



***Bicarbonate solutions residing in a  
stable nonequilibrium state are the  
prototype of living systems.V.***

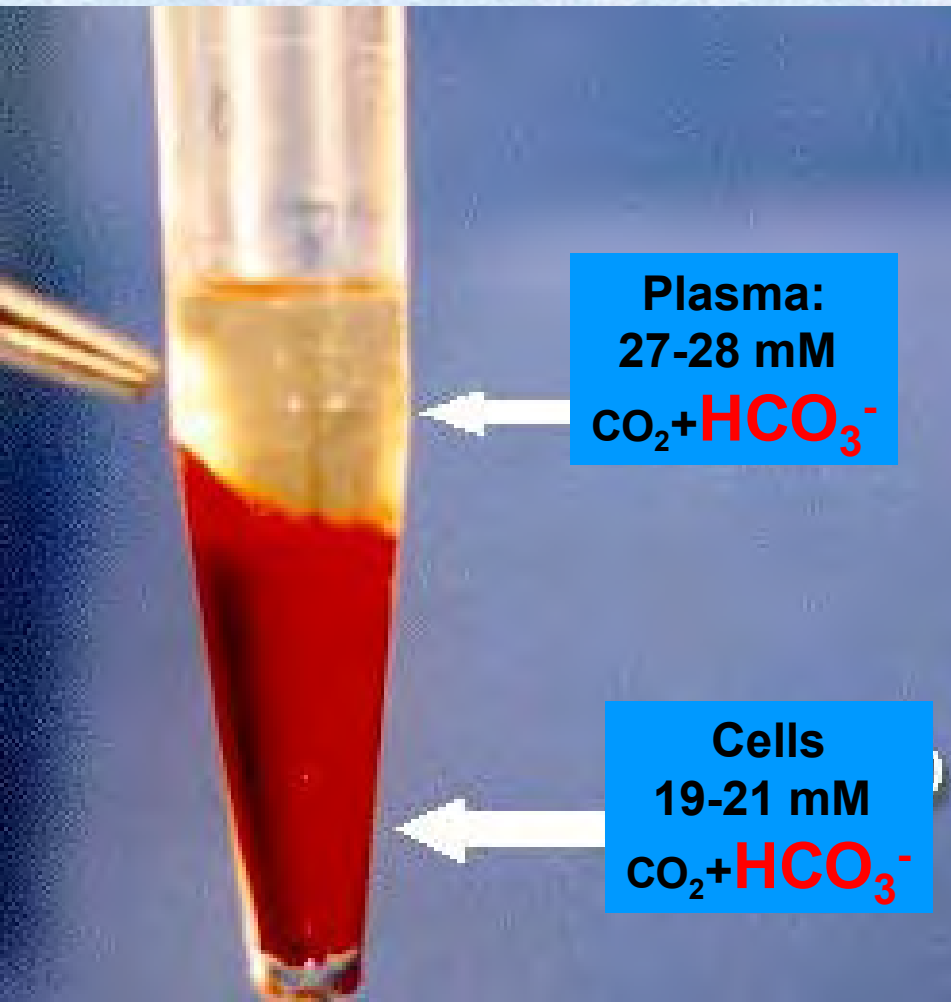
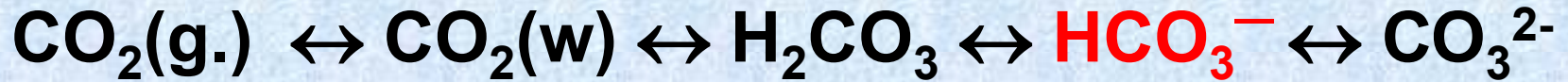
***Voeikov<sup>1</sup>, E. Buravleva<sup>1</sup>, K. Novikov<sup>1</sup>,  
O.Yablonskaya<sup>2</sup>.***

***<sup>1</sup>Faculty of Biology, Lomonosov Moscow State University***

***<sup>2</sup>Emanuel Institute of Biochemical Physics, RAS, Moscow.***

*v109028v1 @yandex.ru*

All REAL WATERS including biological liquids are complex aqueous systems containing representatives of the family of carbonates:



# **Carbonates are vitally needed:**

## **At the level of the whole organism:**

***Deficiency of carbonates → tissue hypoxia***

***(The cause of high mountain disease is “acapnia”:  
deficiency of carbonates in the organism rather than of  
oxygen in the ambient air.)***

## **At the cellular level:**

***“Bicarbonate ions are necessary for the efficient DNA synthesis in  
primary hepatocyte cultures»***

***“Bicarbonate amplifies sperm cells motility and promotes fertilization”***

## **At the molecular level:**

***(I.e., bicarbonates modulate activity of many enzymes and proteins;  
bicarbonates function as antioxidants, eliminating hydroxyl radicals).***

Therefore,  
CO<sub>2</sub> is not just the final product of aerobic respiration, but rather it's the active participant of metabolism

Carbonates are universal modulators of vital processes

*A significant contribution to the mechanism of the beneficial effect of carbonates on vital activity is made by its participation in aerobic respiration, mainly in the one-electron reduction of oxygen*

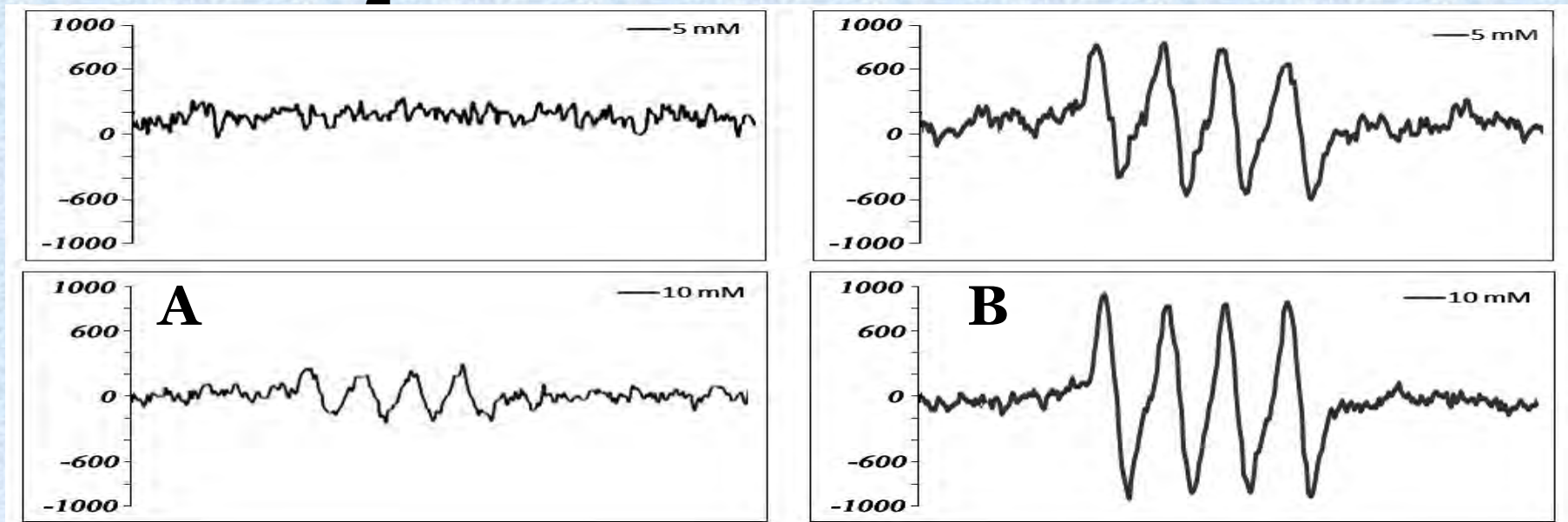
***We claim:***

***energy-related processes go on in ordinary  
“baking soda” (bicarbonate) solutions and in  
bicarbonate mineral waters***





# Using Tiron (ESR probe for superoxide radical ( $O_2^{\bullet-}$ ) we observed continuous generation of $O_2^{\bullet-}$ in bicarbonate solutions

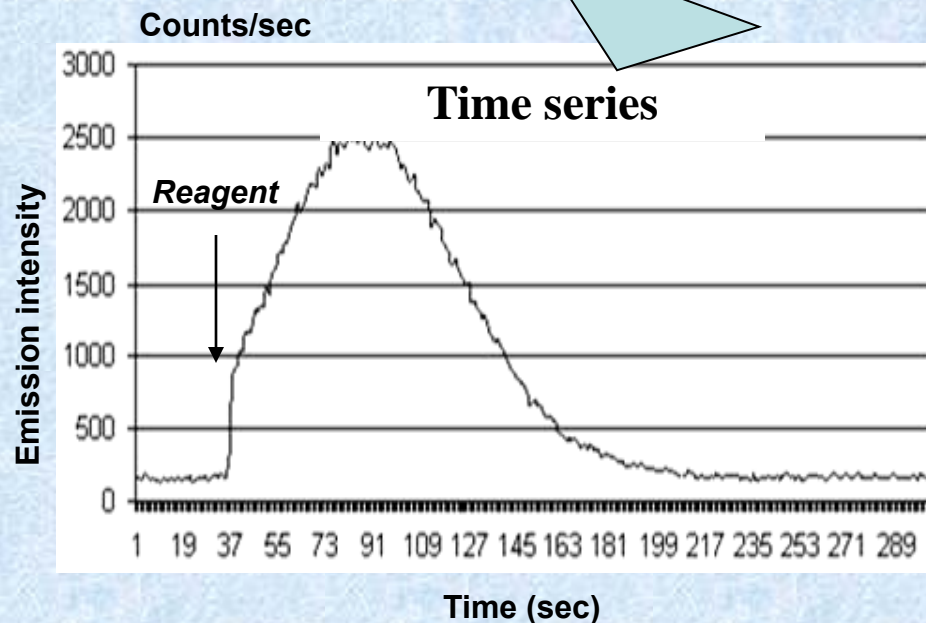
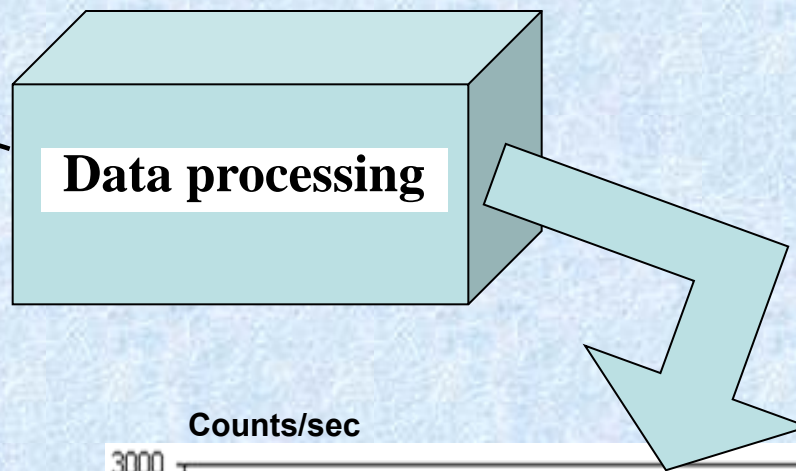
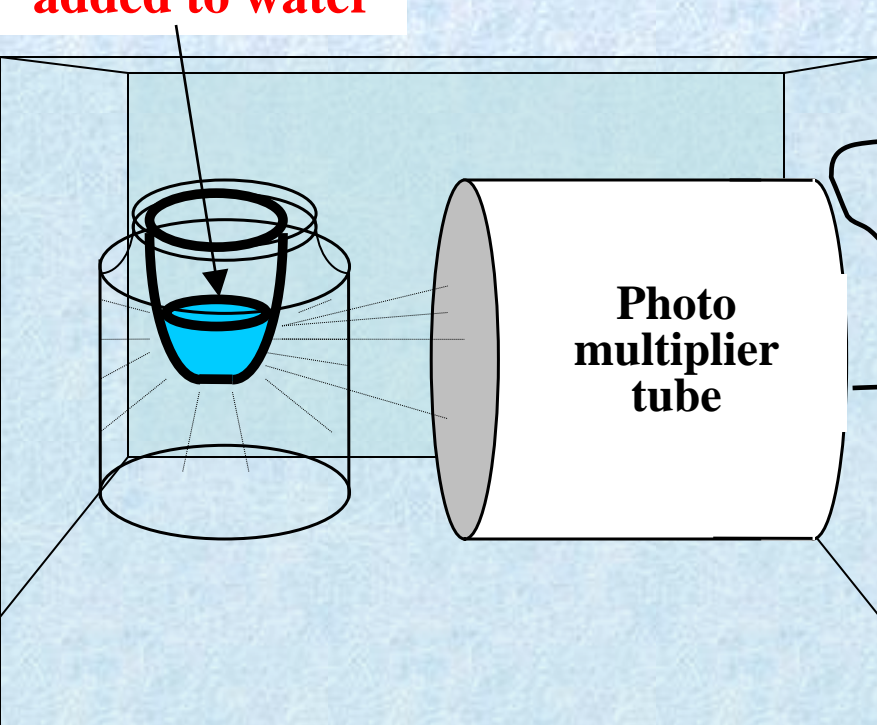


ESR spectra of Tiron in the darkness (A ) and under illumination by white or blue (455 nm) light (B) in  $NaHCO_3$  (5 and 10 mM) solutions

**RATE OF SUPEROXIDE PRODUCTION INCREASES ON ILLUMINATION OF BICARBONATE SOLUTIONS**

Addition of Fe (II) salts in catalytic quantities to bicarbonate waters results in the development of the wave of Luminol-amplified photon emission from them.

**“Reagent”  
added to water**



**“Reagent”:**  
**FeSO<sub>4</sub> (0,1-10 mkM) ±**  
**Luminol (0,1-10 mkM)**

**This indicates that processes in which Reactive Oxygen Species participate PERMANENTLY go on in bicarbonate waters.**

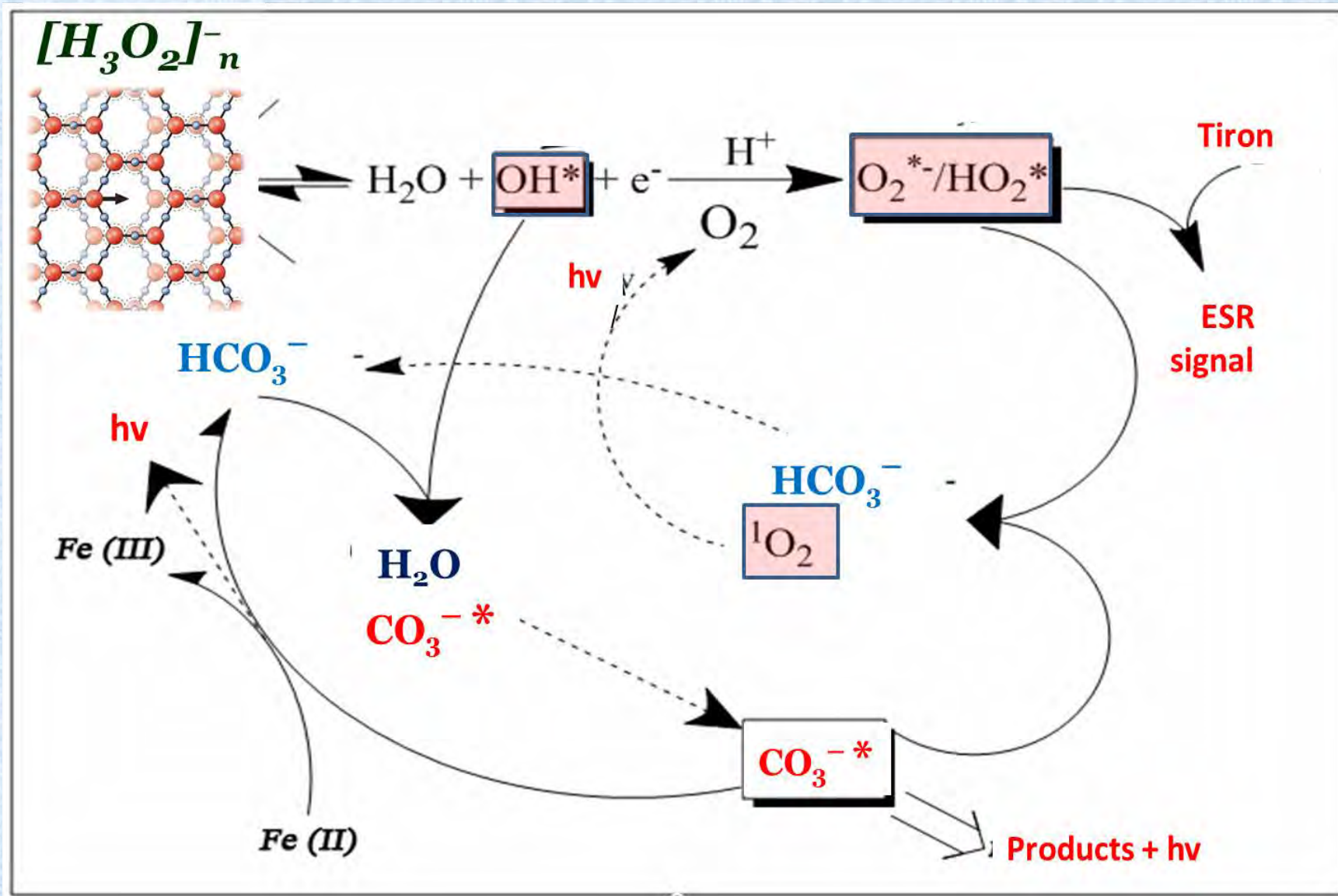
*Both observations indicate that bicarbonate waters continuously generate reactive oxygen species – intermediate products of water “burning”.*

*Therefore,  
bicarbonates promote stable non-equilibrium state of aqueous systems*



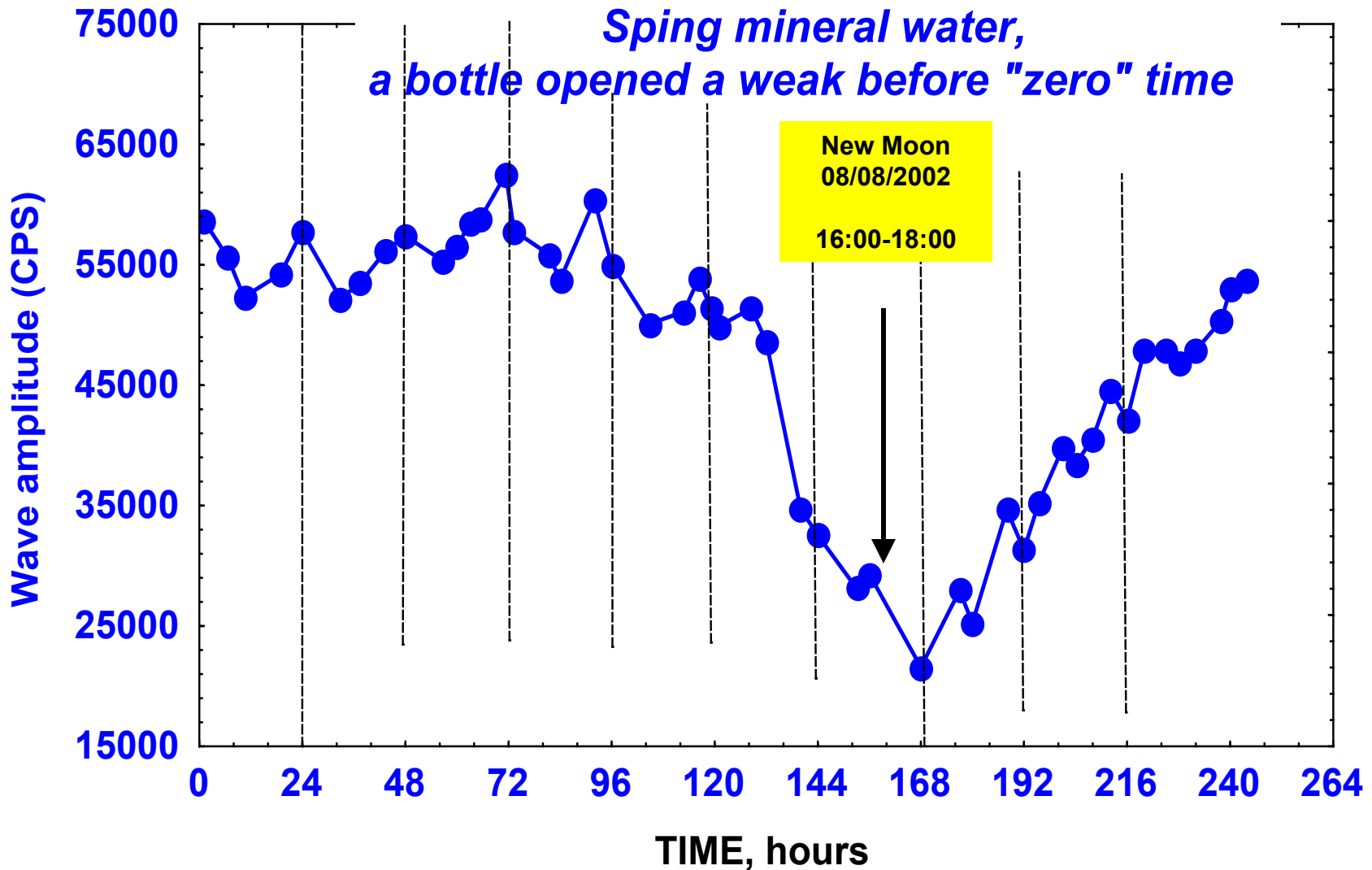
**Red/Ox -processes that incessantly proceed in bicarbonate waters compose the web of looped reactions in the course of which reagents are consumed and regenerated. The existence of this web promotes stable non-equilibrium electronically excited state of bicarbonate water that is able to react to subtle external “irritations”**

# Hypothetical scheme of bicarbonate promoted water oxidation

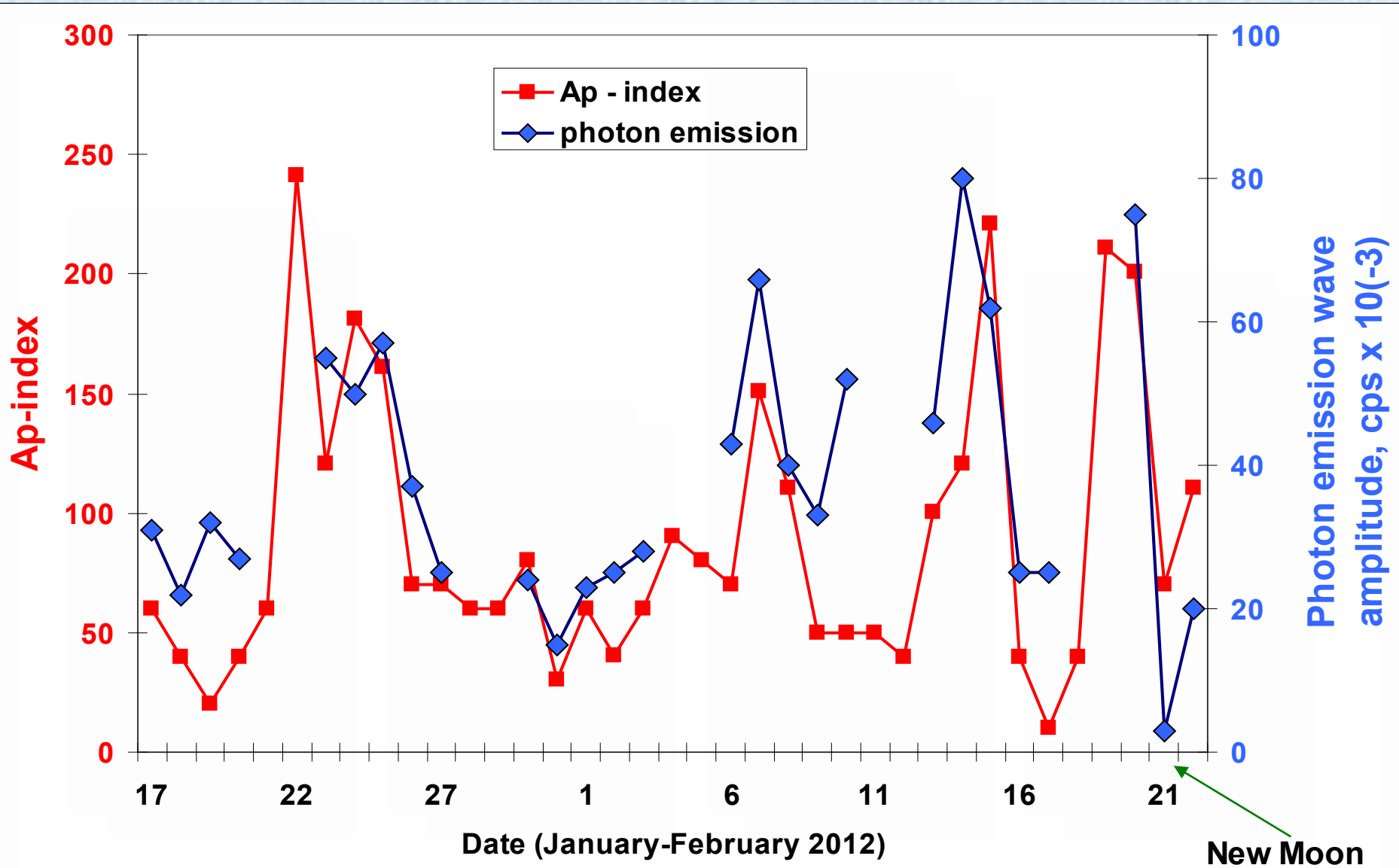


*Red/Ox processes going on in bicarbonate waters (here -- spring water) exhibit circadian rhythms.*

*They are sensitive to variations of subtle environmental factors, e.g. to Moon phase.*



***“Energetic activity” of 5 mM sodium bicarbonate solution is sensitive to the fluctuations of the geomagnetic field (“geomagnetic storms”).***



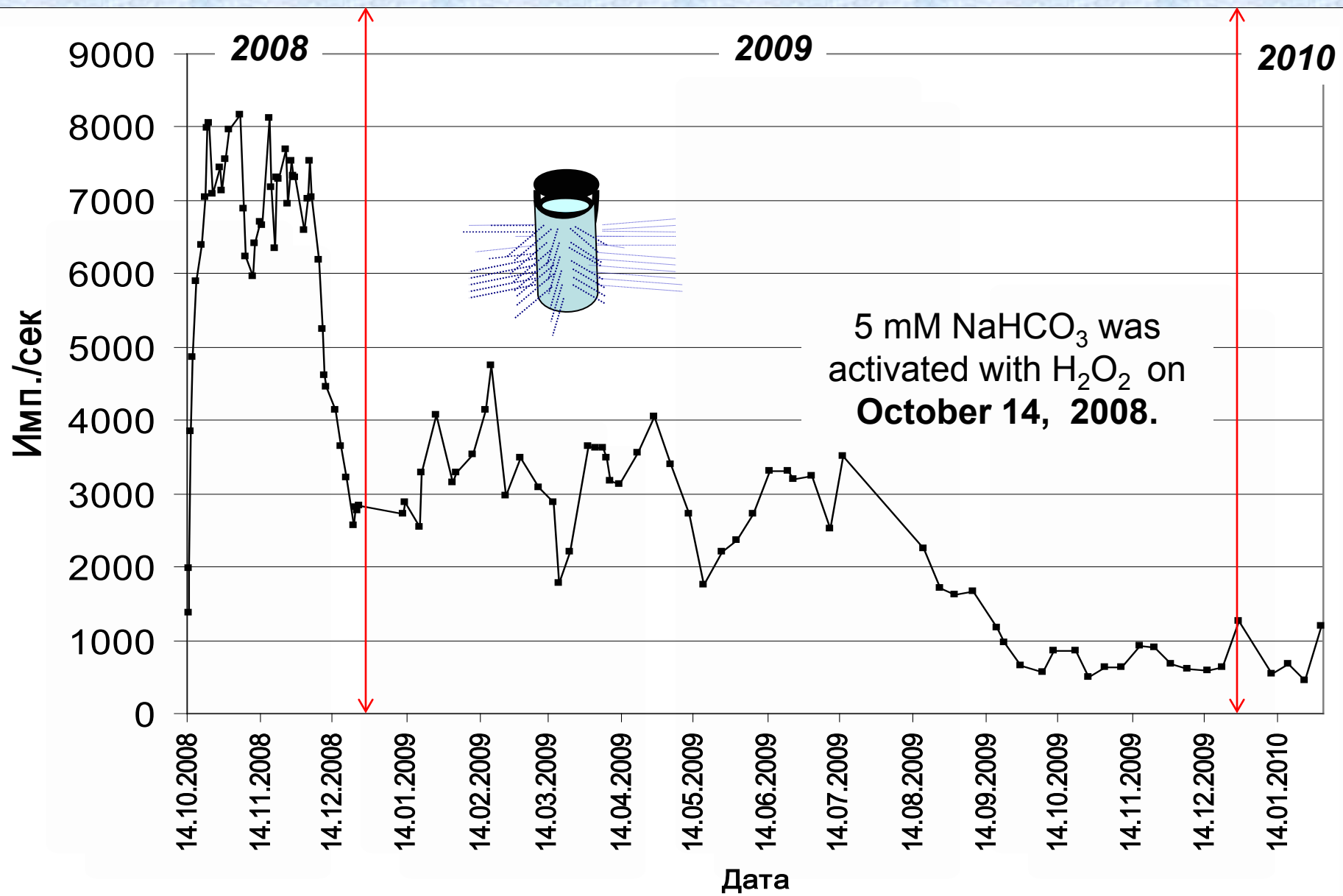
***Bicarbonates support stable long-term  
water “burning”***

***Hermetically closed bicarbonate  
solutions activated with only 0,005%  
H<sub>2</sub>O<sub>2</sub> are the sources of Luminol-  
enhanced photon emission for many  
months even in the complete darkness.***

***Voeikov et al. ACTIVATED BICARBONATE SOLUTIONS AS MODELS OF CONFINED  
ONTIC OPEN SYSTEM AND PROTOTYPES OF LIVING RESPIRING SYSTEMS.***

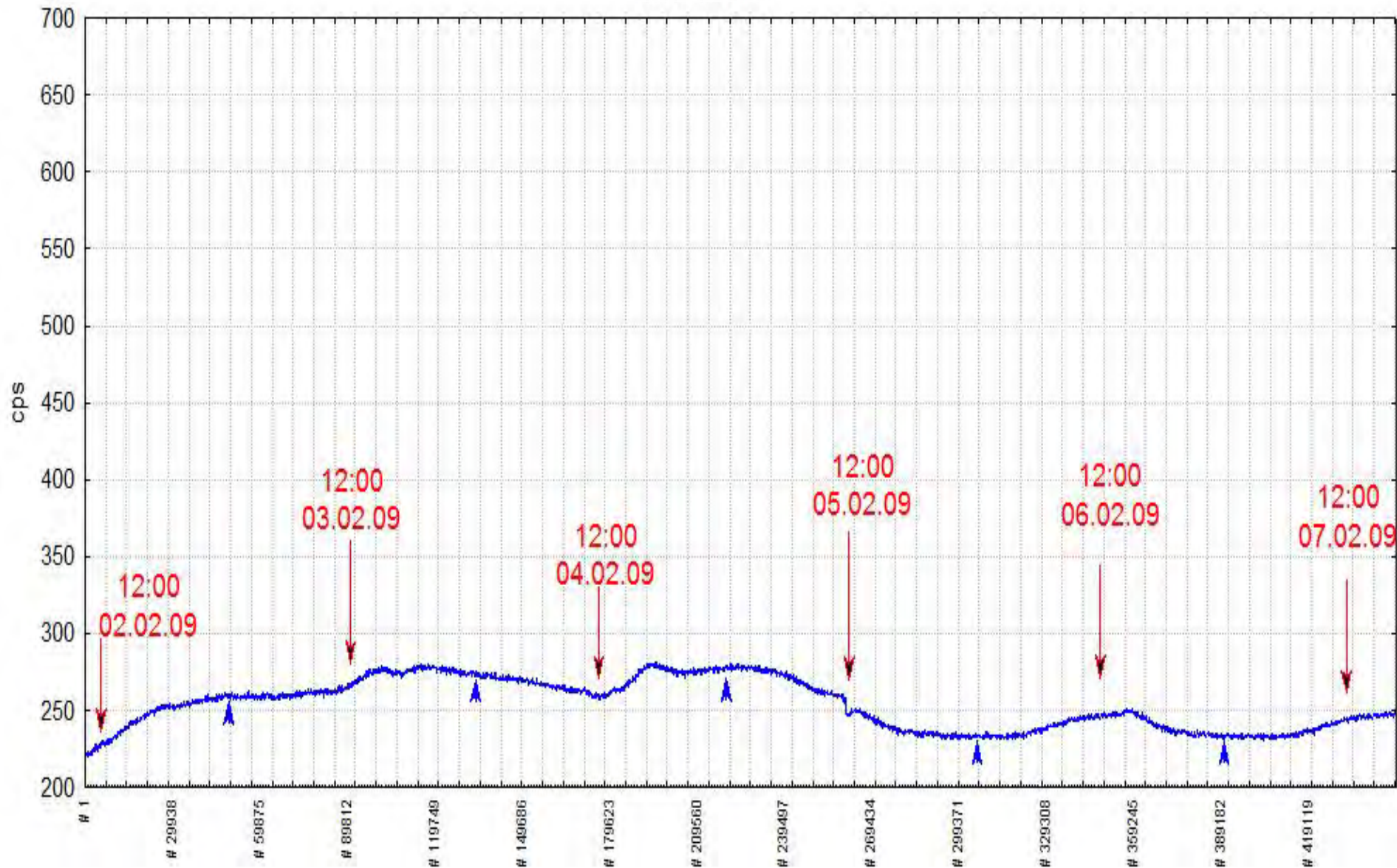
***Int. J. of Design & Nature and Ecodynamics, 2010***

# An example of H<sub>2</sub>O<sub>2</sub>-activated bicarbonate solution “burning” for more than a year.

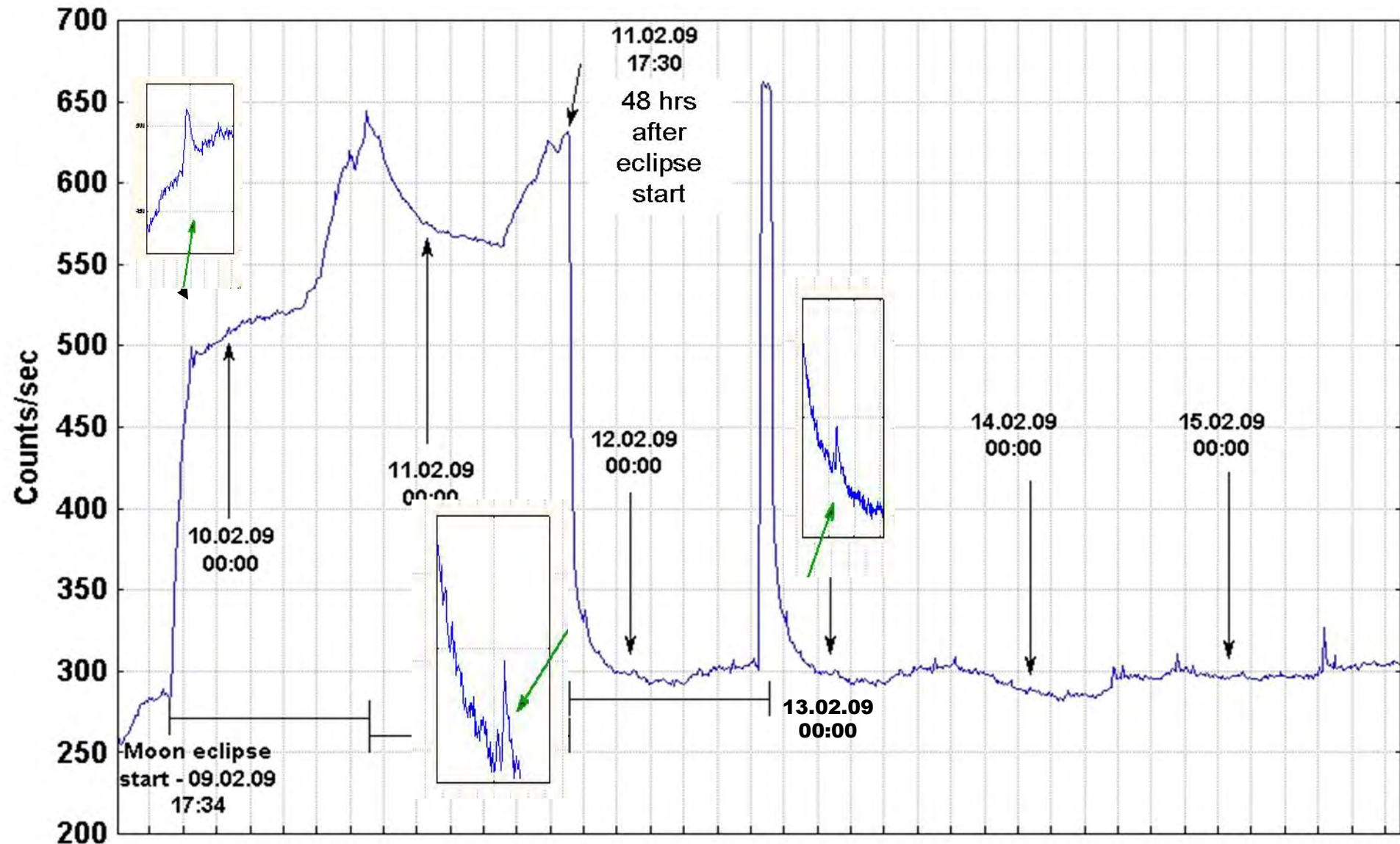


***Quazi-circadian rhythms of photon emission at the stationary state. The sample was activated 2,5 months before this week.***

02.02-07.02.09

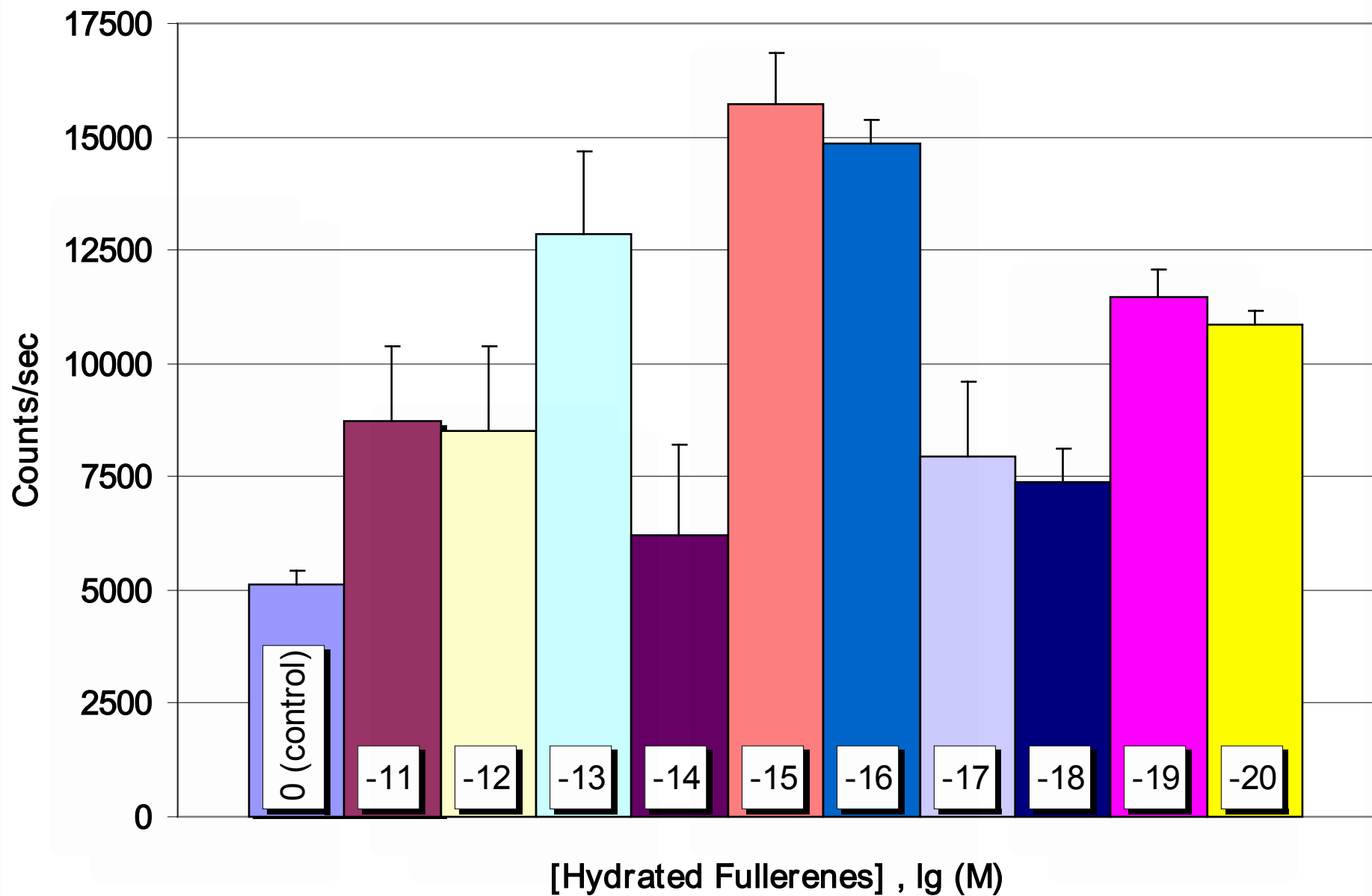


At the beginning of the next week Lunar eclipse happened. Photon emission intensity from activated bicarbonate aqueous solution changed dramatically.





# Photon emission intensity from activated bicarbonate aqueous solutions is sensitive to ultra-low doses of biologically active compounds.



**CARBONATES** are major actors in the processes associated with generation, transformation, accumulation and utilization of energy in water and in living systems.

*Significant part of energy-associated processes are represented by direct oxygen reduction with electrons donated by water (“WATER BURNING”).*

***Why we declare that “Bicarbonate solutions are the prototype of living systems“?***

***Because we share the axiomatic definition of the living state by Ervin Bauer (1937),***

**the Principle of Stable Non-equilibrium:**

**“All and only living systems are never at equilibrium.**

***At the expense of their free energy they ceaselessly perform work against equilibrium, demanded by the physical and chemical laws appropriate to the actual external conditions”***

*Thank you*  
**Спасибо**



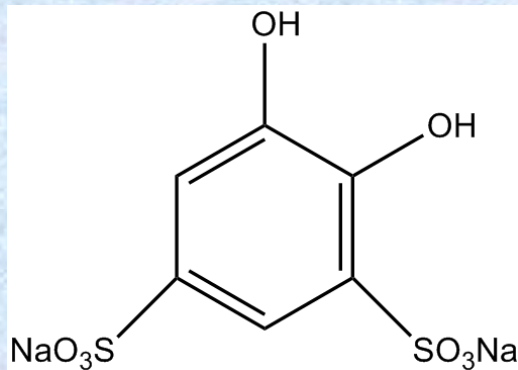
Photo: Charlotte Kons.de



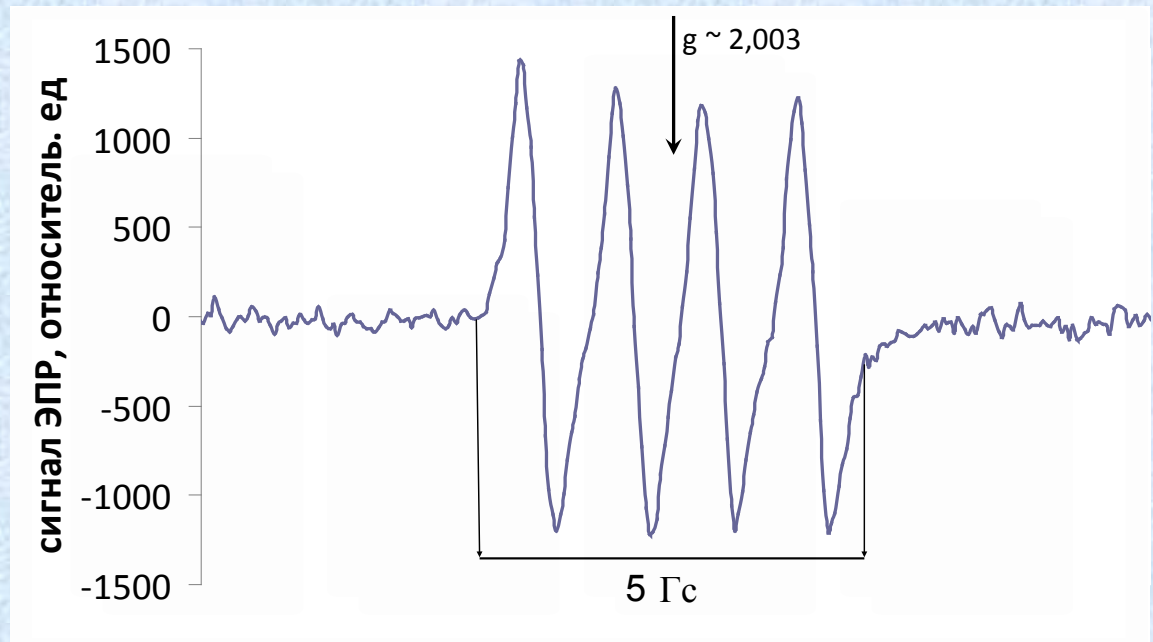
**Saint David Spring – healing water from dolomite  
[CaMg(CO<sub>3</sub>)] enriched hill in Moscow region**

# ЭПР

Прибор ЭПР РЭ-1307 3-сантиметрового диапазона.  
Мощность СВЧ в диапазоне 4 мВт, амплитуда  
ВЧ модуляции 0,1 Гаусс. 35 мкл образец в кварцевый  
плоско-паралельный кювет с толщиной 0,25 мм,  $T \sim 23^\circ\text{C}$ .  
Концентрация тайрона 10 мМ.  
Ось ординат – в отн.ед.

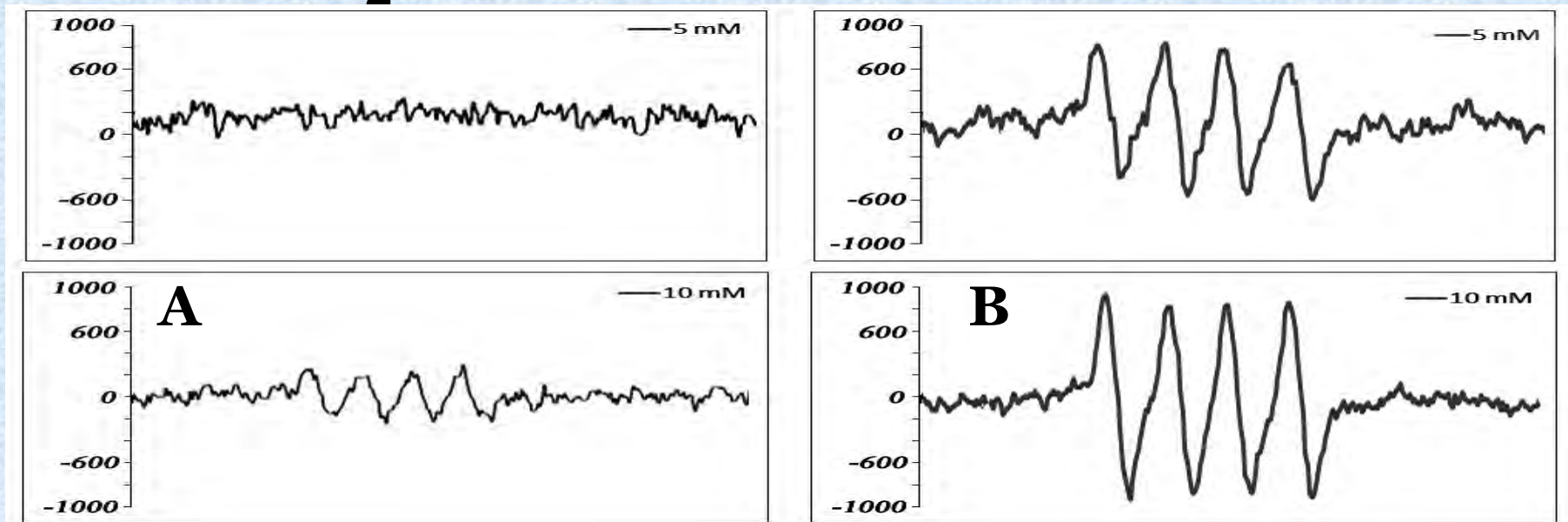


(4,5-дигидроксибензол  
-1,3-дисульфокислота).





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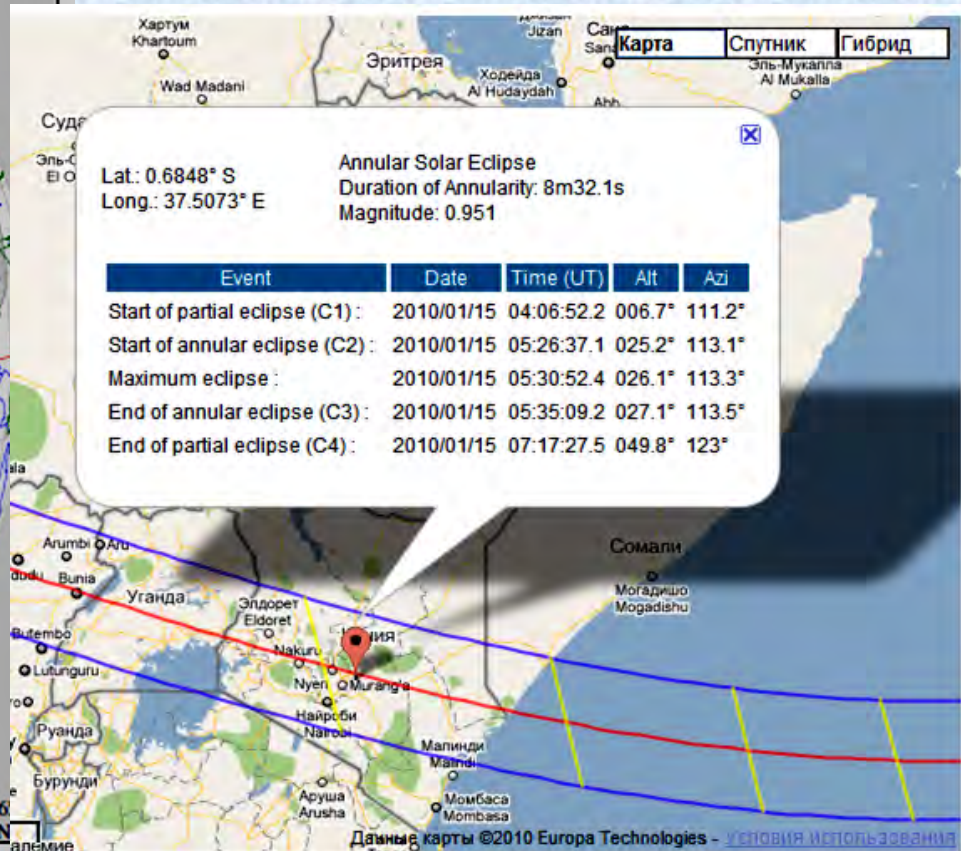
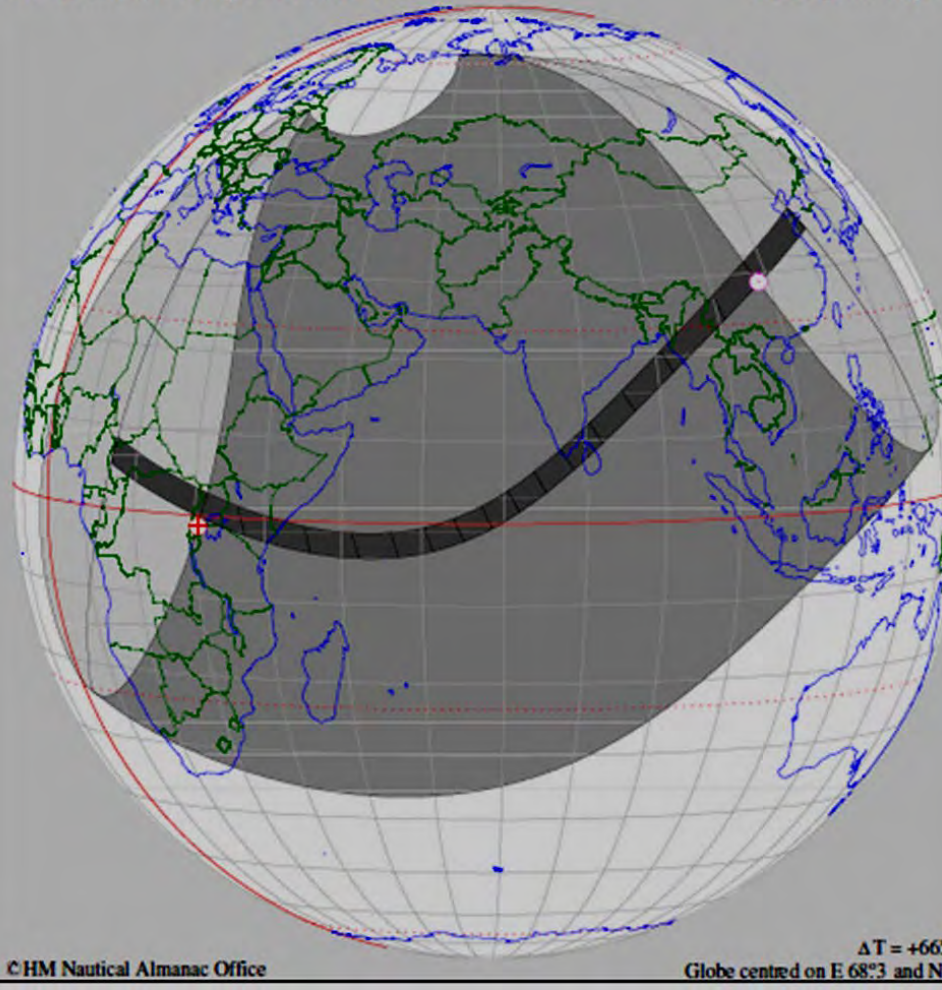
ESR spectra of Tiron in the darkness (A ) and under illumination by white or blue (455 nm) light (B) in  $NaHCO_3$  (5 and 10 mM) solutions

**RATE OF SUPEROXIDE PRODUCTION INCREASES ON ILLUMINATION OF BICARBONATE SOLUTIONS**

# Annular Eclipse of the Sun on January 15, 2010

I. - Annular Eclipse of the Sun

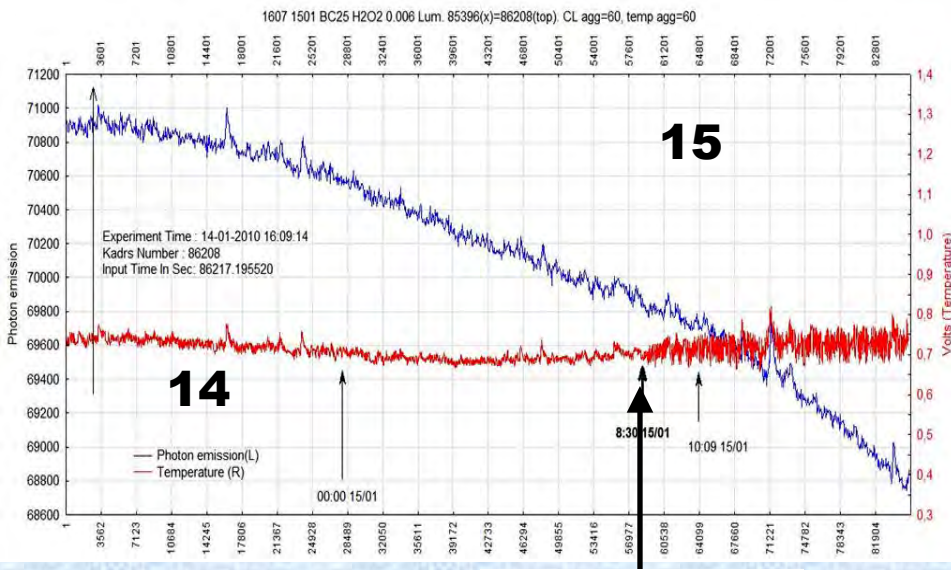
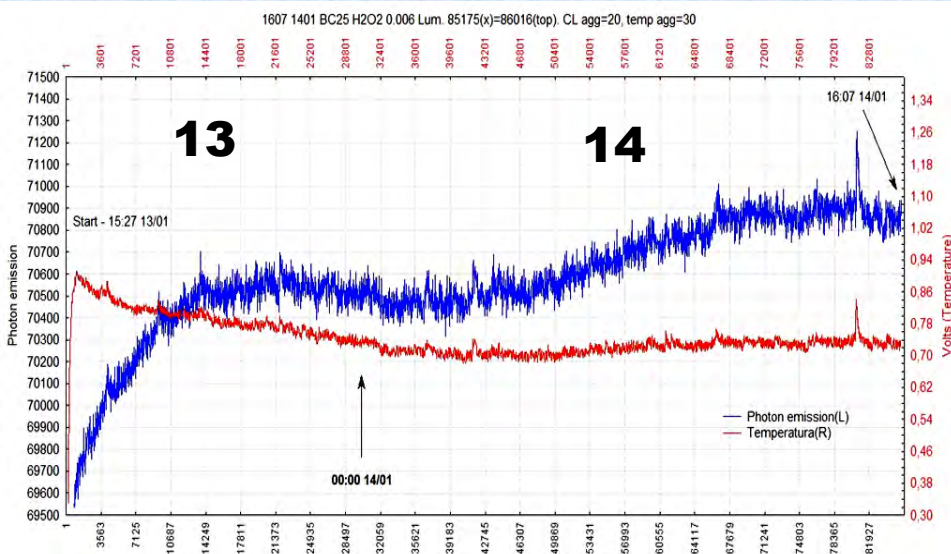
2010 January 15



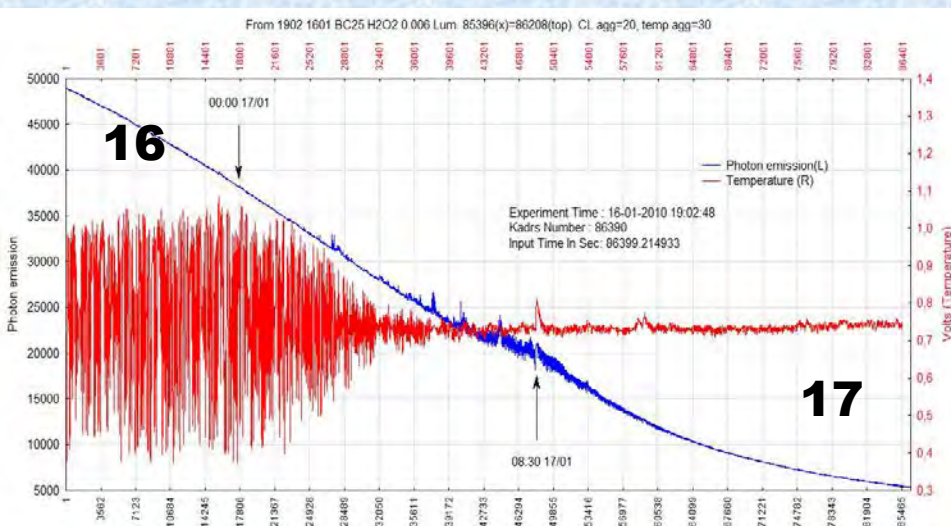
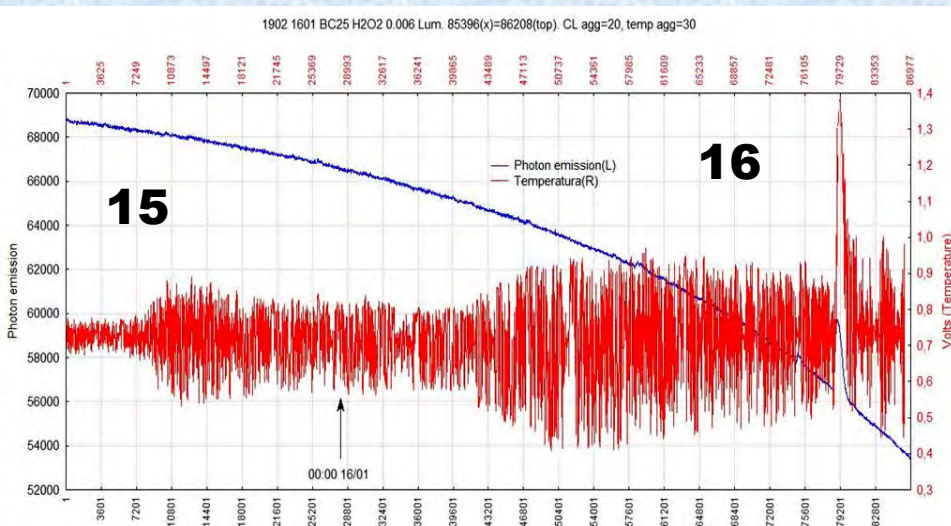
Full eclipse on Moscow longitude ( $37,5^{\circ}$  E) took place at 05.30 UT  
(8.30 Moscow time)



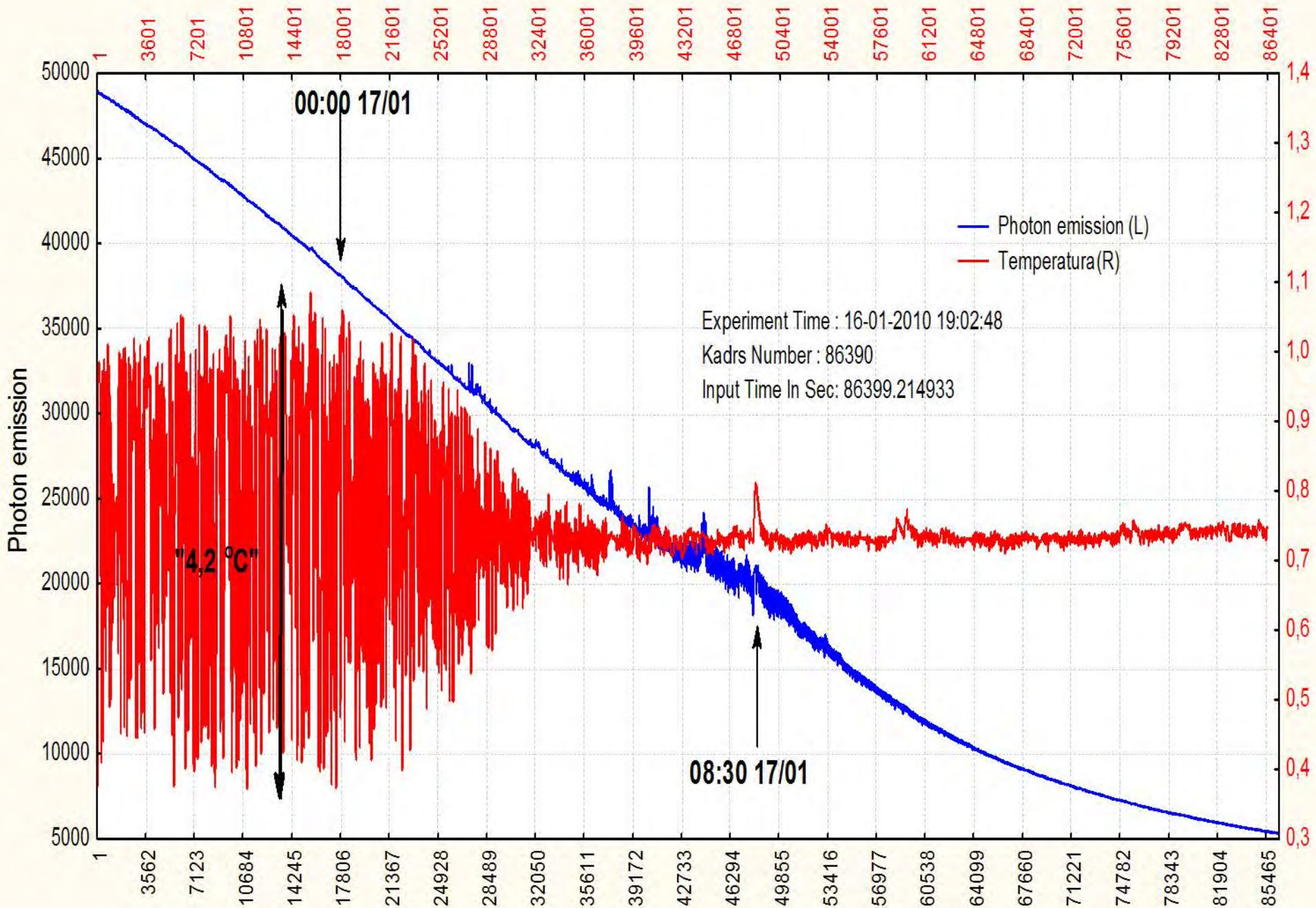
# Behavior of bicarbonate solution before, during and after Annular Eclipse of the Sun on January 15, 2010.



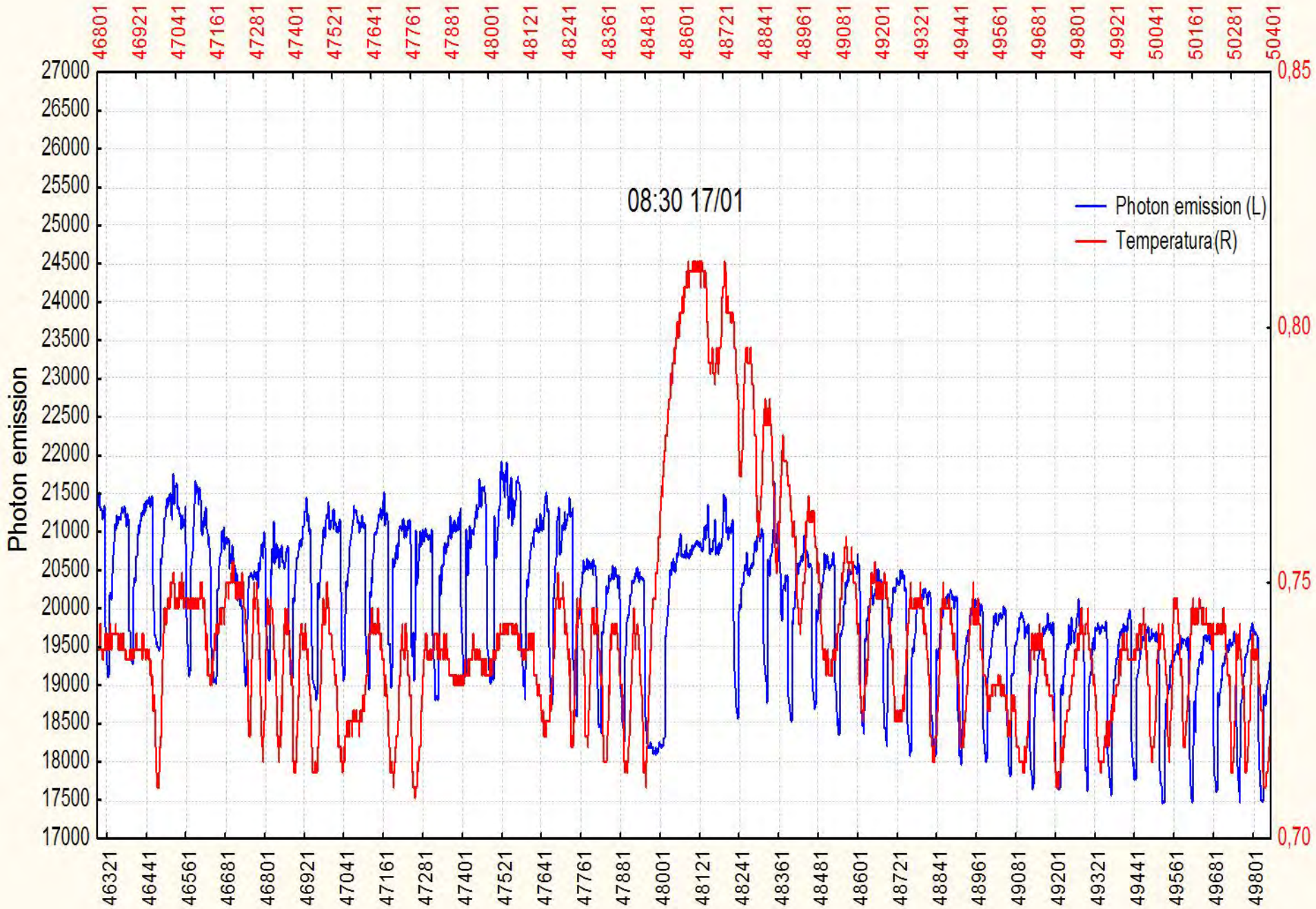
The moment of full eclipse



From 1902 1601 BC25 H2O2 0.006 Lum. 85396(x)=86208(top). CL agg=20, temp agg=30

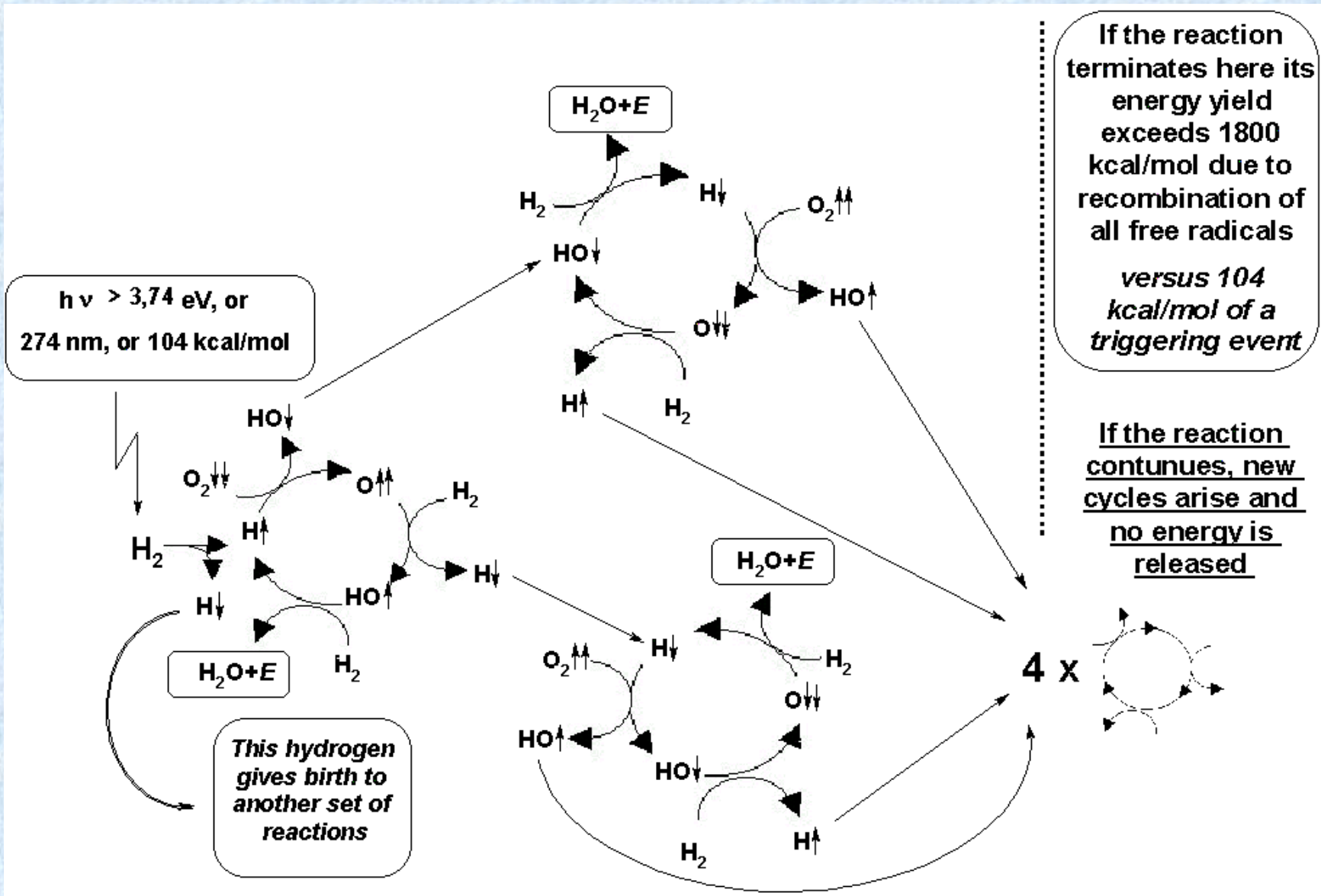


From 1902 1601 BC25 H2O2 0.006 Lum. 85396(x)=86208(top). No agg.

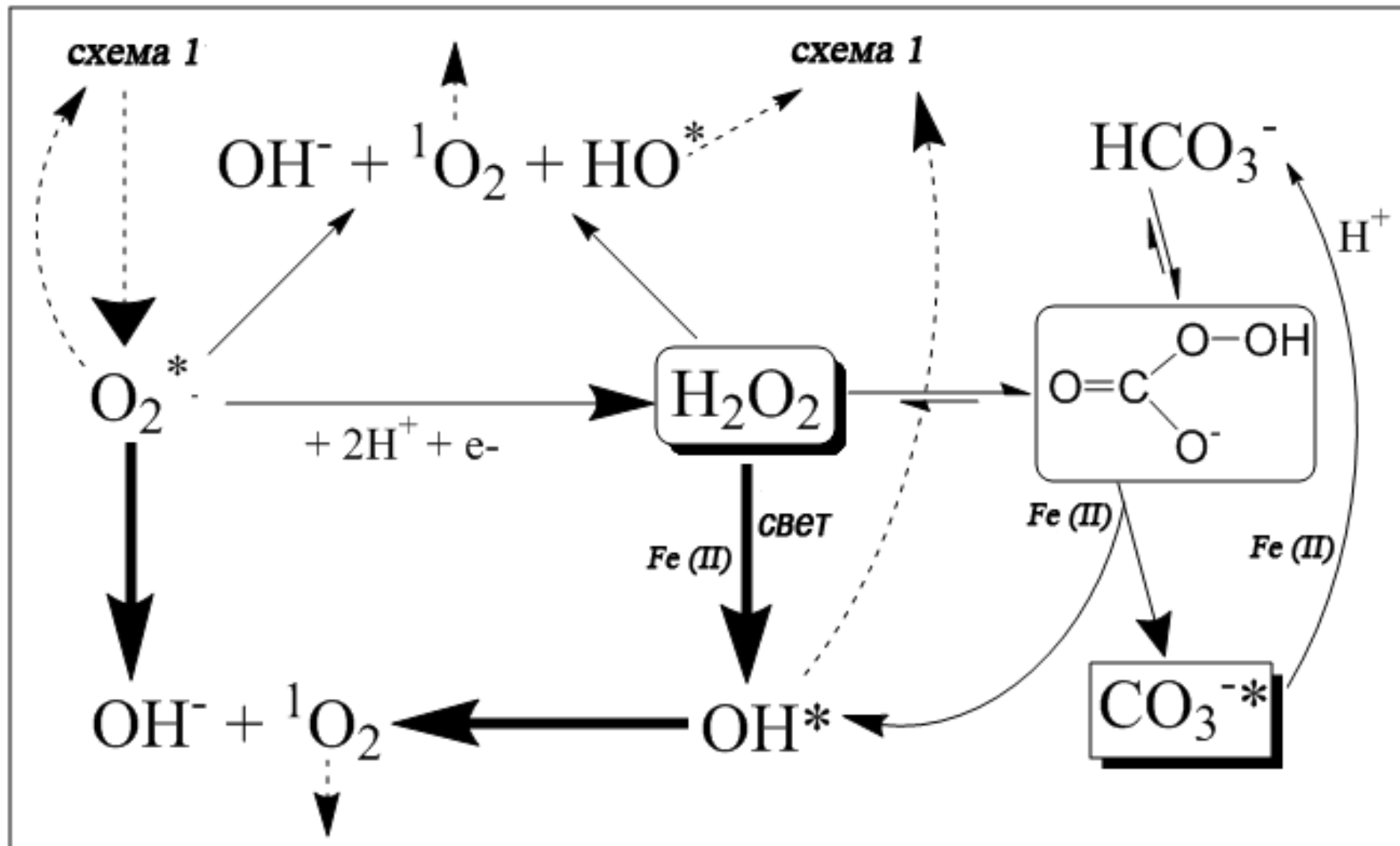


# The principle of branching chain reaction illustrated by the detonating gas ( $H_2 + O_2 \rightarrow H_2O$ ) explosion.

This reaction is a tremendous amplifier and modulator of the initial low intensity impulse



# When H<sub>2</sub>O<sub>2</sub> is added



**Amplitudes of luminescence waves induced in a natural bicarbonate are amplified after addition to them hydrated fullerenes (HyFn) even in ultra-low doses.**

