



KNAMAX™

Process Water Transformation Technology

AAI — Activated Alkaline Ionized Water · Preferred application in slaughterhouses and poultry processing plants, seafood facilities, and other meat processing operations.

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Master Technical-Commercial Document

TECHNICAL-COMMERCIAL DOCUMENT

INTABIOTECH
Problems Solved Intelligently

Overview

01 · INTRODUCTION

KNAMAX™ is not conceived as a conventional chemical product that is diluted and then applied directly to meat. Its technological function takes place **before contact with the raw material**: KNAMAX™ conditions process water and controllably modifies its ionic, electrolytic, and physicochemical properties, generating a functional aqueous medium that INTABIOTECH calls **AAI — Activated Alkaline Ionized Water**.

In slaughterhouses and poultry processing plants, where water is continuously involved in washing, transport, chilling, cleaning, and hygiene control operations, this approach allows water to be treated as a **technological process variable** rather than a mere auxiliary service.

Core Concept

KNAMAX™ acts on water by triggering — upon contact with small amounts of reactive concentrate — a transformative reaction driven by a 100% Mineral (Food Grade) concentrate. The resulting medium, almost instantaneously, is predominantly functionalized process water charged with electrolytes, **not a "KNAMAX™ solution" applied directly to food**. This distinction is highly significant, especially from a regulatory standpoint.

The Concentrate	The Reaction	The Result: AAI
100% Mineral, Food Grade. Incorporated into water before the process point.	Nearly instantaneous. Produces a deep physicochemical transformation of the aqueous medium.	Functionalized water, rich in electrolytes, with modified and controlled physicochemical properties.

Why Start with Poultry Processing?

02 · PRIORITY SECTOR

Poultry processing is one of the food environments where water plays the most intensive role and where cross-contamination control demands a dynamic view of the process. The carcass passes through successive stages in which water, organic matter, surfaces, equipment, and product interact continuously and in complex ways.

For this reason, final microbiological quality does not depend solely on the presence of an antimicrobial intervention. It also depends on water renewal, the water-to-product ratio, organic load, actual contact time, coverage, temperature, line speed, and the possibility of subsequent re-contamination.



Washing and Flushing

Removal of organic matter at critical process stages through controlled process water.



Chilling

Conditioning and microbiological control during chilling stages, especially under high-load conditions.



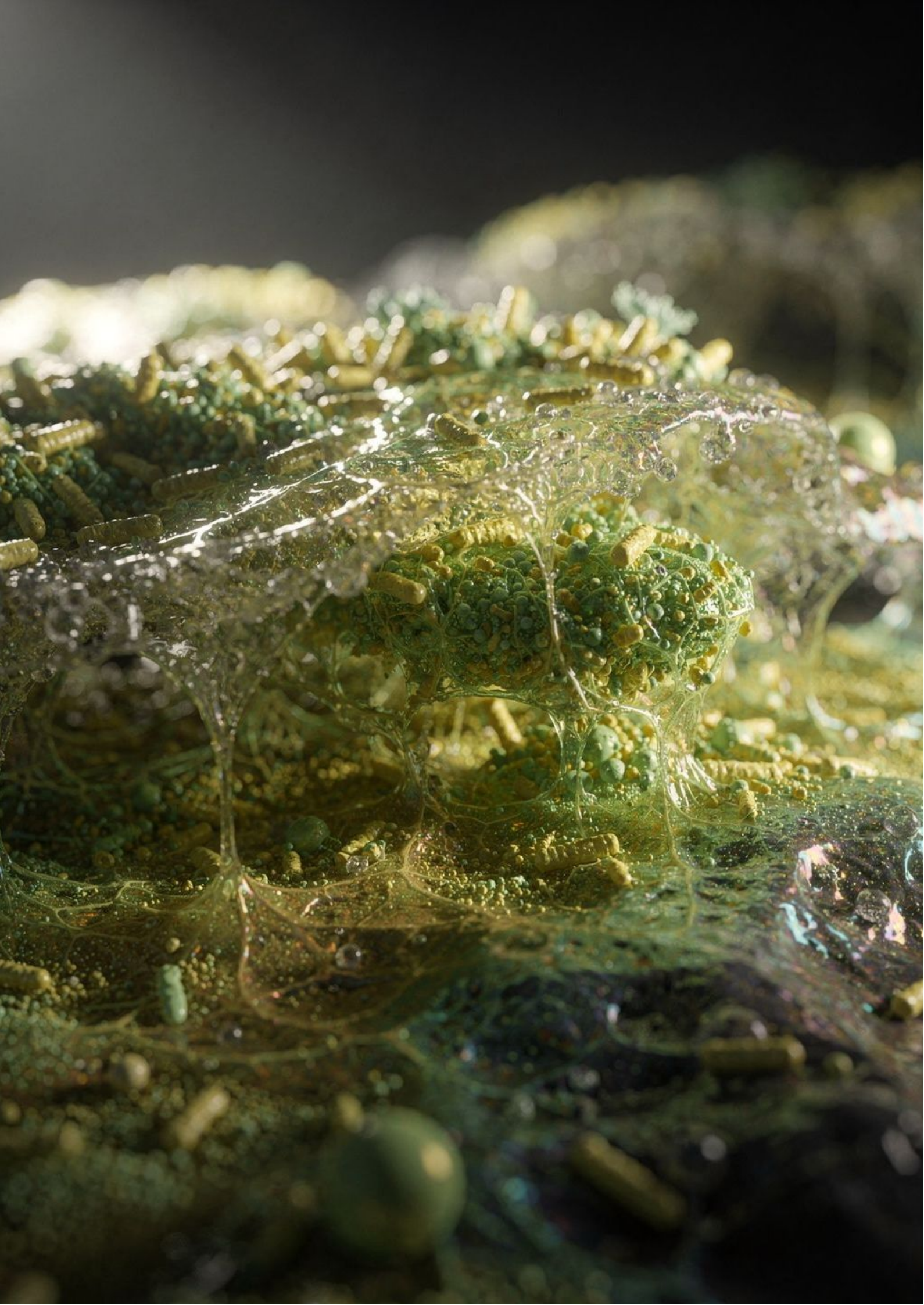
Hygienic Control

Active management of the microbiological load in the industrial environment through functional water.



Surfaces and Equipment

Cleaning of surfaces, equipment, and transport circuits within the plant.



From Service Water to Functional Process Water

03 · THE TECHNOLOGICAL APPROACH

The KNAMAX™ approach consists of transforming process water **before** it is used at the selected industrial point. The controlled incorporation of the product modifies certain measurable parameters of the water and generates an aqueous system with high availability of ionic and electrolytic species, converting the water into an active functional agent.

Modified Parameters in the AAI

Ionic Composition and Ionic Strength

Significant increase in the availability of active ionic species in the aqueous medium.

Conductivity and Alkalinity

Controlled modification of the electrical conductivity and alkalinity profile of the water.

pH and Interfacial Behavior

pH adjustment and improved interaction with biological surfaces and microbial structures.

Technological Sequence

01

KNAMAX™

Incorporation of the reactive mineral concentrate into the process water.

02

Conditioning

Nearly instantaneous physicochemical transformation reaction.

03

AAI

Activated Ionized Alkaline Water ready for application in the plant.

04

Process Point

Application at the selected industrial point with physicochemical and microbiological verification.

Principle of Action: Electrolytes and IONOPHORESIS™

04 · MECHANISM OF ACTION

In INTABIOTECH's technical documentation, **IONOPHORESIS™** refers to the technological model associated with the intensive interaction of ionic species from the AAI with microbial envelopes. The technical designation for the reaction on the cell wall is **Electro Cell-Membrane Disruption (ECMD)**, a physical-mechanical phenomenon well described in the technical-scientific literature.

The combination of high ionic availability, alkalinity, modification of ionic strength, and interfacial phenomena generates a highly hostile physicochemical environment for microorganisms. In lay terms, this can be described as an **"ionic bombardment."** In scientific and regulatory documentation, it is more precisely described as an **intense ionic and electrochemical interaction at the water-microorganism interface.**



Alteration of Electrochemical Gradients

Disruption of transmembrane electrochemical gradients that regulate the cellular viability of the microorganism.



Osmotic Disorganization

Breakdown of osmotic equilibrium and disruption of membrane permeability and transmembrane ionic transport.



Structural Membrane Damage

Alteration of membrane proteins and structures, loss of cellular homeostasis, and consequent microbial inviability.



Technical Claim: The expression "electrocellular disruption" is used as a description of INTABIOTECH's technological model. Its mechanistic attribution is supported by specific experimental data: membrane permeability, membrane potential, ATP, microscopy, zeta potential, or other equivalent techniques.

The Electroporation Phenomenon and Industrial Application

05 · CELL DYNAMICS AND APPLICATION

The functional process water triggers an ionic bombardment on the bacterial cell membrane at a rate that **interferes with the microorganism's ability to regenerate the membrane** through peptidoglycan synthesis: it is destroyed faster than it can be repaired. The electroporation phenomenon simultaneously disrupts the cell's ability to equalize internal-external osmotic pressure, which is why the cell becomes disorganized and ultimately micro-fragments, making its continued existence and reproduction unviable.

This process has a defined window of action: the product treated with functional water **does not remain permanently protected**, as there is no barrier effect beyond the first 24 hours after application. This system enables a clean start with raw material in proper condition, but requires other complementary control systems or measures to prevent recontamination in order to provide extreme and prolonged process efficacy.

Technological Study Points in Poultry Processing

- Surface treatments of carcasses at specifically defined stages
- Washes following certain processing operations
- Stages prior to chilling
- Processing of cuts and pieces with technological justification
- Water circuits where the objective is to control microbiological pressure
- Other operations where water is a relevant vector for contamination transfer

Regulatory Classification

The main official regulatory agencies consider the preparation to be a **technological processing aid**, raising no objection to its use, primarily because the product itself does not come into contact with the meat or surfaces: it is the water, once transformed, that performs this function. This classification is perfectly compatible with the legal definition of a processing aid and presents no objection whatsoever regarding its safety, competence, efficacy, or harmlessness.



From the Laboratory to the Industrial Line

06 · INDUSTRIAL LEARNING

The experience accumulated through laboratory testing and industrial implementations has revealed an essential issue: **a good laboratory result does not automatically translate to a slaughter or processing line**. Industrial application transforms the technology into a process engineering problem. In real implementations at poultry plants, initially promising microbiological results were not reproduced with the same consistency when scaling up the system.

Process analysis showed that effectiveness depended not only on water preparation, but on how the water actually reached the carcass and was renewed during production. The identification of previously overlooked variables — which functioned as open doors to recontamination — proved decisive in optimizing the system.

Water & Contact

- Actual water-to-product ratio
- Effective contact time
- Full carcass coverage
- Renewal and organic load

Process & Line

- Application method
- System temperature
- Line speed
- Drainage and carryover

Incoming Water

- Hardness and composition
- Reliable pH measurement
- Verified conductivity
- Recontamination entry points

The goal is not to maximize the concentration of KNAMAX™, but to identify the **minimum conditioning condition capable of achieving a reproducible technological result** without affecting meat quality or process efficiency.

Control Through Measurable Parameters: the AAI Process Window™

07 · INDUSTRIAL CONTROL

Industrial Conclusion: KNAMAX™ is not presented as "a chemical + a dose," but rather as a **water conditioning and process control platform** whose efficacy depends on the combination of water + application point + contact + renewal + control.

Industrial implementation must move from nominal dosing to the control of objective variables. **Conductivity** is particularly valuable as a complementary parameter to pH, because it allows monitoring of ionic concentration and detection of changes due to dilution, renewal, or system load. The ultimate goal is to establish for each plant a **validated operating window —AAI Process Window™—** defined by measurable parameters correlated with microbiological results.

Control Block	Variables
Water	pH, conductivity, alkalinity, temperature, hardness, turbidity, ionic composition when applicable
Process	Flow rate, contact time, water/product ratio, pressure, coverage, renewal, organic load, line speed
Microbiology	Indicator and pathogen counts defined according to the study objective
Product Quality	Color, odor, texture, meat pH, drip loss, water holding capacity, shelf life when applicable

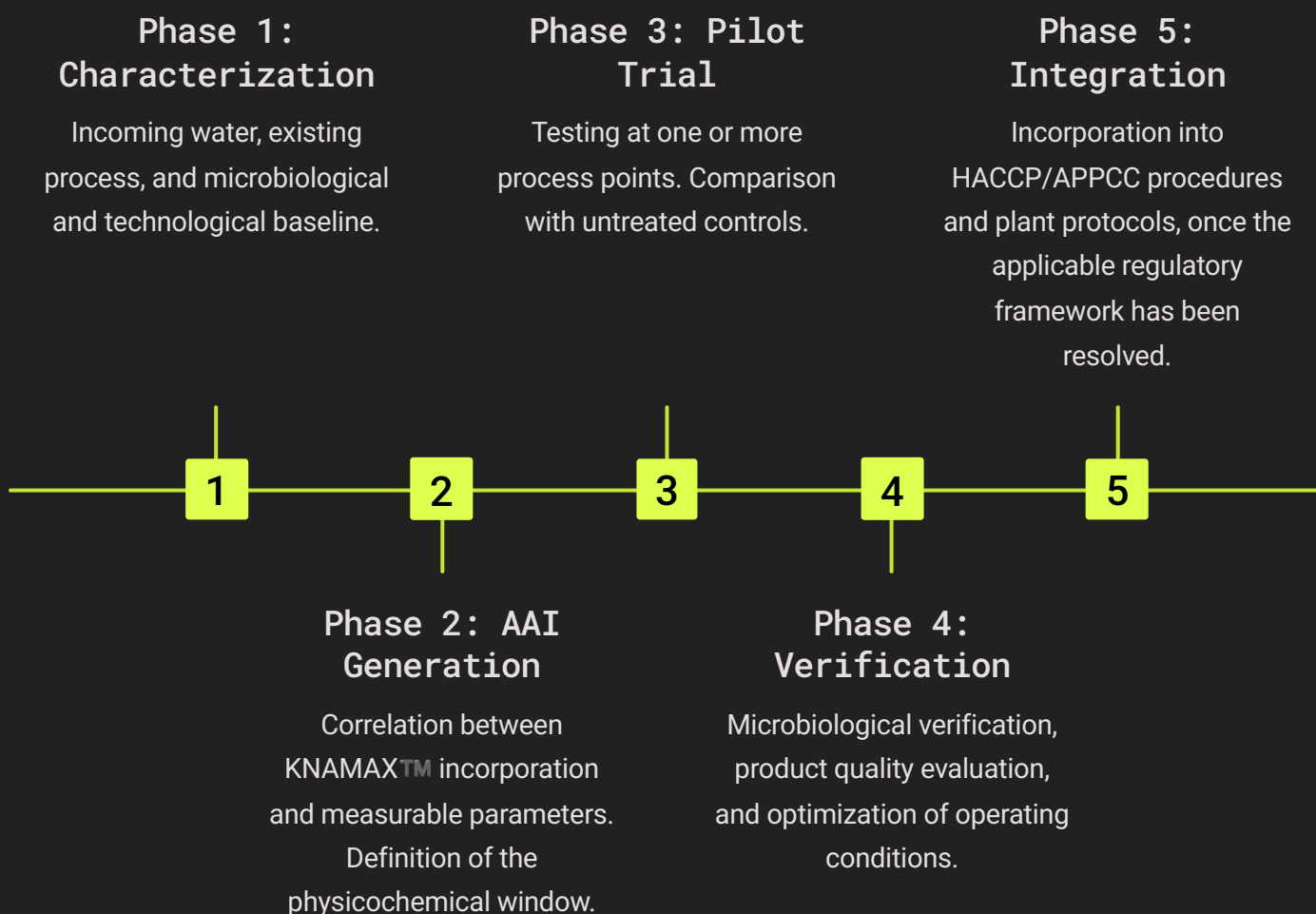
Industrial Validation Program

08 · PHASE-BASED IMPLEMENTATION

The incorporation ranges for KNAMAX™ correspond to the generation or conditioning phase of the process water, not to a concentration of product deposited on the meat. In development studies, conditions have been examined in a range of approximately 1% to 7%, with particular attention to intermediate ranges around 3.5–5%. These figures are development references and do not constitute a universal recommendation.

Important: The concentration of KNAMAX™ is a preparation variable for the AAI. It must never be communicated as a "concentration applied to the meat." This would be neither technically accurate nor regulatorily defensible.

INTABIOTECH proposes a phased implementation approach, so that efficacy and safety are demonstrated under the real conditions of each facility before proceeding to full integration into the plant's management systems.



Regulatory Positioning in the European Union

09 · LEGAL FRAMEWORK

Regulation must be analyzed from the actual function of the system and from the nature of the water that ultimately comes into contact with the product. The regulatory defense must not be based solely on the fact that the KNAMAX™ concentrate is incorporated into the water beforehand, but rather on the **true regulatory and legal support established by current legislation.**

Contact with Products of Animal Origin

Article 3.2 of Regulation (EC) No. 853/2004 establishes that food business operators shall not use substances other than potable water to remove surface contamination from products of animal origin, unless expressly authorized. KNAMAX™ acts at the prior stage of water conditioning, but the final aqueous medium, its composition, possible residues, and behavior at the point of use must be characterized.

Processing Aid

The functional architecture of KNAMAX™ presents elements compatible with the concept of a processing aid: use during processing, defined technological purpose, no intention of consumption as such, and no intended technological function in the final food product. Classification under Article 3.2(b) of Regulation (EC) No. 1333/2008 and Royal Decree 773/2023.

Nature of the Resulting Water

The assertion that the water legally maintains the status of potable water is supported by analytical characterization demonstrating compliance with applicable requirements at the exact point of use. The water remains overwhelmingly water — potable, drinkable, clean, and conditioned — with the ability to create a hostile environment for bacteria through a reactive physicochemical process.

Prior Interactions with Authorities

INTABIOTECH has a track record of technical and regulatory consultations from which it follows that the reactive concentrate for converting process water into AAI can undoubtedly be considered a **processing aid for manufacturing.**



Regulatory Uses and Legal Classification

10 · AUTHORIZED USES

KNAMAX™ has a multidimensional regulatory framework that allows its use in different functions, each with its own legal classification and specific conditions of application.

Human Food Use

Usable as an additive or additive-based preparation as defined in Regulation EC 1130/2011. Formulated from **E524 (sodium hydroxide)** and **E525 (potassium hydroxide)**, complying with the specifications of Regulation (EU) No. 231/2012. Use in accordance with Reg. EC 1333/2008.

Use in Biocidal Function

May be used as an adjuvant in the prevention of deterioration of food raw materials caused by microorganisms. **Exempt from Biocide Registration** in accordance with Art. 2, Paragraph 2, point f) of Reg. EU 528/2012. The product does not have sustained action over time.

Use as a Processing Aid

Technological processing aid in accordance with Annex VIII b of Regulation (EC) No. 889/2008 and Annex I of Royal Decree 640/2015. **Maximum verified residues: <0.0003% residual mineral salts.** May be omitted from label declaration when the conditions of Article 20 of Reg. (EU) No. 1169/2011 are met.

Limitation for Foods of Animal Origin

The classification of KNAMAX™ as a technological processing aid does not replace or exclude the specific provisions applicable to foods of animal origin. When the actual purpose is to eliminate or prevent surface contamination of a product of animal origin, Article 3.2 of Regulation (EC) No. 853/2004 must be specifically evaluated.

Use in Plant Protection Function

May be used for plant protection purposes. The individual components are considered **basic substances** under Art. 23 of Regulation EC 1107/2009 and Implementing Reg. EU 2015/2069. Exempt from prior authorization in accordance with Art. 28, 2, a) of Reg. EC 1107/2009.

Surfaces and Equipment

The treatment of food must be distinguished from the treatment of facilities. When the purpose is to disinfect surfaces, equipment, containers, or circuits related to food production, the applicable regulatory framework is different and must be specifically evaluated for each facility.

Secondary Applications and Sector Extension

11 · OTHER SECTORS

Although poultry processing is the primary application, the concept of **functional water engineering** can be explored in other sectors where water is a real part of the technological process. KNAMAX™ can be integrated with cleaning and disinfection systems and protocols already implemented and validated in the plant, without automatically assuming that both uses share the same regulatory classification.



Red Meat

Bovine, porcine, ovine, and other meat operations where controlled contact with water occurs during the process. Requires specific technical validation due to differences in matrix and process.



Fish and Seafood

A sector with high water-product interaction and its own microbiological control requirements. Requires independent development due to differences in matrix, regulation, and process temperature.



Processed Meat Products

Specific applications in the cutting and transformation of processed meat products, subject to technical and regulatory validation for each product and food category.



Other Industries

Processes in which water can be conditioned and used as a functional medium without intending any residual preservative action in the final food product. Requires case-by-case evaluation.

KNAMAX™ Value Proposition

12 · COMMERCIAL POSITIONING

Commercial Message: We don't start by asking what chemical we should put on the food. We start by asking **what process water can do if we turn it into a controlled technological variable**. This is the true revolution of the process water conversion system into functionalized water that KNAMAX™ provides.

Transform, Not Add

Transform process water instead of merely adding a conventional chemical treatment to the raw material.

Total Integration

Integrate water chemistry, process engineering, microbiology, and industrial control into a single technological platform.

Operational Windows

Define measurable operational windows instead of relying solely on a nominal dose without control of critical variables.

Plant Adaptation

Adapt the technology to each plant rather than forcing the plant to conform to a universal, inflexible recipe.

Quality Without Compromise

Achieve reproducible microbiological reductions without compromising the organoleptic quality of the raw material.

Regulatory Validation

Incorporate regulatory validation as an integral part of the implementation design, not as an afterthought.



Message Matrix – Usage Status

Message	Recommended Use	Status
"KNAMAX™ transforms process water into AAI."	Web / Commercial	✓ Usable
"The concentrate is not applied directly onto the meat."	Web / Commercial	✓ Usable, correctly describing the process
"Water intensely loaded with electrolytes."	Web / Technical	✓ Usable if supported by analytical data
"IONOPHORESIS™ / electrocellular disruption."	Technical / R&D	✓ Description of the technological model with mechanistic validation
"Instant sterilization."	Not recommended due to terminology	✓ Do not use without specific evidence and definition of conditions
"The water maintains the legal status of potable water."	Regulatory	✓ Usable with analytical / evidential support.

ITB Implementation Model

13 · METHODOLOGY

INTABIOTECH has developed an implementation model structured in seven sequential stages that ensures KNAMAX™ technology is integrated in a rigorous, verifiable, and adapted manner to the real conditions of each industrial facility. This model is not a rigid protocol, but rather an **adaptable process engineering platform** tailored to each plant and each process point.



CHARACTERISE

Characterize water, process, microbiological baseline, and plant constraints.
Identification of recontamination entry points.



TRANSFORM

Define the AAI preparation and the target physicochemical window.
Correlation between KNAMAX™ incorporation and measurable parameters.



APPLY

Select the optimal point of use, coverage, contact, flow rate, and renewal for the installation.



MEASURE

Monitor pH, conductivity, and other relevant process parameters continuously and in a documented manner.



VALIDATE

Demonstrate microbiological efficacy and compatibility with product quality through controlled trials.



OPTIMISE

Optimize water consumption, operation, cost, and industrial robustness within the validated operating window.



INTEGRATE

Incorporate the validated procedure into the plant's management system and its regulatory documentation (HACCP).

Final Positioning and Regulatory References

14 · FROM PRODUCT TO PLATFORM

KNAMAX™ must evolve from a **product to a platform**. Its true value lies not solely in the composition of the concentrate, but in the ability to control water chemistry, the method of application, the interaction with raw materials, and microbiological verification within a real industrial process.

The consolidation of KNAMAX™ as a technology platform involves integrating water engineering, process control, applied microbiology, and regulatory documentation into a single management system. None of these components can function independently if the objective is to guarantee reproducible and defensible results before the competent authorities.

Annex I — Working Regulatory References

Reg. (EC) No. 853/2004

Specific hygiene rules for food of animal origin, particularly Article 3.2 on decontamination substances.

Reg. (EC) No. 852/2004

On the hygiene of foodstuffs. General hygiene framework applicable to all food business operators.

Reg. (EC) No. 1333/2008

On food additives and the definition of processing aids. Primary framework for the positioning of KNAMAX™.

Reg. (EU) No. 528/2012

Concerning the making available on the market and use of biocidal products, including PT4. Relevant for registration exemption.

CJEU C-745/22 — Microos

Judgment of February 22, 2024. Relevant case law on the classification of products with antimicrobial activity.

Royal Decree 773/2023

Processing aids used in food manufacturing and production processes. Applicable national framework.

Royal Decree 3/2023

Technical and sanitary criteria for the quality of water intended for human consumption. Decisive for certifying that functionalized water maintains its status as drinking water at the point of use.

Reg. (EU) No. 231/2012

Specifications for the identity and purity of ingredients E524 and E525. Supporting the food-grade quality of the KNAMAX™ concentrate.

Commercial Contact

Let's talk? Our team is ready to assist you.



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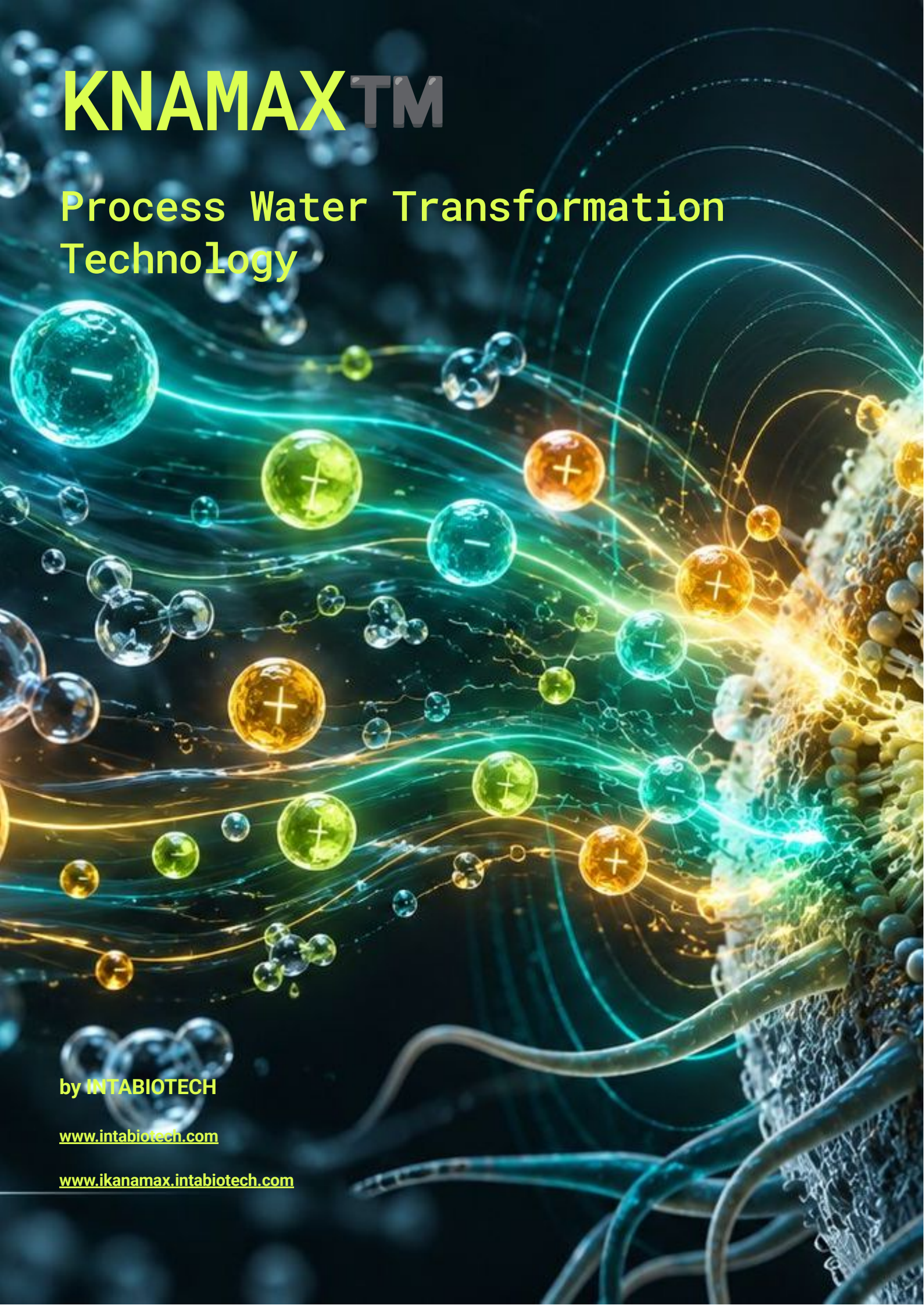
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KNAMAX™ | PROCESS WATER TRANSFORMATION TECHNOLOGY

Transform the Water. Control the Process.

The background is a dark, deep blue space filled with numerous glowing spheres of various sizes and colors, including teal, green, yellow, and orange. Some spheres have white plus or minus signs on them. Swirling around these spheres are thin, luminous lines of light in similar colors, creating a sense of dynamic energy and movement. On the right side, there is a more complex, textured structure that looks like a cluster of small particles or a biological growth, also emitting light.

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