Sustainable Waste Management

MEDI-CLAVE®
Turnkey solutions for today's cssd

Presented by Janita Hoffman

ASLM | 2023
AFRICAN SOCIETY FOR LABORATORY MEDICINE

Webinar Overview:

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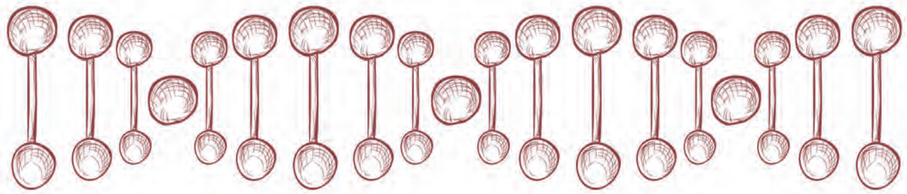
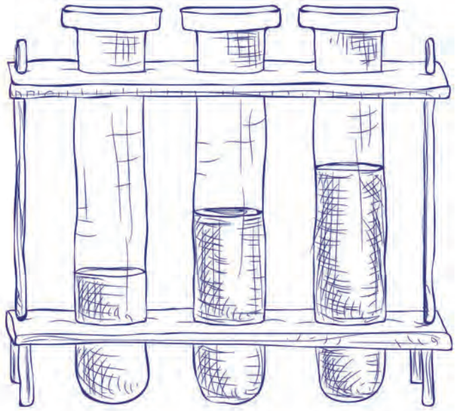
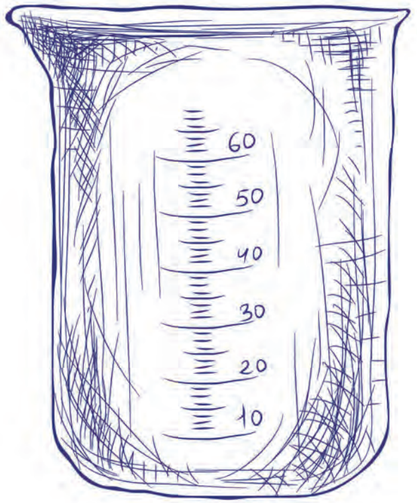
1. What is sterilization?
2. Ways of achieving sterility
3. Safe Disposal of Medical Waste and the process thereof
4. Safe Disposal of live tissues and how it works
5. Closing word







What is sterilization?

Is there a difference between these two devices?

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What is sterilization?

The elimination of all transmissible agents from surfaces and/or equipment.

Sterilization
is a PROBABILITY as it cannot yet be proven.

The Percentage of Microbial reduction with SAL (Sterile Assurance Level)
1 log - 90% means SAL = 10–1
2 log - 99% means SAL = 10–2
3 log - 99.9% means SAL = 10–3
4 log - 99.99% means SAL = 10–4
5 log - 99.999% means SAL = 10–5
6 log - 99.9999% means SAL = 10–6

SAL measures the chances of micro-organisms surviving the sterilization process.
1 to 6 log reduction measurements shows the amount or percentage of live microbes eliminated after sterilization.
Standard healthcare requirements are a 6 log reduction and in certain instances a overkill of 8 log reductions may also be required.

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Ways of achieving sterility:

Hydrogen peroxide (Plasma) Sterilization

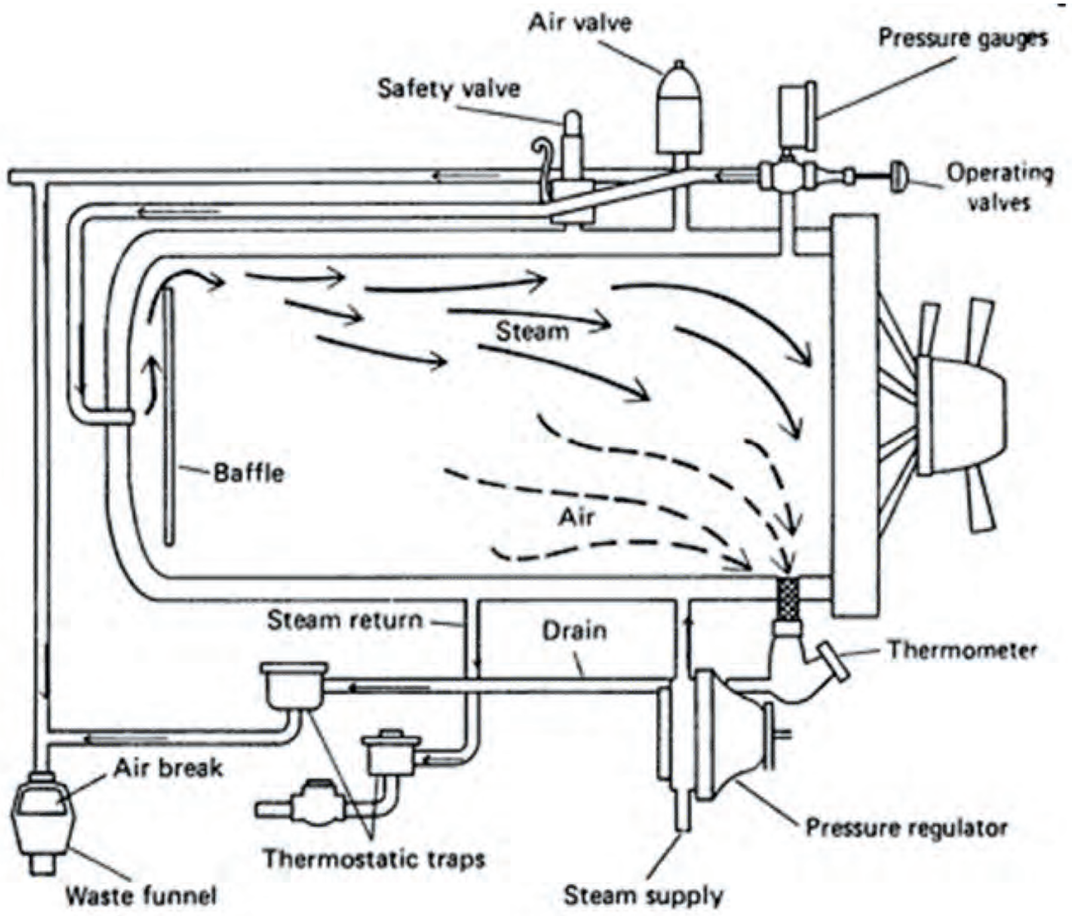
100% Ethylene Oxide (ETO) Sterilization

Formaldehyde Steam Sterilization

Steam Sterilization

- Nontoxic to patient, staff and the environment
- Cycle easy to control and monitor.
- Rapidly microbicidal
- Least affected by organic / inorganic soils among sterilization processes listed.
- Rapid cycle time
- Penetrates medical packing, device lumens

How does an Autoclave sterilize?



3 VITAL FACTORS OF STERILIZATION :

1. Time
2. Temperature
3. Pressure

CYCLE STAGES:

1. Pre-Conditioning
2. Heating up
3. Sterilizing (Exposure time)
4. Exhaust
5. Drying
6. Vacuum Break
7. Door Release

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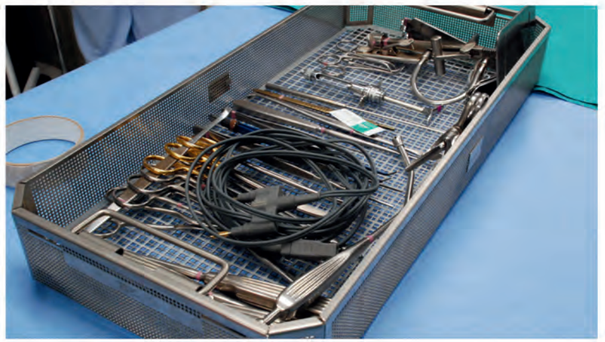
Typical Autoclaved items:

1. Hospital Surgical instruments and equipment
2. Pharmaceutical products
3. Laboratories Media
4. Veterinarian surgical instruments
5. Soil for certain plan production
6. Milk bottles
7. Medical Waste



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What is Medical Waste?

The term medical waste includes all the waste generated within health-care facilities, research centers and laboratories related to medical procedures. In addition, it includes the same types of waste originating from minor and scattered sources, including waste produced in the course of health care undertaken at home (e.g. home dialysis, self-administration of insulin, recuperative care).

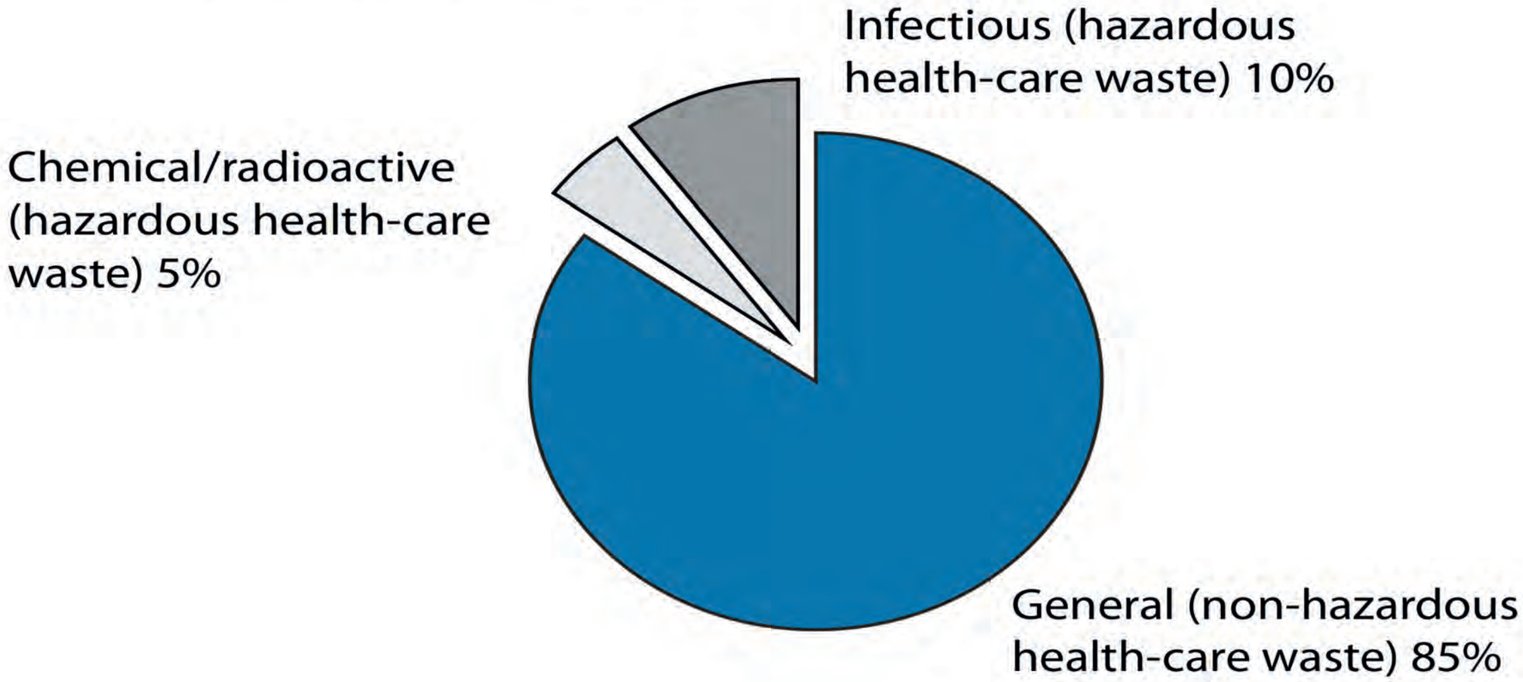

Figure 2.1 Typical waste compositions in health-care facilities

Waste Categories:

Hazardous Waste:

1. Sharp Waste (eg. blades, infusion sets or needles)
2. Infectious Waste (eg. Waste contaminated with blood or other body fluids)
3. Pathological Waste (eg. Human tissues or unused blood products)
4. Pharmaceutical Waste (eg. Waste containing cytotoxic drugs)
5. Chemical Waste (eg. Blood pressure gauges and batteries)
6. Radioactive Waste (eg. Radioactive therapy treatment)
7. Non-Hazardous or General Heath-care waste (eg. Waste that does not contain chemicals, radioactive or physical hazard)

One of the most common problems among countries:

Is the management of hospital waste and the negligence or improper handling thereof, often generating threats to health-care workers, communities and the environment?

Gauteng Health investigates illegal disposal of medical waste material

12 Nov 2023

The Gauteng Department of Health (GDoH) is investigating circumstance that led to medical waste items being illegally disposed of at a field around Ormonde, South of Johannesburg.

https://www.gov.za/news/media-statements/gauteng-health-investigates-illegal-disposal-medical-waste-material-12-nov

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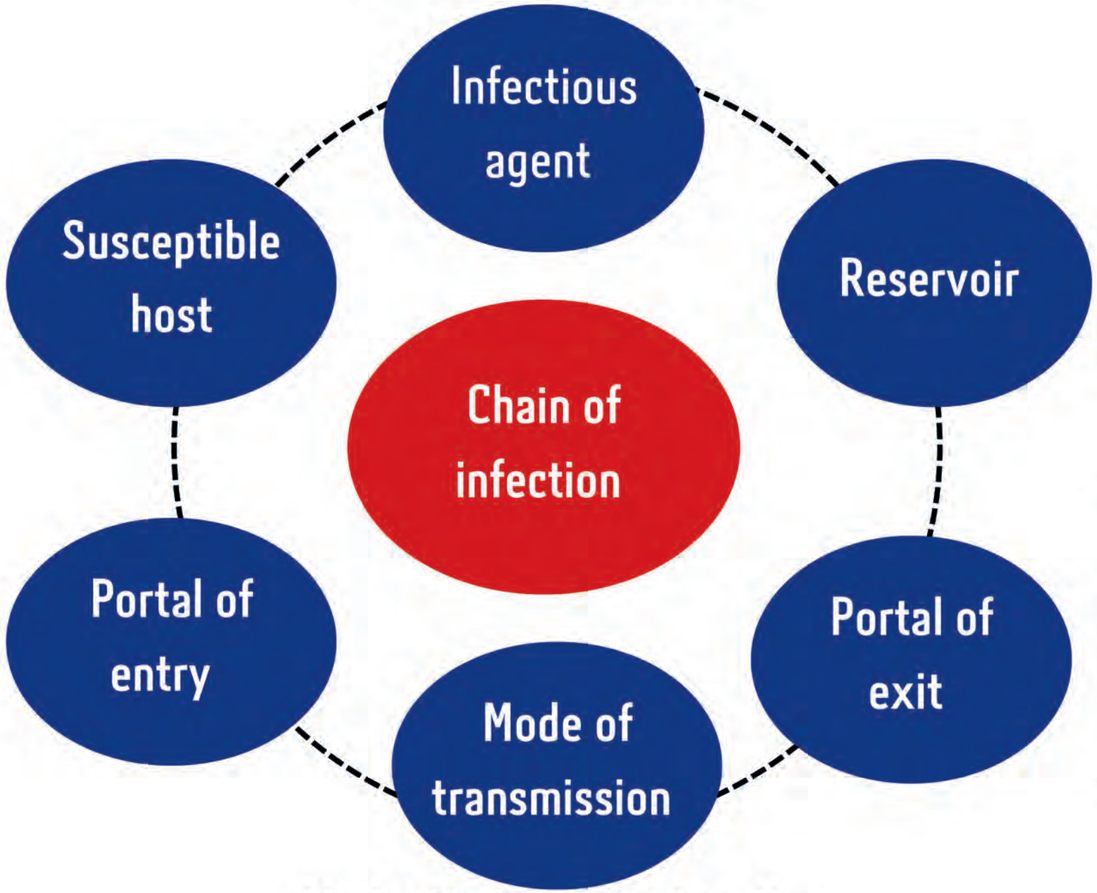
Hazards from Infectious waste:

Due to its hazardous nature Infectious waste should always be assumed to potentially contain a variety of pathogenic microorganisms. This is because the presence or absence of pathogens cannot be determined at the time the waste item is discarded into the container. Pathogens in infectious waste may enter the human body through several routes:

1. through a puncture or cut in the skin
2. through mucous membranes
3. by inhalation
4. By ingestion.

Chain of infection:

Infectious agent: a microorganism that can cause disease



Susceptible host: a person susceptible to the disease, lacking immunity or physical resistance to prevent infection

Reservoir: a place where microorganisms can thrive and reproduce (e.g. in humans, animals, inanimate objects)

Portal of entry: an opening allowing the microorganism to invade a new host

Portal of exit: a means for a microorganism to leave the reservoir (e.g. respiratory, genitourinary and gastrointestinal tracts; skin and mucous membranes; and the placenta)

Mode of transmission: how the microorganism moves from one place to another (e.g. contact, droplets, airborne)

The ideal process for Infectious Waste Management:

1. Segregating the waste
2. Collection of segragated waste
3. Transport to the Disposal Facility
4. At the Facility the Waste is sterilized
5. Now the waste is ready to be REUSED, REDUCE AND RECYCLED or Simply disposed as normal.

Minimum approach to the overall management of medical waste:

All operators dealing with medical waste should be familiar with the main categories of medical waste as set out in either national or local regulations on waste classification. As a minimum, managers responsible for medical waste should conduct a walk-through of the facility to identify the medical areas that produce waste, to obtain an initial estimate of the types and quantities of waste generated, and to understand how the waste is handled and disposed. A rapid assessment, combining observations with interviews and survey questionnaires, should provide sufficient data to identify problems and begin the process of addressing them.

The technology was developed by Medi-Clave Pty Ltd, a local autoclave manufacturer in Pretoria, South Africa, in collaboration with the UNDP Healthcare Waste Project financed by the Global Environment Facility.

PRESS RELEASE

United Nations Development Programme

UNDP is the UN's global development network, advocating for change and connecting countries to knowledge, experience and resources to help people build a better life. We are on the ground in 166 countries, working with them on their own solutions to global and national development challenges. As they develop local capacity, they draw on the people of UNDP and our wide range of partners.

UNDP GEF Project and South African firm develop technology for infectious waste

6 October 2014

In 2014 we were asked to develop a technology that was effective, easy to use, robust, affordable, and appropriate for the conditions in Africa," explained Johann Hoffman, Managing Director of Medi-Clave. "I believe we met all the requirements," he added.

The key objectives when considering any technology or protocol, should be:

1. The Hazardous factor to healthcare workers, communities and the environment
2. Sustainability, simplicity, reliability, viability and effectiveness of the equipment
3. Initial capital layout of the equipment
4. Long term cost effectiveness of the equipment
5. Easy operation
6. Back up service and onsite technical support
7. Energy efficiency
8. Water usage
9. Chamber load capacity or process capacity

It is the institutions responsibility to ensure a sufficient, successful and sustainable waste management system.

1. Implementation and maintaining of institutionalized healthcare waste management procedures and practices in the facility
2. Implementation and sustaining maintenance schedules
3. Forming of support groups and or forums
4. Proper training and skills transfer of;

- Administrators
- Healthcare workers / Nursing staff
- Waste workers and cleaners
- Operators
- Maintenance technicians

- Effective, easy to use, robust, affordable, and appropriate for the conditions in Africa
- Multiple vacuum autoclave with sterilization at 134 degree Celsius or 121degree Celsius
- Manufactured by Medi-Clave Pty Ltd (Pretoria, RSA)
- Developed in collaboration with the GEF/UNDP Project
- 260 liters chamber, 1 to 1.5 hours cycle time per cycle
- Dimensions: 1.1 x 1.5 x 2 m high
- Certified to meet or exceed international autoclave standards.
- Includes boiler, all stainless steel construction
- Easy sliding door
- Low maintenance and reliable in comparison to other Technologies.
- Special trolley with barrel to collect waste; the whole barrel slides into the autoclave to be sterilized after treatment, the barrel rotates to dump out treated waste

Manufactured in Africa for Africa!

Place Waste inside Stainless steel barrel and close the lid

When barrel is full, move to autoclave

Slide barrel into Autoclave

Close Sliding door

Start heating , multi-vacuum and sterilization cycle.

When finished open the door and remove the sterilized barrel

Unlock and rotate the barrel to dump treated waste at the bottom

Barrel and trolley ready to collect more waste.

From This.....

To this!

Muhimbili hospital successfully, sufficiently and sustainably treating waste!

WWW.MEDI-CLAVE.CO.ZA

Envirogest

The ENVIROGEST Tissue Dissolver uses KOH alkaline hydrolysis at an elevated temperature and atmospheric pressure to convert the proteins, nucleic acids and lipids of all cells, tissues and infectious microorganisms, to a sterile aqueous solution made up of small peptides, amino acids, sugars and soaps.

BD-5
Tissue Dissolver
Call Center: +27 (0)82 925 4918
www.medi-clave.co.za

Envirogest

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Once Dissolved it has safely converted animal, human and microbial tissues into a sterile EPA neutral aqueous solution, suitable for disposal to a sanitary sewer.

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Tissue Dissolver
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The ENVIROGEST Process, sterilizes and digests in one operation, reducing waste volume and weight by up to 97%, and completely destroys pathogens.

The ENVIROGEST is environmentally responsible and it releases no dangerous emissions to the atmosphere. The complete dissolving process time is approximately 16 to 24 hours (depending on tissue) or processing weight of a load.

Envirogest

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Example of Chickens being processed in the "Tissue Digestor"

1. Open digestor Lid showing empty chamber.
2. 5kg's Chicken Pieces for demonstration purposes
3. Chicken pieces placed in "Tissue Digestor chamber" and the contents of the ALKALI sachet poured over the Chicken
4. 16 -24hrs after the completed process the only byproducts are the bones and teeth.

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All biological indicators used in efficacy testing of the ENVIROGEST Tissue Dissolver have been completely destroyed. These indicators were ‘Geobacillus stearothermophilus spore strips in glassine envelopes at a concentration of excess of 10 to the power of 6.

All infectious waste will be sterilized in the ENVIROGEST Tissue Dissolver due to the temperature and time of exposure.

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The waste on the following list will be completely sterilized and digested (leaving only remnants of bones and teeth) after treatment.

- Animal carcasses
- Human Cadavers
- Sterile tissue
- Fixed tissue
- Infected tissue
- Frozen or Fresh tissue

Although the ENVIROGEST is specifically designed to both sterilize and dissolve tissue or other degradable waste. If you have infectious waste that needs to be sterilized that is not on the above mentioned list, please contact Medi-Clave for guidance.

There is rapid depolymerization of ribonucleic acid (RNA) and slower destruction of deoxyribonucleic acid (DNA). This is most important in its implications for potentially infectious materials. Both RNA and DNA viruses are completely inactivated by the heat element in the process.

The alkali itself is consumed by generating the salts of the hydrolysis products. The only byproducts of tissue digestion are the mineral constituents of the bones and teeth of vertebrates. These are soft enough after the organic matter has been degraded to be easily crushed (even by bare hands) and recovered as calcium phosphate powder (sterile bone meal).

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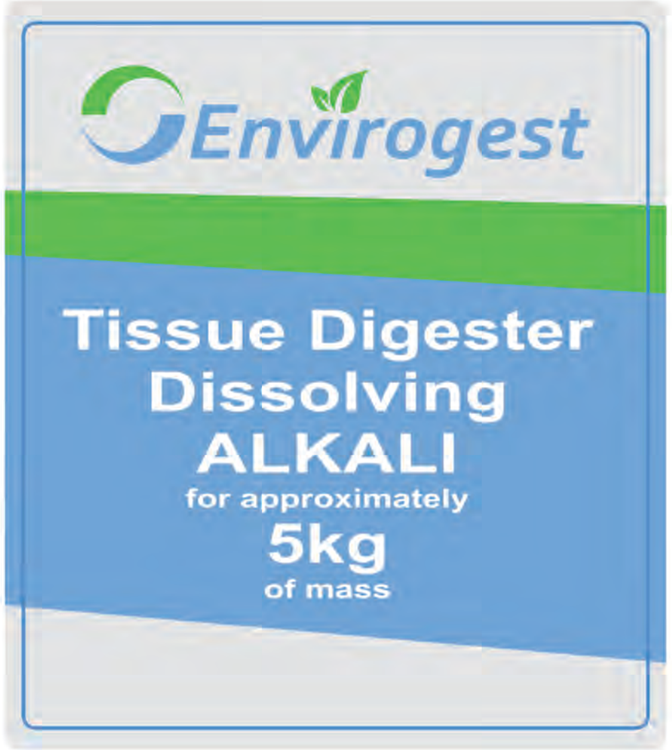
Envirogest

The “ENVIROGEST Tissue Digester Dissolving Alkali sachets are conveniently pre-packed with KOH, minimize handling risk factors associated.

The sachets are packed per mass solution
120g of KOH Alkali for every 1kg of tissue mass.
600g of KOH Alkali for every 5kgs of tissue mass.



Caution!

Use only as directed!

Store in a dry place.

Only open packaging when ready for use.

Place ‘tissue mass’ inside the Envirogest holding basket, open alkali sachet and pour the entire contents of the alkali sachet over the tissue mass.

Care must be taken to avoid skin contact with alkali.

600g

Ingredients:

Formula: NaOH - Flakes
Molar mass: 39.997 g/mol
IUPAC ID: Sodium Hydroxide Solid
Density: 2,13 g/cm³ @ 20°C (flake)
Melting point: 318 °C
Boiling point: 1 390 °C
Soluble in: Water, Alcohol, Glycerol

Corrosive substance

Packed by:
Medi-Clave(Pyt)Ltd
Portion 69
Melvic, Skurweberg
Pretoria, South Africa

P.O.Box 1652
Hartbeespoort
0216
www.medi-clave.co.za

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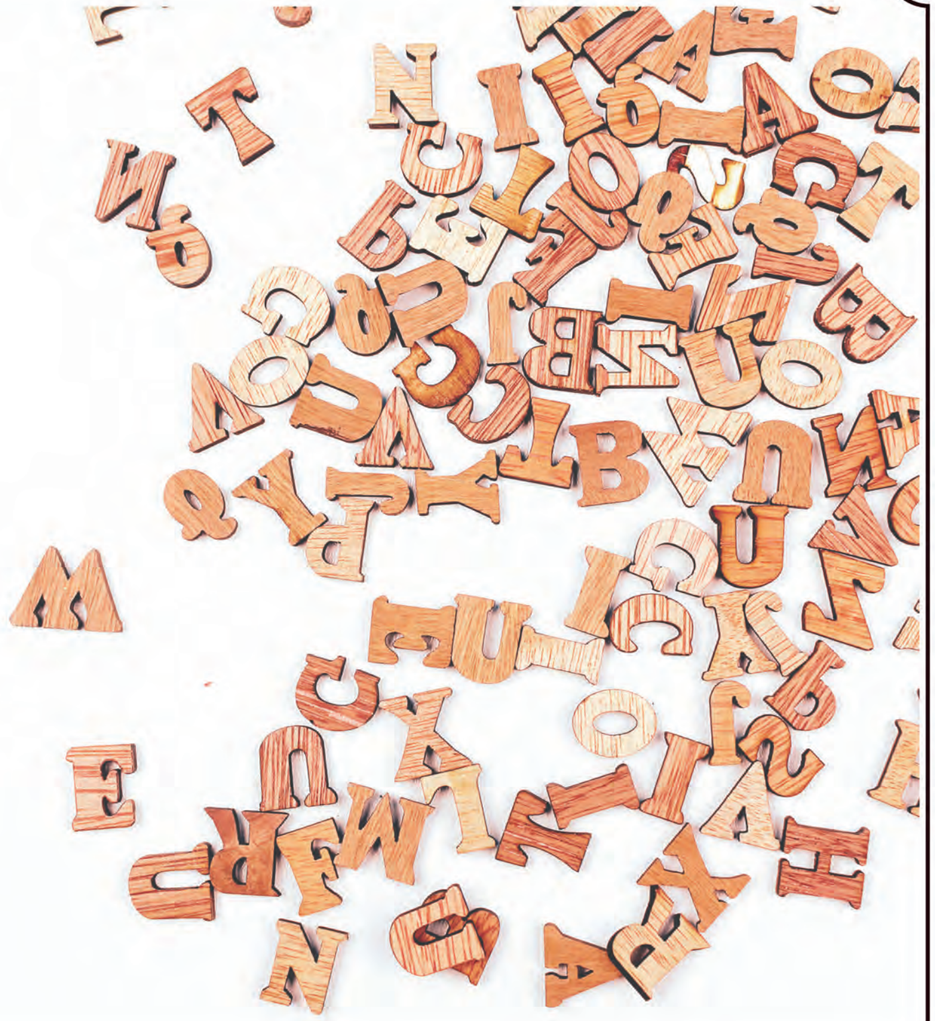
Closing Word!

Manufactured in Africa for Africa, because we understand Africa!

Our core business is the manufacturing, refurbishing, servicing and maintenance of all types of steam autoclaves across Africa.

Excellence presents the wise choice of many alternatives.



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Thank you

Questions?

janita@medi-clave.co.za