

## Pseudo Hydrogen in Potassium Channel

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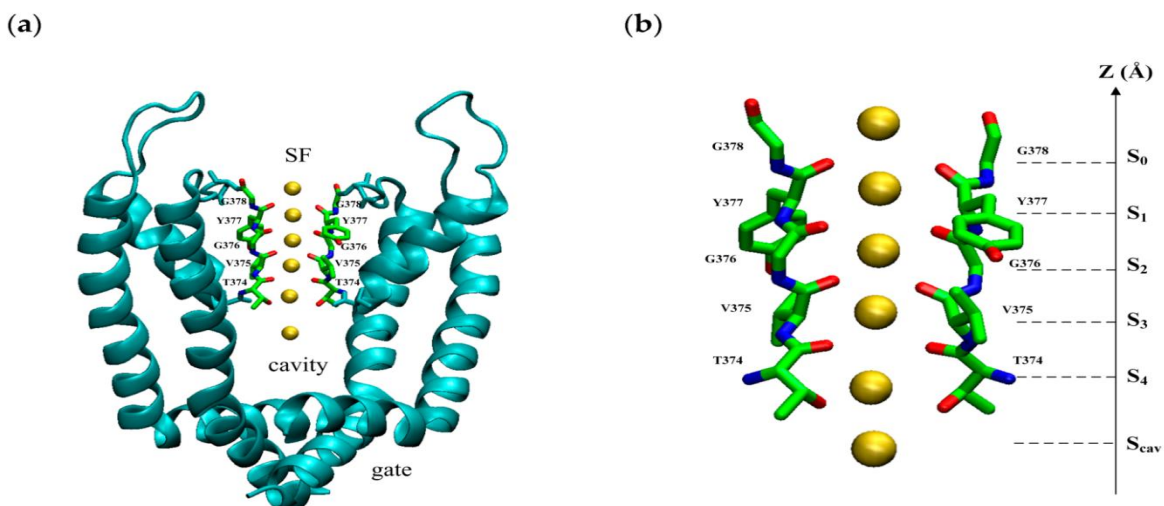
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**Abstract:** hydrogen influencing potassium ion flux through potassium channel is speculated.

**Keywords:** Pseudo hydrogen, potassium channel

### 1. INTRODUCTION

The travel of potassium ions through the potassium channel is successful because of the coordination environment of the channel having selective ligands that bind specifically to potassium ions. The potassium channel protein is a tetramer that contains four identical subunits that form a central pore. The ions flow into a pore that opens and closes, directing the ions to the central cavity as shown in Figure 1[1]:



**Figure1.** (a) The view of the pore domain of the homotetramer of Kv1.2 (PDB ID: 3lut) with an open intracellular gate near the bottom, cavity in the middle, and selective filter SF on the top. (b) The view of the selective filter with two opposite chains of the homotetramer. There are five main K<sup>+</sup> binding sites (S<sub>0</sub>-S<sub>4</sub>) and an additional binding site in the water-filled central cavity (S<sub>cav</sub>). The yellow spheres are potassium ions.

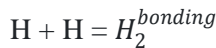
The ion flux is of diffusion rate, and an electric field with 15 THz improves it by 67.7%[1] The concerned frequency correspond to the energy of forming subtle anti-bonding hydrogen molecule. [2] The hydrogen molecules and free atoms are not known to be present in the potassium channel, but the presence of pseudo hydrogen where proton is replaced by positive hole, can be speculated. As proposed below:

### 2. BEGINNING THE STEP

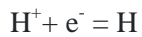
a) Bonding pseudo hydrogen molecule  $H_2^{bonding}$  on the curved elliptic distance between pseudo hydrogen atoms H of  $96 \lambda_e$  consumes the energy 0.062 eV to become anti-bonding pseudo hydrogen molecule  $H_2^{anti-bonding}$  on the curved elliptic distance between pseudo hydrogen atoms H of  $2x 48 \lambda_e$  [2] :

$$H_2^{bonding} + 0.062 \text{ eV} = H_2^{anti-bonding}$$

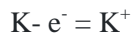
b) Missing bonding pseudo hydrogen molecule  $H_2^{bonding}$  is replaced by the new one formed from the individual pseudo hydrogen atoms H:



c) Now missing pseudo hydrogen atoms H are replaced by the new ones formed from the positive hole  $H^+$  and electron  $e^-$ :



d) Taking the electron  $e^-$  from potassium atom K which consequently becomes positively charged potassium ion  $K^+$ :



e) Positively charged potassium ion  $K^+$  cannot enter the negatively charged environment of potassium channel.

### 3. ENDING THE STEP

a) Anti-bonding pseudo hydrogen molecule  $H_2^{anti-bonding}$  on the curved elliptic distance between pseudo hydrogen atoms H of  $2 \times 48 \lambda_e$  emits the energy 0.062 eV to become the bonding pseudo hydrogen molecule  $H_2^{bonding}$  on the curved elliptic distance between pseudo hydrogen atoms H of  $96 \lambda_e$ :



b) Excessive bonding pseudo hydrogen molecule  $H_2^{bonding}$  breaks down into pseudo hydrogen atoms H:



c) Excessive pseudo hydrogen atoms H break down into positively charged holes  $H^+$  and electrons  $e^-$ :



d) Giving the electron  $e^-$  to the positively charged potassium ion which consequently becomes neutral potassium atom



e) Neutral potassium atom K can now leave the negatively charged environment of potassium channel.

### 4. THE REPEATED EXERCISE

The presented exercise should be repeated at the next subunit of a central pore.

### 5. CONCLUSION

Deus ex machina or just one amongst many pseudo solutions

### DEDICATION

To life which is a gift with freedom on one side and responsibility on the other

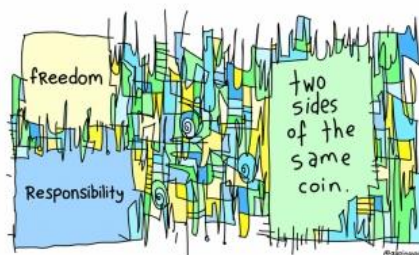


Figure2. Freedom with responsibility [3]

REFERENCES

- [1] Ding W, Zhao X, Wang H, Wang Y, Liu Y, Gong L, Lin S, Liu C, Li Y. Effect of Terahertz Electromagnetic Field on the Permeability of Potassium Channel Kv1.2. *Int J Mol Sci.* 2023 Jun 17;24(12):10271. doi: 10.3390/ijms241210271. PMID: 37373419; PMCID: PMC10299135.
- [2] Janez Špringer (2023) "Subtle Bond of Hydrogen Molecule "International Journal of Advanced Research in Physical Science (IJARPS) 10(12), pp.4-5, 2023.
- [3] Freedom with Responsibility – Grumble Services – Montessori Elementary Learning

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