

## **High Pressure Electrocoagulation Process - Reduce Pathogens**

**The management of biosolids resulting from the biological treatment of municipal sewerage and animal residuals from farm and agricultural applications represents two of the primary concerns facing municipalities and the world. The United States currently has approximately 16,000 wastewater treatment facilities generating about 20,000 dry tons of biosolids per day. The environmental fate of biosolids is application to the land once they have been stabilized such that pathenogenic organisms have been rendered harmless to human and animal health as well as the environment.**

**Disinfection is defined as the selective destruction of disease causing organisms (pathogens). Disease causing organisms (pathogens) of primary concern to humans, animals and the environment are bacteria, viruses and amoebic cysts. Bacteria and amoeba are single cell organisms belonging to the Kingdom Protista. A virus is the smallest biological structure containing all the information necessary for its own reproduction. As a parasite it requires a host for survival. The host infected by the viruses therefore classifies viruses.**

**Pathogens share a commonality in that the basic unit of life is the cell, which is composed of 80% water and 20% dry matter. The structure of the living cell is such that it consists of an outer cell wall that may be either a rigid or flexible membrane. Contained within the interior boundary of the cell membrane is a colloidal suspension of proteins, carbohydrates and other complex organic compounds called cytoplasm. The cell membrane provides the semi-permeable boundary through which the osmotic interchange of water and nutrients necessary for life.**

**Disinfection is commonly accomplished by the use of chemical agents, physical agents, mechanical means and radiation. The following four mechanisms of disinfection have been proposed to explain the action of disinfectants:**

- 1. Damage to the cell wall:  
Damage and/or destruction of the cell wall results in cell lysis and death.**
- 2. Alteration of cell permeability:  
Altering of the permeability of the cytoplasmic membrane destroys the selective permeability of the membrane allowing vital nutrients required for life (nitrogen and phosphorus) to escape resulting in death of the cell.**
- 3. Alteration of the colloidal nature of the protoplasm:  
Coagulation of the cell proteins that are in colloidal suspension within the cytoplasm is lethal to the cell.**

**4. Inhibition of enzyme activity:**

**Enzymes are organic catalysts produced by living cells used to aid the transport of nutrients through the cell membrane and for synthesis and energy reactions within the cell. Oxidation processes alter the chemical arrangement of enzymes rendering them inactive, resulting in death.**

**The method and apparatus of Ecolotron's patented process satisfy the requirements of the aforementioned mechanisms of disinfection.**

**Specifically:**

- 1. The electromotive force present within the electrocoagulation apparatus disrupts the osmotic interchange through the cytoplasmic membrane and in so doing the differential pressure across the cytoplasmic membrane results in the implosion and/or explosion of the cell destroying the cell wall therefore resulting in cell lysis and death.**
- 2. The electromotive force present within the electrocoagulation apparatus disrupts the osmotic interchange through the cytoplasmic membrane destroying the selective permeability of the cytoplasmic membrane allowing the release of essential nutrients (nitrogen and phosphorus) resulting in death.**
- 3. Radiation (electromotive force and electron flooding) present within the electrocoagulation apparatus alters the colloidal nature of the protoplasm coagulating proteins and other matter in suspension within the cytoplasm therefore producing a lethal effect resulting in death.**
- 4. The oxidation reduction regime and oxygen and hydroxyl radicals available for reaction within the electrocoagulation apparatus alter the chemical arrangement of enzymes rendering said enzymes inactive resulting in death.**