SCIENCE TECHNICS

Protease Blend for Soya Sauce ST & Soya Sauce Enzyme Blend ST

PRODUCT PRESENTATION

A sizeable market exists in South East Asia for enzymes to be used in the sauce industry

This includes soya sauce in

- Malaysia
- Singapore
- Indonesia
- Philippines

Extensive Studies On Industrial Enzymes

Science Technics Sdn Bhd has carried out extensive studies on how industrial enzymes (developed in the last 100 years) could be used to enhance the traditional processes for producing sauces.

These traditional methods were developed hundreds if not thousands of years ago.

Traditional Process For Producing Soya Sauce

Many different biochemical reactions occur. during soya sauce fermentation - some occur simultaneously, some in sequence, etc.

STEP 1

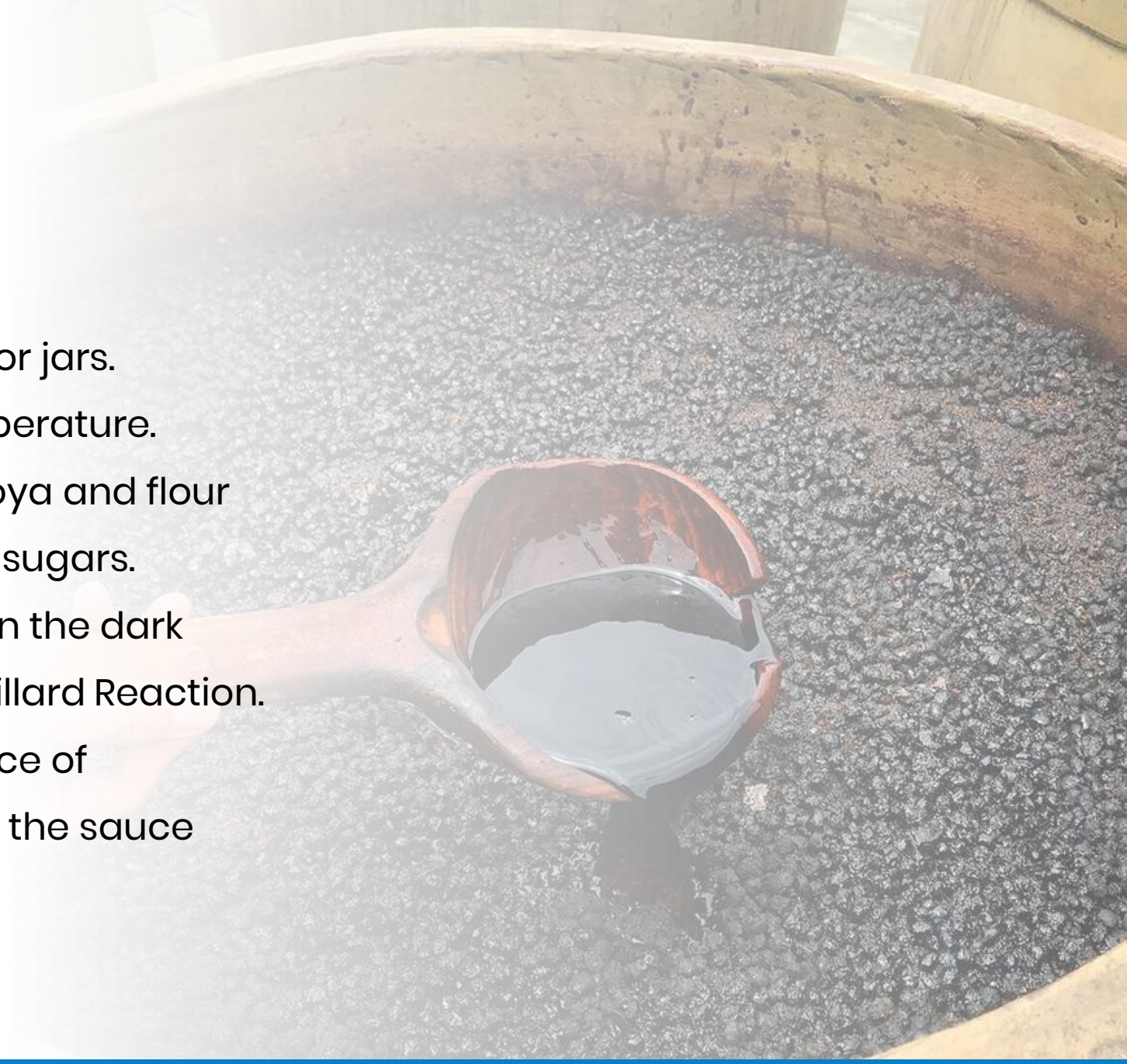
Koji Production

- Soya beans steamed and coated with wheat flour
- Aim: Create ideal conditions for fungal growth
- Cooled beans spread on trays
- Inoculated with Aspergillus oryzae culture
- Culture develops into a mat called koji (soya beans, wheat flour, fungal mycelium)
- Process takes several days
- Fungus produces enzymes (proteases and amylases) during mat formation.

STEP 2

Brine Fermentation

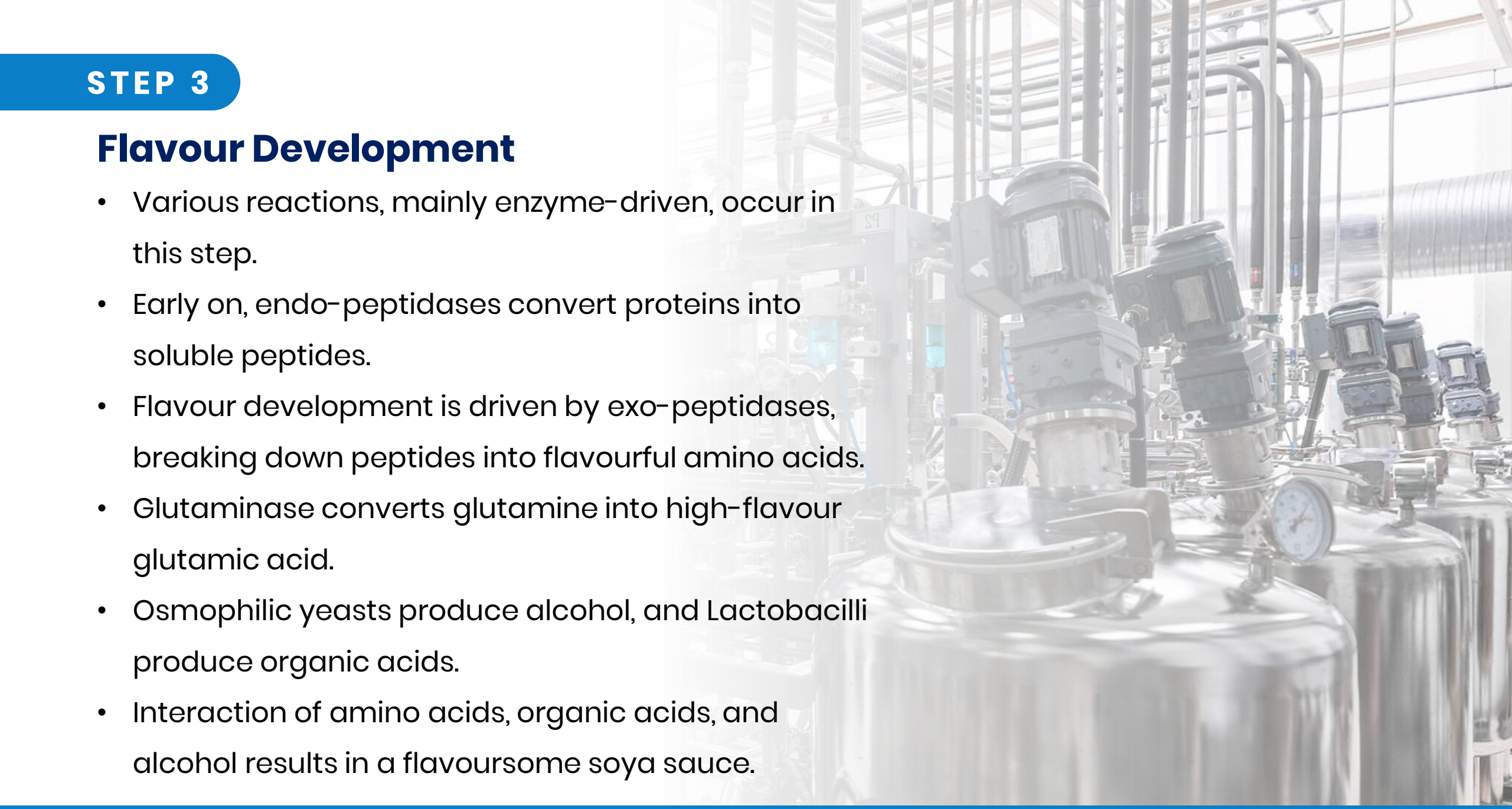
- Koji is mixed with brine in tanks, vats, or jars.
- Duration: A few months at room temperature.
- Fungal enzymes in koji break down soya and flour protein into peptides and starch into sugars.
- Peptides and sugars react, resulting in the dark colour of soya sauce through the Maillard Reaction.
- Periodic mixing promotes the presence of Osmophilic yeasts and Lactobacilli in the sauce from the surroundings.



STEP 3

Flavour Development

- Various reactions, mainly enzyme-driven, occur in this step.
- Early on, endo-peptidases convert proteins into soluble peptides.
- Flavour development is driven by exo-peptidases, breaking down peptides into flavourful amino acids.
- Glutaminase converts glutamine into high-flavour glutamic acid.
- Osmophilic yeasts produce alcohol, and Lactobacilli produce organic acids.
- Interaction of amino acids, organic acids, and alcohol results in a flavoursome soya sauce.

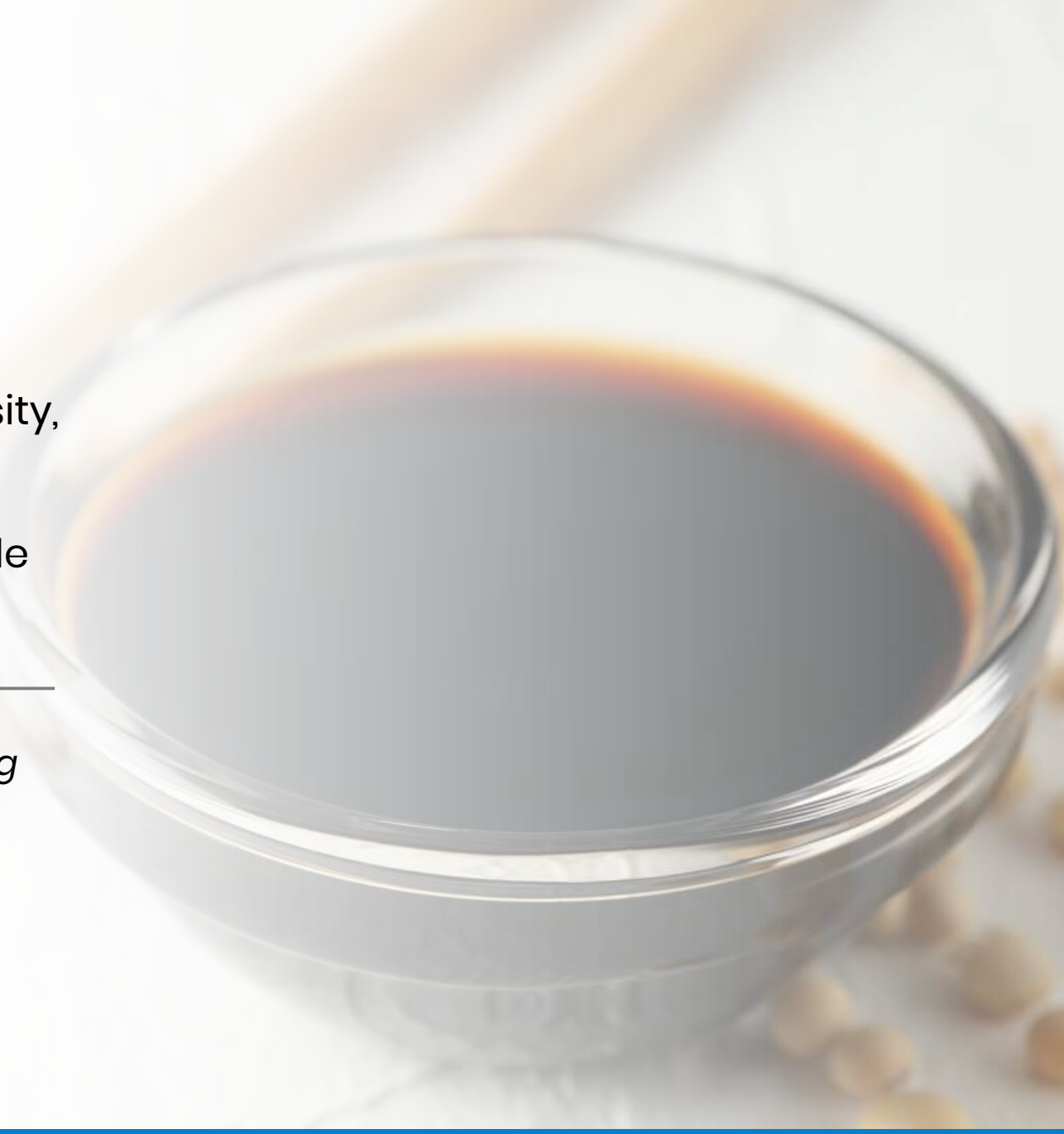


STEP 4

First Draw Soya Sauce

- When the flavour reaches the desired intensity, the first draw of the soya sauce is made.
- This draw is used to produce premium-grade soya sauce.

If the residue has high protein content after drawing soya sauce, the producer can add more brine for a second draw soya sauce.



STEP 5

Flavour Profile Adjustment

- The first draw soya sauce can have its flavour profile adjusted by the addition of sugar, syrups, caramel and other chemicals to give the final soya sauce for bottling and sale.

Summary of Soya Sauce Production

STEP 1

Koji Production

STEP 2

*Day 0

Addition of Koji into brine

STEP 3

*4-6 Weeks

Fermentation using Koji Enzymes

STEP 4

Addition of Protease Enzymes for Soya Sauce ST at dosage of 1 % on total weight of the soya sauce mash

i.e. 10g per litre

STEP 5

1 Month before Filtration of Soya Sauce

Add Enzyme Blend for Soya Sauce ST at dosage of 1 % of the soya sauce mash

i.e.10g per litre

Filter

STEP 6

Soya Sauce

Drawbacks Of The Traditional Process

- Aspergillus oryzae strain in the inoculum must maintain high enzyme production.
- Mutations can lead to a drop in enzyme levels.
- Reduced enzyme production results in poor solubilization of soya bean protein (typically 70-85%, sometimes less).
- Enzymes have low stability, especially in tropical conditions.
- Loss of enzyme activity over time affects flavour generation.
- Poor-quality soya sauce results from diminished enzyme activity, leading to low nitrogen (= protein) values.

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ENZYME BLENDS FOR PRODUCTION OF SOYA SAUCE

2 Different Types Of Protease Enzyme Are Required For The Production Of High Yield And High Quality Soya Sauce

Endo-Proteases

Endo-Proteases which hydrolyse and solubilize proteins from inside the protein chain to peptides. This increases the yield of protein and soya sauce but does not give a flavoursome product because peptides are not flavoursome.

Exo-Proteases

Exo-Proteases act on the short chain peptides from the end of the chain releasing single or double amino acids from the peptides. These single or double amino acids are responsible for the flavour of soya sauce

For Endo-Proteases

Science Technics Sdn Bhd offers

Protease Blend for Soya Sauce ST

For Exo-Proteases

Science Technics Sdn Bhd offers

Soya Sauce Enzyme Blend ST

Maintaining Koji Starter Culture

We are aware that most soya sauce manufacturers who produce soya sauce by fermentation inoculate the soya sauce with a koji starter culture which is a source of enzymes.

For this reason we recommend that this step is maintained.

Stability Of The Koji Enzymes

However the soya sauce fermentation in salt water brine and under tropical temperatures are conditions which are not good for the stability of the koji enzymes.

We estimate that after 4 – 6 weeks most of the koji enzymes would have been inactivated.

Use of Enzyme

Science Technics recommendation for use of enzymes in the production of soy sauce

It is summarized in the chart below

STEP 1

Koji Production

STEP 2

*Day 0

Addition of Koji into brine

STEP 3

*4-6 Weeks

Fermentation using Koji Enzymes

STEP 4

Addition of Protease Enzymes for Soya Sauce ST at dosage of 1% on total weight of the soya sauce mash

i.e. 10g per litre

+ Protease Blend for Soya Sauce ST

STEP 5

1 Month before Filtration of Soya Sauce

Add Enzyme Blend for Soya Sauce ST at dosage of 1% of the soya sauce mash

i.e.10g per litre

+ Soya Sauce Enzyme Blend ST

Filter

STEP 6

Soya Sauce

INTRODUCING SCIENCE TECHNICS

Protease Blend for Soya Sauce ST & Soya Sauce Enzyme Blend ST

PROTEASE BLEND FOR SOYA SAUCE ST

Protease Blend for Soya Sauce ST is a blend of proteases formulated to increase the solubilization of protein during the production of soya sauce

Appearance:
The product is a white powder of maltodextrin carrier in which the enzyme granules are dispersed.

Solubility:
The ingredients in the product are freely soluble in water.

Moisture:
The product has a maximum moisture content of 13%.

PROTEASE BLEND FOR SOYA SAUCE ST

Heavy Metal Content

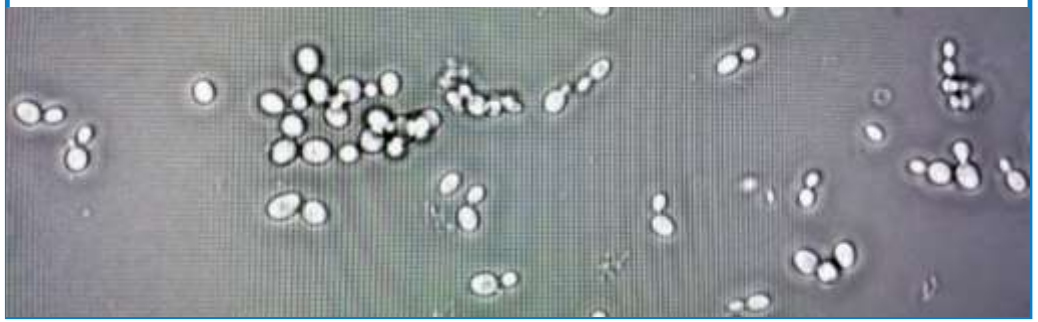
Protease Blend for Soya Sauce ST complies with Malaysian Food Laws with respect to heavy metals.

Typical Analysis:
Heavy Metal Limits
Lead: Max 0.5 mg/kg
Arsenic: Max 1 mg/kg
Cadmium: Max 1 mg/kg
Mercury: Max 0.05 mg/kg

Microbial Count

Protease Blend for Soya Sauce ST complies with FAO/WHO JECFA recommended specifications for food grade enzymes.

Maximum Limits:
Total Count: < 5 x 104 per gram
Moulds: <102 per gram
Coliforms: Absent in 25g
E.coli: Absent in 25g



PROTEASE BLEND FOR SOYA SAUCE ST

No Genetic Modification

No genetic modification technology is involved in the production of the enzyme component of Protease Blend for Soya Sauce ST.

nonGMO Product

The carrier used in production of Protease Blend for Soya Sauce ST is food grade non-GMO maltodextrin.

Protease Blend for Soya Sauce ST can therefore be described as a nonGMO product.

How To Use Protease Blend for Soya Sauce ST?

1

Soya sauce production is started as normal using soya beans, wheat flour and koji inoculum. This production continues till brine is added to the koji in jars or tanks.

2

After 1 month of brine fermentation it can be said that the koji enzymes would have been denatured.

3

At this stage (after 1 month of brine fermentation) Protease Blend for Soya Sauce ST is dissolved in a small quantity of water and added with mixing to the fermentation.

The dosage is 1% on total weight of the soya sauce mash.

4

This will increase the protein solubilization and protein content of the soya sauce.

SOYA SAUCE ENZYME BLEND ST

Soya Sauce Enzyme Blend ST is a blend of protease enzymes. The formulation is designed to enhance the final liquid fermentation of soya sauce. As a result more free amino acids are produced. This increases the umami flavour of soya sauce.

Appearance:
The product is a beige coloured powder. The active ingredients are enzymes of microbial origin.

Solubility:
The ingredients in the product are freely soluble in water.

How To Use Soya Sauce Enzyme Blend ST?

1

Soya sauce Enzyme Blend ST is recommended to be added to the liquid stage of soya sauce production.

2

1 month before final filtration, Soya Sauce Enzyme Blend ST may be dissolved into the brine solution.

3

Typical dosage is 1% of the soya sauce mash.

4

This increases the umami flavour of soya sauce.

Packaging & Storing of Protease Blend for Soya Sauce ST & Soya Sauce Enzyme Blend ST

Packaging

10kg plastic-lined carton boxes.

Storing

- Should be stored in a dry place and cool.
- Storage in an air-conditioned room is recommended.
- The product has an overfill and when stored in an air-conditioned room. It has a shelf life of 12 months from production date.
- Storage under direct sunlight or in hot rooms or warehouses may result in a shorter shelf life.

DEMONSTRATE THE EFFICACY OF SOYA SAUCE ENZYME BLEND ST IN IMPROVING THE FLAVOUR OF SOYA SAUCE

Procedure

1. Obtain 1 litre of first draw soya sauce
2. Divide into two portions of 500ml each
3. Add to two separate glass/plastic bottles
4. To one bottle (A) add 5g of Soya Sauce Enzyme Blend ST. Mix to dissolve enzymes.
5. The second bottle (B) is the control
6. Leave the two bottles (closed) at room temperature for 1 week for the enzyme to work.
7. At the end of one week do a sensory evaluation test comparing the two bottles.

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THANK YOU