

Tetrahedral Versus Bent Water Molecule Deposited Energy

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Abstract: Respecting zero water molecule enthalpy of transformation and double-surface geometry the tetrahedral water molecule deposited energy of 2.77 eV is calculated. Taking into account the already known bent water molecule deposited energy of 2.46 eV the difference of 0.304 eV is given. The latter value is comparable to the energy currency of the biological cell, i.e. ADP/ATP phosphorylation energy yielding 7kcal/mole.

Keywords: Orbital energy and orbit length, double-surface geometry, zero enthalpy of transformation, water molecule contraction and extension, energy transmitter and receiver, deposited and raised energy, ADP/ATP phosphorylation and ATP/ADP hydrolysis energy

1. PREFACE

Previously one proposed the contraction[1] and extension[2] of the bent gaseous water molecule based on the exchange of orbital energies between the bound Hydrogen and non-bound Oxygen electrons in the water molecule. Further, the concept was upgraded with limitations proposed to be inherent to the participants – the transmitter and the receiver –of the energy exchange [3]. Resolving the task the deposited energy was introduced to explain the difference between the transmitted and the received energy during the energy exchange at the zero water molecule enthalpy of transformation of the bent gaseous water molecule. In the present paper the mentioned exercise would be repeated in the case of tetrahedral solid water molecule to see the difference between both extreme deposited energies.

2. THE OUTER WATER MOLECULE ELECTRONS

Let us recall again the outer electron structure of water molecule [1], [2],[3]consisting of four non-bound Oxygen electrons creating the negative pole as well as two bound Hydrogen electrons and two bound Oxygen electrons enabling the positive pole of the molecule as presented in Figure1 [1], [2],[3]:

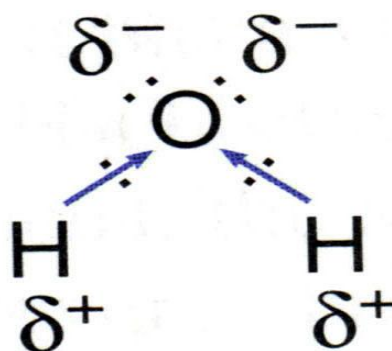


Figure1. The outer water molecule electrons

3. THE INITIAL ORBITAL ENERGIES AND ORBIT LENGTHS OF TETRAHEDRAL WATER MOLECULE

The initial orbital energy of Oxygen non-bound electron and the initial orbital energy of Hydrogen bound electron are deduced from the water molecule geometry in the solid state [4]:

$$E_{O \text{ non-bound}}^{\text{initial}} = -15.404 \ 828 \ \text{eV}. \quad (1)$$

$$E_{H \text{ bound}}^{\text{initial}} = -18.016 \ 030 \ \text{eV}. \quad (2)$$

The orbital energies and orbit lengths are in inverse proportion [4]:

$$E \times s = Ry \times \alpha^{-1}. \tag{3}$$

Where $Ry = 13.605\ 693\ 009\ \text{eV}$ and $\alpha^{-1} = 137.035\ 999\ 139\ \lambda_e$.

So the initial orbit length for the non-bound Oxygen electron as well as for bound Hydrogen electron is given:

$$s_{O\ non-bound}^{initial} = 121.031\ 518\ \lambda_e. \tag{4}$$

$$s_{H\ bound}^{initial} = 103.489\ 490\ \lambda_e. \tag{5}$$

4. THE ZERO ENTHALPY OF TRANSFORMATION

At the zero enthalpy of transformation the sum of interacting orbital energies conserves [4]. In the case of non-bound Oxygen electron and bound Hydrogen electron interaction we have [3]:

$$2(E_{O\ non-bound}^{initial} - E_{O\ non-bound}^{changed}) = (E_{H\ bound}^{changed} - E_{H\ bound}^{initial}). \tag{6}$$

Factor 2 means that two non-bound Oxygen electrons interact with one bound Hydrogen electron.

And applying (3) the next relation for the orbit lengths belonging to the energies (6) is given:

$$2\left(\frac{1}{s_{O\ non-bound}^{initial}} - \frac{1}{s_{O\ non-bound}^{changed}}\right) = \left(\frac{1}{s_{H\ bound}^{changed}} - \frac{1}{s_{H\ bound}^{initial}}\right). \tag{7}$$

It can be examined [3] that the interacting orbital energies (and consequently the concerned orbit lengths) are in inverse proportion. Lower the orbital energy and shorter the orbit length of the transmitter means higher the orbital energy and longer the orbit length of the receiver. And of course vice versa. Note also, that orbital energies are signed negative and the highest yields zero.

5. THE STABLE ELECTRON ORBIT

Respecting double-surface geometry a stable electron circulation on the orbit is enabled satisfying the next formula for the orbit length expressed in the wavelengths of the electron [3]:

$$s(n) = n \left(2 - \frac{1}{\sqrt{1 + \frac{\pi^2}{n^2}}} \right), \quad n \in \mathbb{N}. \tag{8}$$

Here n is the elliptic length and in the same time the number of the orbit. For instance, the initial orbit length for the non-bound Oxygen electron should be the next:

$$s_{O\ non-bound}^{conceptual\ initial} = s(121) = 121.040763 \dots \tag{9}$$

And for bound Hydrogen electron should be one half of the subtle touch orbit length [4]:

$$s_{H\ bound}^{conceptual\ initial} = \frac{s(207)}{2} = s(103.5) = 103.0547646 \dots \tag{10}$$

The given values are comparable to that (4), (5) from section 3.

6. THE TETRAHEDRAL WATER MOLECULE CONTRACTION

The water molecule contraction takes place when the bound Hydrogen electron is a transmitter of the orbital energy [1]. Let us propose that in the case of tetrahedral water molecule the energy transmitting electron should gradually step down to the shorter orbits than 103.5, i.e. $\frac{n}{2} < 103.5$. The descent to non-adjacent orbit is not allowed [3]. Consequently the non-bound Oxygen electron as an energy receiver should gradually step up to the longer orbits than 121, i.e. $n > 121$. Since the temporary received energy put the energy receiving electron on the unstable orbit $m \notin \mathbb{N}$ (8) the surplus of received energy should be somehow deposited. Its value is given taking into account the next relation:

$$E_{deposited} = Ry \times \alpha^{-1} \left(\frac{1}{s(n \in \mathbb{N})} - \frac{1}{s(m \notin \mathbb{N})} \right) \quad \text{for } m - n < 1 \text{ on the interval } 121 < n < 2010. \tag{11}$$

The data for the whole finite step by step contraction are collected in Table1. The whole deposited energy is then step by step raised up in the inverse process from the final 34.5th bound Hydrogen orbit back to the initial 103.5th one.

Table1. Deposited energy at expected 69-fold step by step tetrahedral water molecule contraction from Hydrogen 103.5th to 34.5th orbit accompanied by non-bound Oxygen orbit elongation from 121th to 2010th orbit.

	Transmitter	Temporary Receiver	Final Receiver	Deposited Energy		Transmitter	Temporary Receiver	Final Receiver	Deposit ed Energy
n th step	H-orbit length (λ _e)	O-orbit length (λ _e)	O-orbit length(λ _e)	Inner wave (eV)	n th step	H-orbit length (λ _e)	O-orbit length(λ _e)	O-orbit length(λ _e)	Inner wave (eV)
0	103,5476	121,0408	121,0408	0	36	67,5730	140,2174	140,0352	0,01730
1	102,5481	121,7343	121,0408	0,08775	37	66,5746	142,2455	142,0347	0,01945
2	101,5486	121,7480	121,0408	0,08948	38	65,5752	144,3821	144,0343	0,03119
3	100,5491	121,7621	121,0408	0,09126	39	64,5764	146,5233	146,0338	0,04265
4	99,54956	121,7767	121,0408	0,09309	40	63,5776	148,6748	148,0333	0,05434
5	98,55006	121,7917	121,0408	0,09498	41	62,5788	150,8360	150,0329	0,06616
6	97,55057	121,8072	121,0408	0,09692	42	61,5801	153,0076	152,0325	0,07816
7	96,55110	121,8231	121,0408	0,09893	43	60,5814	155,1905	155,0318	0,01230
8	95,55163	121,8396	121,0408	0,10099	44	59,5828	158,4294	158,0312	0,02966
9	94,55218	121,8566	121,0408	0,10313	45	58,5842	161,6861	161,0306	0,04694
10	93,55273	121,8741	121,0408	0,10533	46	57,5856	164,9619	164,0301	0,06421
11	92,55330	121,8923	121,0408	0,10760	47	56,5871	168,2586	168,0294	0,01511
12	91,55388	121,9110	121,0408	0,10995	48	55,5887	172,6329	172,0287	0,03794
13	90,55448	121,9303	121,0408	0,11238	49	54,5903	177,0386	177,0279	0,00064
14	89,55509	121,9503	121,0408	0,11488	50	53,5920	182,5414	182,0271	0,02886
15	88,55571	121,9710	121,0408	0,11748	51	52,5937	188,0900	188,0262	0,00336
16	87,55634	121,9924	121,0408	0,12016	52	51,5956	194,7616	194,0254	0,03632
17	86,55699	122,0145	121,0408	0,12293	53	50,5974	201,4993	201,0245	0,02185
18	85,55766	122,0374	121,0408	0,12580	54	49,5994	209,3946	209,0236	0,01580
19	84,55834	122,0612	122,0404	0,00259	55	48,6014	218,4764	218,0226	0,01776
20	83,55904	123,1028	123,0401	0,00772	56	47,6036	228,7793	228,0216	0,02708
21	82,55975	124,1464	124,0398	0,01291	57	46,6058	240,3453	240,0206	0,01050
22	81,56048	125,1920	125,0395	0,01817	58	45,6081	254,3478	254,0194	0,00948
23	80,56123	126,2397	126,0391	0,02351	59	44,6105	270,8889	270,0183	0,02219
24	79,56196	127,2898	127,0388	0,02893	60	43,6130	290,0981	290,0170	0,00180
25	78,56279	128,3420	128,0385	0,03443	61	42,6156	314,4889	314,0157	0,00893
26	77,56360	129,3969	129,0382	0,04005	62	41,6184	344,4215	344,0143	0,00641
27	76,56443	130,4544	130,0379	0,04577	63	40,6213	382,8540	382,0129	0,01073
28	75,56528	131,5147	131,0377	0,05161	64	39,6243	433,2718	433,0114	0,00259
29	74,56615	132,5779	132,0374	0,05757	65	38,6275	504,0878	504,0098	0,00057
30	73,56705	133,6443	133,0371	0,06368	66	37,6309	609,2842	609,0081	0,00139
31	72,56797	134,7141	134,0368	0,06993	67	36,6345	780,8773	780,0063	0,00267
32	71,56892	135,7874	135,0365	0,07634	68	35,6382	1110,488	1110,004	0,00073
33	70,56989	136,8644	136,0363	0,08293	69	34,6422	2010,030	2010,002	1,3E-05
34	69,57090	137,9455	137,0360	0,08970					∑ 3.4314
35	68,57193	139,0308	138,1297	0,08748					

7. THE TETRAHEDRAL WATER MOLECULE EXTENSION

The water molecule extension takes place when the non-bound Oxygen electron is a transmitter of orbital energy [2]. Let us propose that in the case of tetrahedral water molecule the energy transmitting electron should gradually step down to the shorter orbits than 121, i.e. n < 121. The descent to non-adjacent orbit is not allowed. [3] Consequently the bound Hydrogen electron as an energy receiver should gradually step up to the longer orbits than $\frac{n}{2} = 103.5$, i.e. $\frac{n}{2} > 103.5$. Since the temporary received energy put the energy receiving electron on the unstable orbit $m \notin \frac{N}{2}$ (8) the surplus of received energy should be somehow deposited. Its value is given taking into account the next relation:

$$E_{deposited} = Ry \times \alpha^{-1} \left(\frac{1}{s \left(\frac{n}{2} \in \frac{N}{2} \right)} - \frac{1}{s \left(m \notin \frac{N}{2} \right)} \right) \text{ for } m - \frac{n}{2} < 1 \text{ on the interval } 103.5 < \frac{n}{2} < 3261.5. \quad (12)$$

The data for the whole finite step by step extension are collected in Table 1. The whole deposited energy is then step by step raised up in the inverse process from the final 74th non-bound Oxygen orbit back to the initial 121th one.

Table2. Deposited energy expected at 47-fold step by step tetrahedral water molecule extension from Hydrogen 103.5th to 3261.5th orbit caused by non-bound Oxygen orbit shortening from 121th to 74th orbit

	Transmitter	Temporary Receiver	Final Receiver	Deposited Energy		Transmitter	Temporary Receiver	Final Receiver	Deposited Energy
n th step	O-orbit length (λ _e)	H-orbit length(λ _e)	H-orbit length(λ _e)	Inner wave (eV)	n th step	O-orbit length (λ _e)	H-orbit length(λ _e)	H-orbit length(λ _e)	Inner wave (eV)
0	121,0408	103,5476	103,5476	0	24	97,05084	153,3170	152,5323	0,0626
1	120,0411	105,0443	104,5472	0,0844	25	96,05136	157,6901	157,5313	0,0119
2	119,0414	106,0991	105,5467	0,0920	26	95,05190	163,1587	162,5304	0,0442
3	118,0418	107,1559	106,5463	0,0996	27	94,05245	168,6596	168,5293	0,0085
4	117,0422	108,2148	107,5459	0,1072	28	93,05302	175,2758	174,5283	0,0456
5	116,0425	109,2758	108,5455	0,1148	29	92,05359	181,9388	181,5272	0,0232
6	115,0429	110,3391	109,5450	0,1225	30	91,05418	189,7408	189,5260	0,0111
7	114,0433	111,4047	110,5446	0,1302	31	90,05478	198,7060	198,5249	0,0086
8	113,0436	112,4727	111,5442	0,1380	32	89,05539	208,8587	208,5237	0,0143
9	112,0440	113,5433	112,5438	0,1458	33	88,05602	220,2285	219,5225	0,0272
10	111,0444	114,6166	114,5431	0,0104	34	87,05667	232,8499	232,5212	0,0113
11	110,0448	116,7305	116,5423	0,0258	35	86,05732	247,8989	247,5199	0,0115
12	109,0452	118,8499	118,5416	0,0408	36	85,05800	265,4609	264,5187	0,0250
13	108,0457	120,9749	120,5409	0,0555	37	84,05869	285,6393	285,5173	0,0028
14	107,0461	123,1059	122,5403	0,0699	38	83,05939	310,9297	310,5159	0,0080
15	106,0465	125,2430	124,5396	0,0841	39	82,06011	341,6204	341,5144	0,0017
16	105,0470	127,3866	126,5390	0,0980	40	81,06085	380,5626	380,5130	0,0006
17	104,0474	129,5370	128,5384	0,1118	41	80,06161	431,0173	430,5115	0,0051
18	103,0479	131,6946	131,5375	0,0169	42	79,06239	498,2308	497,5599	0,0054
19	102,0483	134,9110	134,5367	0,0385	43	78,06319	593,0433	592,5083	0,0032
20	101,0488	138,1395	137,5359	0,0592	44	77,06401	737,7037	737,5067	0,0007
21	100,0493	141,3807	140,5351	0,0794	45	76,06485	985,2042	984,5050	0,0013
22	99,04981	144,6353	144,5341	0,0090	46	75,06571	1502,021	1501,503	0,0004
23	98,05032	148,9658	148,5332	0,0364	47	74,06660	3261,615	3261,502	2E-05
									∑ 2.1042eV

8. RESULTS AND CONCLUSIONS

Both deposited energies at the tetrahedral water molecule contraction and extension being collected in Table1 and Table2, respectively, are also presented in Figure2.

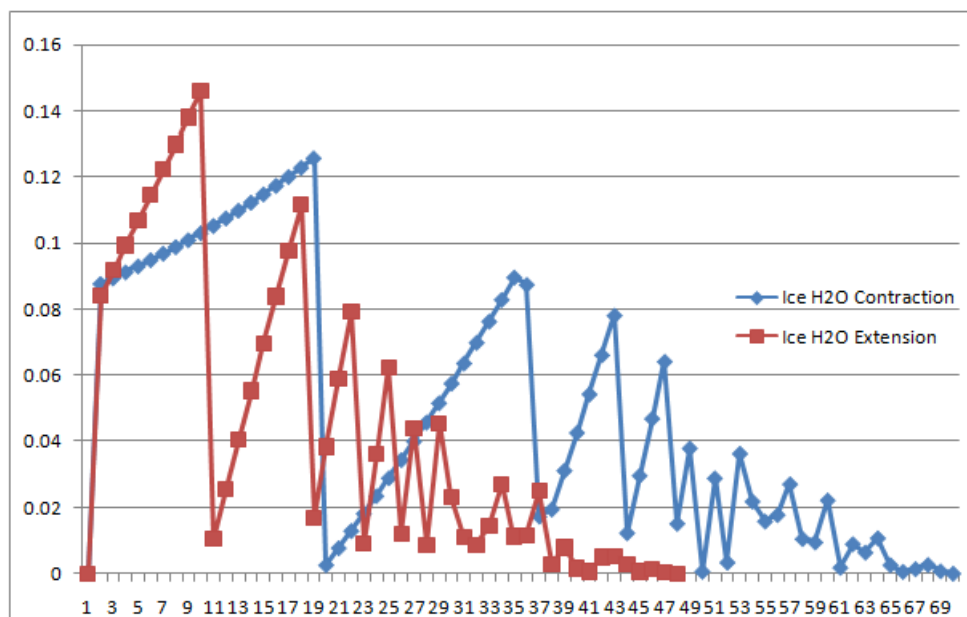


Figure2. Deposited energy (expressed in eV) expected at the tetrahedral water molecule contraction and extension

We can see that more energy is deposited in the contraction than in extension process since:

$$E_{contraction}^{whole} = 3.4314 \text{ eV} > E_{extension}^{whole} = 2.1042 \text{ eV}. \quad (13)$$

Although the greatest single deposited energy is found amongst the extension process quanta as follows:

$$E_{extension}^{maximal \ single} = 0.1458 \text{ eV} > E_{contraction}^{maximal \ single} = 0.1258 \text{ eV}. \quad (14)$$

The average value of both in principle equally probable whole deposited energies is the next:

$$E_{average}^{tetrahedral} = \frac{E_{contraction}^{whole} + E_{extension}^{whole}}{2} = 2.7678 \text{ eV}. \quad (15)$$

Interesting is the difference between recently calculated deposited energy of tetrahedral water molecule and previously calculated [3]deposited energy of bent water molecule:

$$E_{average}^{tetrahedral} - E_{average}^{bent} = 2.7678 \text{ eV} - 2.4634 \text{ eV} = 0.304 \text{ eV}. \quad (16)$$

The given difference is comparable to the energy currency or coin of the biological cell, i.e. ADP/ATP phosphorylation energy of 7 kcal/mole [5]what means that water molecule deposited energy could be involved in that as well as the inverse, i.e. ATP/ADP hydrolysis process.

ACKNOWLEDGEMENT

Thanks God for Life and Water again and again

DEDICATION

This fragment was written 100 years after the End of World War One and is dedicated to Love as the noblest currency of Life.

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