
Thus $NADPH+H^+$ formation in light phase of photosynthesis is occured through four reaction-steps in the following way :

(i) $NADP^+ + e \text{----------} \rightarrow NADP$,

(ii) $NADP+H^+$----------→$NADPH^+$,
(iii) $NADPH^+$+e----------→NADPH
and (iv) $NADPH+H^+$----------→[$NADPH+H^+$]

The formulation of reduced NADP is $NADPH+H^+$ and the formulation of non-reduced cell compound is $NADP^+$. It is seen from analysis that the compound cannot be exist as NADP in cell. This informations shows that reduced NADP formation process is not a single-step reaction procedure, where NADP reacts with 2e and $2H^+$ to form $NADPH_2$; rather it is a multi-steps reaction procedure, where $NADP^+$ reacts with 2e and $2H^+$ to form $NADPH+H^+$. Thus the summary of this process is :

$NADPH+H^+$ Formation Steps(Pathway)



Specific Reaction Centre

VI. Acnowledgements

I indebt to thank Shree Gouri Sankar Dolai, student of college for his help to type this paper. I also like to thank Mr. Santu Bag, Head teacher, Duki Pry. School for his inspiration.

References

[1] David O. Hall, Krishna Rao, *Photosynthesis (Studies in Biology)*, Chembridge University Press (1999).
[2] Robert E. Blan, *Molecular Mechanism of Photosynthesis*, Wiley-Blackwell (2002).
[3] Bobbie Kalman, *Photosynthesis : Changing Sunlight Into Food*, Crabtree Publishing Company (2005).
[4] A.S.Raghavendra, *Photosynthesis*, Chembridge University Press (1997).
[5] Hans-Walter Heldt, Birgit Piechulla, *plant Biochemistry*, Academic Press (2011).