**Ozone's Effect on Oxidation/Reduction Potential & Ph by Saul Pressman**

From: "Saul Pressman"   
Date: Wed Sep 22, 1999 2:45 pm   
Subject: Re: QUESTION ON ORP  
  
Dear Carol,  
  
The direct answer to your question is #14 below. But, a little background helps to understand.  
  
1) Oxidation occurs when a chemical substance loses an electron. (Oxygen may or may not be involved.) Energy is liberated during oxidation.   
  
2) Reduction occurs when a chemical substance gains an electron. Energy is stored during reduction.   
  
3) There is no reduction without an accompanying oxidation and no oxidation without an accompanying reduction. Equations must be balanced.   
  
4) The term redox comes from oxidation/reduction potential, ORP, and is measured in millivolts.   
  
5) The redox potential (ORP) measures the tendency for a solution to either gain or lose electrons when it is subject to change by the introduction of a new chemical substance.   
  
6) A solution with a high redox potential (ORP) will have a tendency to gain electrons.   
  
7) A solution with a low redox potential (ORP) will have a tendency to lose electrons.   
  
8) Redox potential (ORP) values are determined by measuring the potential difference between an inert indicator electrode in contact with the solution and a stable reference electrode connected to the solution.   
  
9) Redox measurement (ORP) is useful as an analytical tool to monitor changes in a system (such as a fish tank, or a swimming pool), rather than determining their absolute value.   
  
10) pH is the scale for measuring the concentration of hydrogen ions in solutions. It is set up on a basis of 1 - 14, with 7 as neutral; acidity is pH from 1 - 7; alkalinity is pH from 7 - 14.   
  
11) Pure water breaks down slowly to form H+ (hydrogen ions) and OH - (hydroxide ions)   
  
12) An acid has more H+ ions than OH - ions. A base has more OH - ions than H+ ions.   
  
13) pH and ORP are inversely related. When pH goes down (increasing acidity), the ORP goes up. When pH goes up (increasing alkalinity) the ORP goes down. 1 pH degree = 59 millivolts. The colder the water, the higher the ORP. Ozone has a very high ORP of over 2700 millivolts. Ozone does not change the pH of water (except very slightly upward -alkalinizing)   
  
14) Acidic water has a high ORP of positive hydrogen ions (H+). Ozonated water has a high ORP, but is due to the availability of excess oxygen atoms which have a strong affinity for electrons. So it is a high positive ORP, but for a different reason. Acidic water should not be taken internally. Ozonated water most definitely should.   
  
15) Most interior living cells have a pH of about 6.8. Blood plasma and other fluids surrounding the cells have a pH of about 7.2 to 7.4. Various substances, called buffers, regulate these pH levels so that they do not vary much. Buffers either bond ions or release ions to maintain stability of pH.   
  
16) The body produces energy through the process of oxidation. Sugar (carbohydrate : carbon, hydrogen and oxygen) is oxidized by oxygen in the cell, releasing ATP, the energy currency of the cell. The more oxygen available, the more energy released. People with low energy are starved for oxygen. Oxidation supplies the heat in the body. People with low body temperature are also starved for oxygen.   
  
17) The left over products of this process, if any, must also be oxidized, requiring more oxygen. If it is not available, these products can build up and clog the cells. One of the most detrimental is carbon monoxide, which is a poison.   
  
18) By introducing ozone into the body, oxidation is increased and the left over products, including carbon monoxide, are oxidized and rendered harmless. Energy increases and body temperature rises.   
  
19) The cells of the body are protected from excessive oxidation by enzymes which reduce the oxygen (provide it with electrons). These enzymes are glutathione peroxidase, superoxide dismutase, catalase and reductase. These guardian enzymes are produced in increased amounts with the beneficial stress produced by oxygen/ozone therapy.   
  
20) A lack of oxidation in the cells, caused by a buildup of anti-oxidants, results in cancer if the supply of oxygen to the cell for respiration falls below 60% of its requirements. The cell, cut off from oxygen by the blocking action of the antioxidants, is forced to ferment its sugar, and rapidly loses its ability to maintain its differentiation (as a liver cell, or a prostate cell or a colon cell, etc.) Without differentiation, the cell has no governor on replication. It ferments its sugar and throws off lactic acid and carbon monoxide, both of which are acidfying.   
  
21) If the area around the cell becomes too acid, and is not buffered by sufficient amounts of calcium, a passing T-cell or macrophage will be stimulated by the excessive acidity and produce some enzyme growth factor, to 'heal the wound', as it perceives it.   
  
22) Stimulated by enzyme growth factor, the fermenting cell will replicate itself endlessly. This is called cancer.   
  
23) Ozone therapy (and the resulting hydro peroxides) will attack cancer cells directly because the cells lack the protective enzymes.   
  
I hope this long answer has helped you understand this chemistry. If you have further questions, do not hesitate to ask.  
  
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