RESOLUTION OIV-OENO 482-2013

MONOGRAPH ON NANOFILTRATION MEMBRANES

THE GENERAL ASSEMBLY,

In view of article 2, paragraph 2 iv of the agreement of 3rd April 2001 establishing the International Organisation of Vine and Wine;

CONSIDERING the work of the “Technology” expert group on the use of ultrafiltration membranes;

CONSIDERING resolutions OIV-OENO 373A-2010 and OIV-OENO 373B-2010 adopted in 2010 on the application of membrane techniques in musts or in wines;

CONSIDERING resolutions OIV-OENO 450A-2012 and OIV-OENO 450B-2012 adopted in 2012 on the reduction of the sugar content in musts through membrane coupling combining microfiltration or ultrafiltration with nanofiltration or reverse osmosis;

Following the proposal by the “Specifications of oenological products” expert group;

DECIDES to add the following monograph to the “International Oenological Codex”:

NANOFILTRATION MEMBRANES

1. OBJECT, ORIGIN AND SCOPE OF APPLICATION

Membranes belonging to the family of semi-permeable membranes, these can be homogenous or composite membranes and are generally organic; they may have a spiralled or "spiral-wound", flat sheet or "frame and plate", tubular or hollow fibre configuration.

Nanofiltration is a membrane technique under pressure that covers a separation scope between reverse osmosis and ultrafiltration, enabling the separation of molecules in solution at less than approximately 2 nm. Most of the membrane materials used in nanofiltration have surface charges that play a part in the separation of ionic species, thus the selective retention of multivalent ions compared with monovalent ions can be obtained.

Generally, the MWCO (Molecular Weight Cut Off) of separation for organic compounds varies from 150 to 500 $g{\cdot}mol^{-1}$ (150 to 500 daltons) to a maximum of 2000 $g{\cdot}mol^{-1}$ (2000 daltons).

The transfer selectivity of the solutes through the membrane is generally expressed by

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their retention rate (= [1- (final conc. / initial conc.)] x 100).

2. PROCEDURE PRINCIPLE

This is a physical method of removing a portion of the solvents (water and alcohol) and very low molecular weight compounds from the must or wine (close to the cut off) using a semi-permeable membrane driven by a pressure gradient at ambient temperature and without changing or altering its state.

The process is carried out as a tangential flow.

The apparatus may consist, for example, of a high pressure pump (e.g. from 2 to 8·104 Pa or 20 to 80 bars) used to overcome the osmotic pressure, a membrane block and monitoring equipment, such as a flowmeter, pressure indicator and controller, etc.

3. COMPOSITION

All the equipment used in the procedure conforms with regulations relating to equipment in contact with food (pipes, pumps, monitoring equipment, joints, etc.).

These membranes are usually prepared through in situ polymerisation of a polymer on the surface of a porous substrate. The thin layer serves as the discriminating membrane, while the porous substrate acts as the physical support.

For example, the main organic polymers used may include cellulose acetate and polyamide, etc.

As an example, the structural formula of the polyamide base is as follows:

4. LABELLING

The main characteristics should be indicated on the label, particularly the batch number.

5. MANUFACTURE

Through a number of procedures, it is possible to obtain a whole range of pore sizes, from tangential microfiltration to the dense membrane of reverse osmosis.

The final characteristics (thickness, porosity, pore size, internal structure) of the membrane depend on a great number of parameters (choice of ternary solvent/polymer/non-solvent, composition of collodion, addition of porogenes, operating conditions - temperature, casting speed, diameter/thickness of the collodion, etc.)

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6. MEMBRANE CLEANING

The user may use inorganic products authorised according to regulations, provided that the operation ends by rinsing with water so as to completely remove the cleaning product before adding the must or wine.

7. LIMITS

- All the equipment in contact with food products must comply with the standards in force.
- There should be no noticeable change in the organoleptic characteristics of the processed must or wine.

Any potential release of the product or derivative comprising the membrane must comply with the current specific migration standards for the various constituents of the equipment.

8. SPECIAL RESTRICTIONS

The membrane must meet the regulatory requirements for equipment in contact with food.

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