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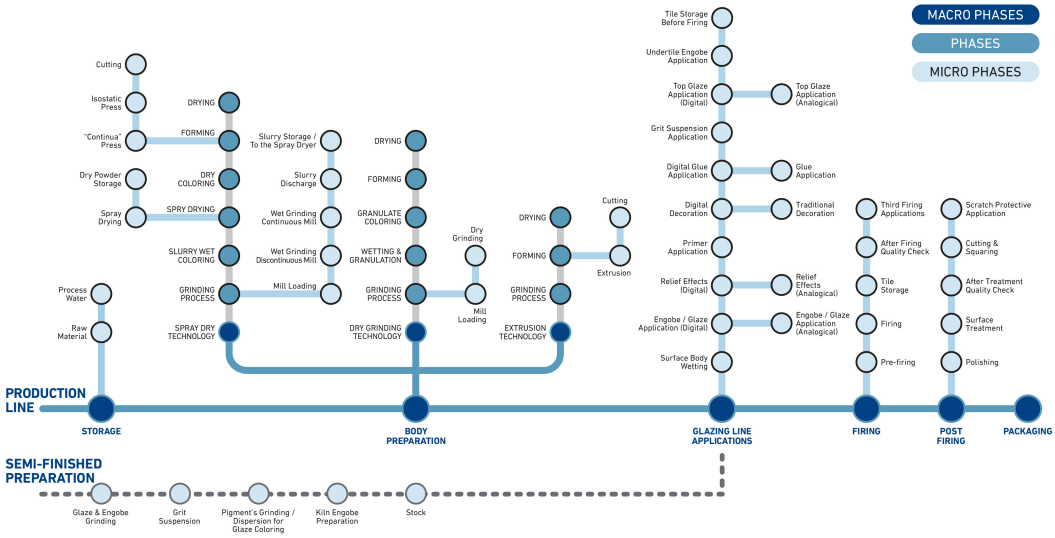
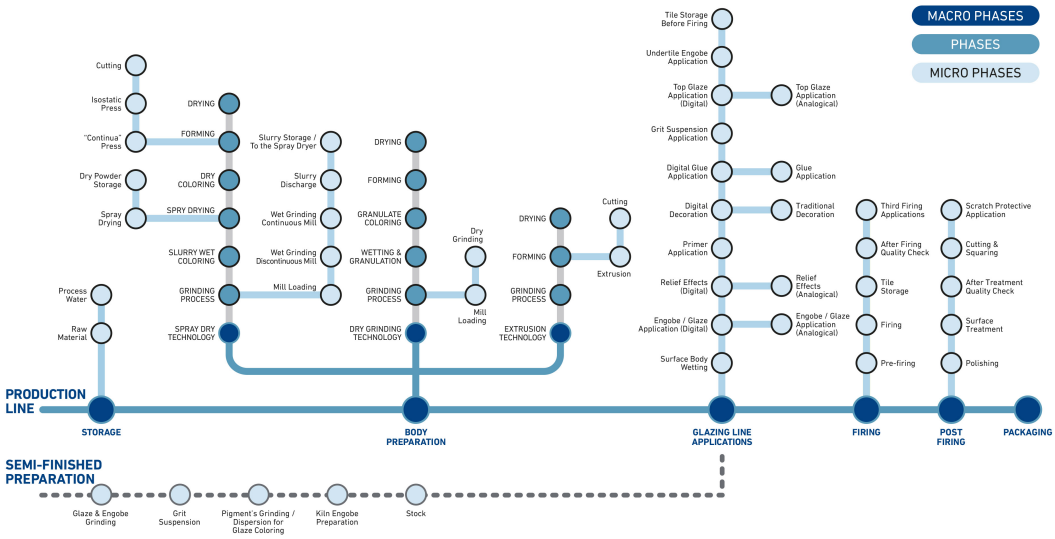
At every stage of the ceramic production process

A journey through problems & solutions



#53 CHEMISTRY-A.I. – CHEMISTRY SEEN THROUGH ARTIFICAL INTELLIGENCE. A GAME



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1. Introduction

This text is meant to be playful—and should be read that way.

As the Latin saying goes: “Semel in anno licet insanire”—once a year, it’s okay to go a little crazy.

After more than fifty podcast episodes and related articles on topics of shared interest, always guided by our two key words—chemistry and ceramic production—we decided to do something different: play a game. Using just a few simple prompts, we asked **artificial intelligence** to write a short piece about chemistry, giving it full freedom to choose the topics and decide what to highlight.
The result? Amusing—and at times, a bit bizarre. It’s accurate in parts, but certainly not all the way through.

As many know, **Large Language Models** (the technology behind text-generating AI tools) can produce content that sounds very convincing—often accurate, but not without mistakes or even plain clichés. Since these models pull from the vast content of the web, there’s always room for error.

As you read the following text—presented here in full and exactly as it was generated—it’s important to keep in mind that this is an experiment, and we stress again, a playful exercise.

The result is, quite clearly, incomplete and at times overly simplistic. We fully acknowledge its limitations and distance ourselves from its content. Still, we invite you to treat it not only as light reading, but also as a chance to spark thoughtful reflection. No matter your point of view.

2. The report

Chemistry is a fundamental science that explores the composition, structure, properties, and changes of matter. It plays a central role in many other fields—like biology, physics, medicine, engineering, and environmental science—because everything around us, including ourselves, is made up of chemical substances.

a) The importance of chemistry in everyday life

Chemistry is part of every aspect of our daily lives. From the food we eat to the air we breathe; everything is shaped by chemical reactions. Cooking, for example, is a complex chemical process involving Maillard reactions, fermentation, and other transformations that affect the taste and texture of food. Even our own metabolism is a continuous chain of chemical reactions that allows our bodies to extract energy from the nutrients we consume.

Note
The Maillard reaction is a chemical reaction between amino acids and reducing sugars that produces melanoidins—compounds responsible for the distinctive flavor and golden-brown color of many cooked foods. Searing a steak, frying dumplings, baking cookies or bread, toasting marshmallows, and cooking falafel are all examples of this reaction in action. It's named after French chemist Louis Camille Maillard, who first described it in 1912 while studying the biological synthesis of proteins.

In medicine, chemistry plays a vital role in the development of drugs, vaccines, and innovative therapies. Antibiotics, for instance, are chemical compounds that fight bacterial infections, while chemotherapy drugs are used to treat cancer. Thanks to chemistry, advanced diagnostic techniques such as MRI (magnetic resonance imaging) and PET (positron emission tomography) have been developed—essential tools for detecting diseases at an early stage.

b) Chemical in industrial productions

Industrial chemistry relies on a wide range of additives that enhance the properties of numerous products. Depending on the application sector, these additives serve specific functions, improving the quality, durability, and safety of materials.

Cosmetics
Chemical additives in cosmetics help stabilize emulsions, improve texture, and extend product shelf life. Preservatives like parabens prevent bacterial growth, while emollients and humectants—such as glycerin—keep the skin hydrated. Chemical sunscreens protect against UV rays, reducing skin damage.

Cleaning Products
In both household and industrial cleaning products, chemical additives play a crucial role. Surfactants, optical brighteners, enzymes, and synthetic fragrances enhance cleaning performance and surface disinfection. Sequestrant agents like sodium citrate prevent limescale buildup.

Ceramics
In ceramic production, additives improve clay workability, mechanical strength, and the glossiness of glazed surfaces. Deflocculants prevent particle clumping in the slurry, while fluxes aid in glaze melting.

Textiles
In textile manufacturing, chemical additives affect strength, breathability, and water repellency. Softeners and antistatic agents improve fabric softness and reduce dust attraction. Flame retardants enhance safety in case of fire.

Leather
Leather tanning is a chemical process that uses specific additives to achieve softness, durability, and water resistance. Chromium salts are commonly used in mineral tanning, while vegetable tannins are employed in more eco-friendly treatments.

c) Chemistry & environment

Another important area where chemistry has a major impact is environmental protection. Environmental chemistry focuses on the composition of air, water, and soil, studying sources of pollution and seeking ways to reduce their impact. Research in this field has led to the development of biodegradable materials, water purification processes, and CO_2 capture technologies.

Sustainable energy is another field where chemistry plays a crucial role. Lithium-ion batteries, used in electric vehicles and electronic devices, are the result of advanced chemical research. Likewise, solar panels and fuel cells rely on chemical principles to efficiently and cleanly convert solar or hydrogen energy into electricity.

d) Chemophobia: fear of chemistry

Although chemistry has brought enormous benefits to humanity, in recent decades a growing mistrust toward it has emerged. This fear, known as chemophobia, shows up in the negative perception of chemical substances, which are often seen as dangerous or artificial regardless of their actual properties. Why does chemophobia arise? Chemophobia has several roots.

Misinformation and fear of the unknown – Many people associate the word "chemical" with something artificial and harmful, forgetting that chemistry is part of nature itself. Even the most harmless substances, like water and oxygen, are chemical compounds.

Scandals and environmental contamination – Incidents like the Bhopal disaster, the use of DDT, and harmful additives have reinforced the belief that chemistry is a danger to health and the environment.

The trend toward all things natural – In recent years, the idea that "natural" products are automatically better than "chemical" ones has become widespread, ignoring the fact that many natural substances can be toxic (such as cyanide in bitter almonds or botulinum toxin).

e) Consequence of chemophobia

The irrational fear of chemistry leads to poor decisions in both consumer choices and legislation. The demonization of certain food and cosmetic additives—often without solid scientific evidence—has fueled the spread of so-called "chemical-free" products, a concept that makes no sense.

f) Chemistry & the future

Chemistry will continue to play a crucial role in the development of society. Research in green chemistry aims to reduce the use of toxic substances and develop more sustainable production processes. Artificial intelligence is revolutionizing the discovery of new materials and drugs, speeding up research and lowering costs.

Another promising field is nanotechnology, which uses materials at the nanoscale to create devices and substances with extraordinary properties. Nanotechnologies have applications in medicine, electronics, and materials engineering, leading to groundbreaking innovations.

In conclusion, chemistry is an essential science for understanding and improving the world around us. Thanks to progress in this field, we are better equipped to face global challenges such as climate change, disease, and environmental sustainability—paving the way for a safer, more prosperous future for the generations to come.