

Informational Handout: Alkaline Hydrolysis

Background

The Cremation Association of North America (CANA) defines cremation as “the mechanical and/or thermal or other dissolution process that reduces human remains to bone fragments.”

This definition includes a variety of processes that can be used to reduce bone fragments and ultimately facilitate successful cremation, such as the following:

- Flame-based cremation
- Calcination
- Alkaline hydrolysis

In 2010, CANA’s Board of Directors voted to expand the cremation definition to include alkaline hydrolysis because state and provincial laws were already in place that determined these processes could be marketed as cremation.

- Also known as Green Cremation, this process was originally developed for the Mayo Clinic.
- It is a legal practice per Minnesota Statute, Section 149A.02 which defines alkaline hydrolysis as “the reduction of a dead human body to essential elements through a water-based dissolution process using alkaline chemicals, heat, agitation, and pressure to acceleration natural decomposition.”

Alkaline Hydrolysis: What is it?

Alkaline hydrolysis is similar to many physiological processes that occur naturally in the body. Water, alkaline chemicals, heat, and sometimes pressure are used to convert tissues in the body to a solution of micro molecules, ultimately accelerating natural decomposition. The decomposition that occurs is the same as the processes that occur during burial, except it is dramatically accelerated using chemicals that are environmentally friendly and do not

produce toxic gases or air pollutants. After this process occurs, only bone fragments and a fluid called effluent remains. Remaining effluent is:

- Sterile, and contains salts, sugars, amino acids, and peptides
- Has no leftover tissue or DNA once the process is complete
- Can be discharged with waste water and is a welcome addition to water systems

More about the Process

- The dead body is placed in a pressurized stainless-steel chamber
- Water (95%) and alkali (5%) are added. The alkali solution of potassium hydroxide (KOH) is commonly found in various household products
- The temperature is raised to 350 degrees
- Water, alkali, heat, and pressure circulate over the body to initiate accelerated decomposition
- The resulting sterile solution is drained from the chamber, leaving behind soft bone fragments, and is recycled through the waste water treatment system. The entire process typically takes 2-3 hours, which is similar to traditional cremation processes



Green Cremation

Alkaline hydrolysis is also referred to as green cremation because it is a more environmentally friendly alternative to flame-based cremation. According to the Funeral Consumers Alliance of Minnesota, when compared to traditional cremation processes alkaline hydrolysis offers:

- More than 75% reduction of carbon footprint
- Uses 1/8 the amount of energy needed for flame-based cremation
- Preserves over 20% more bone fragments than flame-based cremation
- Mercury from dental fillings is contained and recycled, not vaporized

Carbon Footprint Comparison

	Flame-Based	Green
Container Production	28	3
Fuel Consumption	201	25
Electrical Consumption	10	7
NOX Emissions	3	
Other Emissions	1	1
KOH Production / Transport		16
CH4/NOX from Water Processing		4
Energy at Processing Plant		3
Total Kg CO2 Equivalents	243	59

75.72%
less carbon impact on environment

Additional Resources

- Cremation Association of North America
<https://www.cremationassociation.org/page/alkalinehydrolysis>
<https://www.cremationassociation.org/page/alkalinehydrolysis>
- Mayo Clinic:
<https://www.mayoclinic.org/body-donation/biocremation-resomation>
- Minnesota Statute 149A:
<https://www.revisor.mn.gov/statutes/cite/149A.02>
- Green Cremation:
<http://www.greencremation.com/>
- Funeral Consumers Alliance of Minnesota
<https://fcaofmn.org/alkaline-hydrolysis-green-cremation.html>