

INTRINSIC SUSTAINED ACTIVITY OF BICARBONATE AQUEOUS SOLUTIONS.

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Addition of Fe(II) salts (FeSO₄ or FeCl₂) in the range of concentrations of 10-50 mkM to bicarbonate artesian waters or aqueous bicarbonate solutions induces a wave of photon emission (PE) from them. Intensity of the wave is boosted in the presence of luminol, the probe for the reactive oxygen species (ROS). Induction by Fe(II) of luminol-amplified PE indicates that spontaneous chain reactions with ROS participation continuously flow in aqueous bicarbonate solutions. PE-waves in bicarbonate aqueous solutions can be induced in them by addition of Fe(II) in the presence of Luminol many weeks after their preparation provided that they are contacting with the air. Amplitudes of PE-waves decrease if a bicarbonate solution is kept in a sealed vessel. After its opening amplitude of PE-wave increases again indicating that contact with the air is needed for the persistence of processes responsible for PE. However, addition of H₂O₂ in sub-millimolar concentrations to 1-5 mM Na/K-bicarbonate solutions initiates in them a peculiar process accompanied with spontaneous low-level photon emission amplified with luminol. The process may proceed in hermetically closed test-tubes and in the darkness for many months without decay. The process exhibits extremely high sensitivity to the action of physical and chemical factors of ultra-weak intensity. Monthly and circadian rhythms of PE are observed. Amplitude of PE intensity from test-tubes filled with active solutions increases 2-3 fold on periods coinciding with the eclipses of Moon and Sun. Preparations of water-soluble fullerenes in dilutions equivalent to their concentrations 10⁻¹³, 10⁻¹⁵ and 10⁻¹⁹-10⁻²⁰ M increased photon emission 2-3-fold while intermediate dilutions affected it much weaker. We suggest that addition of H₂O₂ to aqueous bicarbonate solutions initiates in them cyclic chain reactions in which water is oxidized with oxygen. Bicarbonate may stabilize these cyclic reactions due to its ability to participate in free radical reactions. Extremely long-lasting photon emission (high density electromagnetic energy) from activated bicarbonate solutions indicates that they reside in stable non-equilibrium (excited) state supported presumably by continuous efflux of low density (electromagnetic) energy from the environment. Thus such systems are able to transform low grade energy into high grade energy. It is notable that bicarbonate is the necessary constituent of cytoplasm of aerobic cells and of important biological liquids, in particular of blood plasma. Normal and healing drinking waters also usually represent bicarbonate solutions. Steady activity of bicarbonate aqueous solutions induced by rather weak factors may represent a property important for many vital functions of individual living systems as well as for the natural environmental processes.