“Innovation for quality control of grains and flours”
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Functionalities of flours | Analysis of flours

**Description and advantages of the equipment**

- By eliminating all causes of variations caused by manual operations, the SRC-CHOPIN achieves results **up to 5 times more accurate.**
- The SRC-CHOPIN **simplifies** testing by automatically performing each step of the method, from recording the weight of the flour to calculating and displaying the results.
- Thanks to the automation of the testing, the SRC-CHOPIN **only requires an operator for approximately 10 minutes per test,** compared with 45 minutes with the manual method.
- The SRC-CHOPIN allows **8 samples to be analyzed simultaneously,** giving a choice of possible combinations from 1 to 8 flours, and 1 to 4 solvents.
- The SRC-CHOPIN is a **complete system;** it integrates a balance, a shaker, a centrifuge, a draining system for the supernatant and a touch screen control.

**Principle of the method**

The SRC (Solvent Retention Capacity) method is a measure of hydration based on the increased swelling capacity of the flour's different polymers when brought into contact with certain solvents – distilled water, 5% lactic acid (to measure the glutenins), 5% sodium carbonate (to measure the damaged starch) and 50% sucrose (to measure the pentosans). These solvents are used to predict the functional contribution of each of the polymers to the quality of the flour.

[Kweon, Slade & Levine, 2011] *

The different steps of the method are: preparation of samples, solvation, shaking, resting, centrifugation, draining the excess of supernatant, weighing and displaying the results.

To find out more +

[Image -0x444 to 595x819]

[QR Code]
The SRC-CHOPIN automatically, simply and very accurately measures the solvent retention capacity of flours.

Applications of the method*

**Breeding**
- Carry out the test on ground wheat (20g only), predicting the SRC values of white flour,
- Complete the results of other pre-existing methods (Mixograph, Zeleny Test, Farinograph...).

**Milling**
- Optimize wheat tempering and the quality of flour,
- Determine blends to meet specifications: SRC values follow the blending law,
- Evaluate the effects of chlorination processes on the quality of the flour.

**Baking**
- Write simple specifications: for example, for cookies and crackers: SRC-water < 51%, SRC-lactic acid > 87%, SRC-sodium carbonate < 64%, and SRC-sucrose < 89%,
- Anticipate the volume of final products: for example, the higher the value of SRC-lactic acid, the greater the volume of bread,
- Anticipate the bread crumb structure: high SRC-lactic acid, SRC-sucrose and SRC-sodium carbonate values lead to a hard crumb.

*List of studies available at www.chopin.fr/en

**Complementarity with rheological analysis**
Rheology devices, such as the Alveograph, measure the combined effects of different functional polymers of flour. The SRC method provides an analysis, and therefore a better understanding, of individual contributions from each of these principal polymers (damaged starch, glutenins and pentosans) with regards to the final characteristics of the dough.

For example: in biscuit factories, manufacturers want minimum water absorption, and particularly the lowest possible contribution of absorption in correlation to the damaged starch or pentosans.

SRC and rheological analysis provide fully complementary information to enhance the understanding of the behavior of flour and dough.
Alveograph

**Principle**

The Alveograph measures the visco-elastic properties of wheat flours. The test consists of producing a test piece of dough, which, under air pressure, turns into a bubble. This expansion mode reproduces the deformation of the dough, under the influence of a surge of carbon dioxide during fermentation.

The test provides 4 key values:

- The P value represents the tenacity of the dough, meaning its aptitude to resist deformation,
- The L value corresponds to the maximum volume of air that the bubble can withhold and indicates the extensibility of the dough,
- The I.e. value corresponds with the index of elasticity,
- The W value indicates the baking strength of the dough.

**Applications**

The new AlveoPC uses software with a simple, modern and intuitive interface. It allows the visco-elastic properties of wheat flours to be measured at constant hydration (50% b15). It is adapted for the following applications:

- Select, characterize and classify wheat and flour in relation to their future usage,
- Detect insect contaminated wheat,
- Define and optimize blends of wheat and flour,
- Select the most appropriate additives to improve the quality of finished products,
- Verify how well the products conform to their specifications,
- Analyze the effects of salt content on dough properties,
- Analyze the effects of adding gluten, protease or deactivated yeast on the visco-elastic properties of the dough.

**Measure the tenacity, extensibility, elasticity and baking strength of flours using an internationally recognized reference**

**Benefit from a standardized analysis (AACC 54-30.02, ICC 121, NF EN ISO 27971) for commercial transactions**

**Make the most of the know-how of CHOPIN Technologies' expertise for flour analysis, acquired over more than 90 years**
• Measure water absorption, tenacity, extensibility, and baking strength of flours using an internationally recognized reference
• Measure the plastic qualities of wheat and flour under constant or adapted hydration
• Evaluate the behavior of dough during mixing
• Benefit from a standardized analysis (AACC 54-30.02, ICC 121, NF EN ISO 27971) for commercial transactions
• Modify the test parameters to create personalized protocols
• Work in a completely controlled environment (temperature and humidity)

Description and advantages of the equipment

The Alveolab benefits from the know-how of CHOPIN Technologies’ expertise for flour analysis, acquired over more than 90 years.

• Use universally recognized values (P, L, W, i.e.),
• Thanks to the automation of various steps of the test, and the control of the equipment via user friendly software, the test is even easier to carry out,
• Thanks to the automatic regulation of temperature and humidity in the test compartment, the results are independent of environmental conditions, and are therefore more accurate,
• With the Alveolab, it is now possible to increase the number of tests done per day, and therefore to maximize the return on investment,
• With the help of dedicated protocols, the equipment analyzes all types of wheat (soft, hard, durum) under optimal conditions that correspond to their utilization in the industry.

To find out more +
**The Alveograph’s most recent development**

The CHOPIN Alveolab now benefits from some key innovations, making the Alveograph test more accurate and easier to conduct.

- **Automatic calibration** of the pump allows the operator to save time and ensure constant precision,
- During mixing, **water** is now **added automatically** and very accurately,
- The use of **new accessories**, such as resting plates with the anti-adhesive coating and the semi-automatic cutter, create a better preparation of dough test pieces,
- The **positioning** and the **blowing** of dough test pieces are now **automated**, and carried out in a temperature and humidity controlled environment,
- **The inverted bubble** is more spherical and closer to the ideal conditions of the test.

Another important innovation is the control software. It is simple, complete and intuitive, and allows the user to delve even further into the analysis of the results.

- Thus, **new parameters** such as 1st derivative, stress/strain parameters and consistency of the dough during mixing, are now available,
- An **improver guide** allows the user to choose the most appropriate additive to obtain target alveographic values. Furthermore, a new function helps to optimize wheat and flour blends,
- It is also possible to **develop new protocols**. For example, by varying the intensity and the duration of the mixing, it makes the alveographic analysis even more predictable of flour performance.

**Applications**

The Alveolab is also perfectly suited to carry out the applications detailed on page 6.

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Measure the visco-elastic properties of wheat flours with the internationally recognized reference.
<table>
<thead>
<tr>
<th>Protocol</th>
<th>Alveolab</th>
<th>Alveo PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alveographic Analysis – standard protocol at constant hydration (50% b15)</td>
<td>Value P determination ●</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>Value L determination ●</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>Value P/L determination ●</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>Value W determination ●</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>Value I.e. determination ●</td>
<td>●</td>
</tr>
<tr>
<td>Alveographic Analysis – calculation of new parameters</td>
<td>Stress/strain ●</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1st derivation ●</td>
<td>-</td>
</tr>
<tr>
<td>Alveographic Analysis</td>
<td>Degradation protocol ●</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>Relaxation protocol ●</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Hybrid protocol ●</td>
<td>-</td>
</tr>
<tr>
<td>Measure of consistency during mixing</td>
<td>●</td>
<td>-</td>
</tr>
<tr>
<td>Consistograph Analysis</td>
<td>●</td>
<td>-</td>
</tr>
<tr>
<td>Alveographic Analysis – protocol at adapted hydration</td>
<td>●</td>
<td>-</td>
</tr>
<tr>
<td>Creation of new specialized protocols (mixing speed, duration, etc.)</td>
<td>●</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test</th>
<th>Integrated Peltier effect</th>
<th>Water (cryostat or tap)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric maximum consumption</td>
<td>2200W/h</td>
<td>1250W/h</td>
</tr>
<tr>
<td>Calibration of the pump (92/60)</td>
<td>Automatic</td>
<td>Manual</td>
</tr>
<tr>
<td>New generation</td>
<td>Aluminum/Stainless steel dough trough</td>
<td>●</td>
</tr>
<tr>
<td>Adding of water</td>
<td>Automatic</td>
<td>Manual</td>
</tr>
<tr>
<td>Regulated water temperature</td>
<td>●</td>
<td>-</td>
</tr>
<tr>
<td>Semi-automatic cutter</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Anti-adhesive resting plates</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Resting chambers</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Positioning and squashing of test dough pieces</td>
<td>Automatic</td>
<td>Manual</td>
</tr>
<tr>
<td>Type</td>
<td>Automatic</td>
<td>Manual</td>
</tr>
<tr>
<td>Analysis zone with regulated temperature and humidity</td>
<td>●</td>
<td>-</td>
</tr>
<tr>
<td>Bubble</td>
<td>Inverted</td>
<td>Upright</td>
</tr>
<tr>
<td>Temperature</td>
<td>15-28°C</td>
<td>18-22°C</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>15-90%</td>
<td>50-80%</td>
</tr>
<tr>
<td>Average number of tests in 8 hours (1 operator)</td>
<td>20</td>
<td>12</td>
</tr>
</tbody>
</table>

| Software                                                             | Multilingual              | ● | ● |
| Control of the test                                                 | ● | - |
| Data acquisition in real time                                       | ● | ● |
| Automatic save and archive                                          | ● | ● |
| Comparison                                                           | ● | ● |
| Automatic creation of certificate of analysis                       | ● | ● |
| Improver guide                                                      | ● | - |
| Help in managing blends                                             | ● | - |
| Virtual store                                                       | ● | - |
| Histogram (record of past performance)                              | ● | - |
| Control card for the equipment                                      | ● | - |

Behavior during mixing | Analysis of dough
**Mixolab 2**

**Principle and advantages**

The Mixolab measures the consistency of dough responding to the double constraint of mixing and an increase in temperature. It analyzes the quality of protein and starch from a sample of 50g of flour.

**Complete** - Use the only standardized instrument giving a complete analysis of dough subject to temperature increase

**Versatile** - Easily design customized protocols to test different cereals, wheat flours or dough sampled directly from the production line

**Simple** - The analysis is completely automated and the “Profiler” system simply characterizes products according to six quality criteria

**The Mixolab has 3 main features:**

**The Standard Mixolab** - The “Chopin +” standard protocol gives a complete analysis of flour in 45 minutes and 5 phases.

**Mixolab Profiler** - The integrated software measures all the parameters on the standard curve, and transforms them into six qualitative indexes: water absorption, behavior during mixing, gluten strength, maximum viscosity, amylase activity and retrogradation.

**Mixolab Simulator** - The Simulator protocol gives a theoretical Farinograph® curve and provides results that can be directly compared with the Farinograph®; Hydration, Development time, Stability, and Weakening.
The Mixolab determines the complete qualitative profile of flour (protein network, starch, enzymatic activity) by simulating the conditions of the manufacturing process.

**Applications**
The Mixolab can analyze flour, ground grain or dough directly sampled from the production line. It also offers extraordinary flexibility and provides relevant information on a wide range of applications: soft wheat, durum wheat, barley, rye, rice, corn, quinoa, cassava, etc. The equipment allows the user to develop formulations by evaluating the effects of additives (gluten, protease emulsifiers, lipases, cysteine, amylases, etc.) and ingredients (salt and substitutes, sugar and fatty substances, etc.). It is also possible to develop bread-making prediction models. It is also extremely helpful in the development of products that are rich in fiber and/or gluten-free.

**The 2nd generation of Mixolab**

An innovative, reliable and efficient instrument
- Very accurate automatic regulation of the temperature of the dough mixer (max: 90°C),
- Dual-component aluminium/stainless steel dough mixer, which is robust and easy to clean,
- Easy to extract water tank for quick and easy cleaning,
- Water added automatically, quickly and very accurately (+/- 0.02ml). Possibility to add water in different fractions (pump capacity: 75ml),
- Full calibration on all the measurement points on the Chopin+ curve (temperature and torque) for greater analysis precision.

Simple, complete and intuitive software
- Temperature stability index, evaluating the dough's resistance to temperature increase (in addition to the traditional mixing stability value),
- Possibility to carry out protocols while simultaneously varying the temperature (max: 90°C) AND the mixing speed (max 250rpm), for example, to mimic a resting phase,
- "Blending law" function to create and save theoretical curves corresponding with researched blends,
- "Additive effect" function to directly visualize the optimum amount of additive to use,
- Function creating automatic calculations at the end of the test, displaying the results of "predicted formulas" such as bread volume,
- Integrated "control card" menu to follow the precision of the equipment,
- Automatic test to determine flour hydration in less than 8 minutes.

The 2nd generation of Mixolab applications manual is available on our website www.chopin.fr/en
**Rheo F4**

**Principle and advantages**

- The **volume of finished products** depend on both the quantity of carbon dioxide produced by the yeast, and the ability of the dough to retain this gas while it continues developing.

- The Rheo F4 offers a **complete study of the fermentative capacity of flours** by measuring the production of carbon dioxide and the volume of the dough, as well as its porosity and its tolerance throughout fermentation.

- The equipment evaluates short or long fermentation thanks to the easy customization of the protocol.

- The Rheo F4 is controlled by simple and intuitive PC **software**. In a few clicks, a test is started. The analysis is then completely **automated**.

- The results can be easily compared to a reference, and printed in the form of a certificate of analysis.

**Method and results**

The Rheo F4 test creates two types of curve:

1. A **dough development curve**, indicating:
   - The maximum development (Hm) reached by the dough, correlated with bread volume,
   - The time required for maximum development (T1), in relation to yeast activity,
   - The relative stability time at the maximum point (T2-T’2) in relation to tolerance of the dough and the optimum time for loading the oven.

2. A **gas production curve**:
   - The total quantity of gas produced (linked to yeast activity and substrate availability),
   - The amount of carbon dioxide that the dough loses during fermentation, directly linked to dough porosity, which is more or less precocious (Tx) and closely linked to the quality of the protein network.