**APPLICATION**

*PN4™* was isolated and selected by the Institute of San Michele in Trentino, Italy. This wine bacteria has the capacity to achieve malolactic fermentation for red and white wines in limiting conditions for pH, alcohol, SO₂ and temperature. In red wines, *PN4™* is recognized to highlight spiciness and structure; in traditional white wines, it will contribute to buttery flavor and mouthfeel, which will support the integration of oak.

**PROCESS**

The 1-Step® starter kit is a highly efficient starter culture to promote malolactic fermentation (MLF) of most red and white wines, in a wide range of oenological conditions. The 1-Step® starter kit consists of a malolactic active freeze-dried *Oenococcus oeni* and specific activator. The excellent activity and high vitality of the 1-Step® starter culture is achieved during a short acclimatization step that activates their metabolism to induce a fast onset of malolactic fermentation.

**MICROBIAL AND OENOLOGICAL PROPERTIES**

- pH tolerance > 3.1
- Alcohol tolerance: up to 15.5 % vol.
- SO₂ tolerance: up to 60 mg/L total SO₂
- Pay attention to molecular SO₂ at low pH
- T° tolerance > 16°C
- Moderate nutrition demand
- Good implantation
- MLF kinetic: Fast
- Low volatile acidity production
- No production of biogenic amines
- Co-inoculation possible

**SENSORY PROPERTIES**

Beyond bio-deacidification, *PN4™* is a true winemaking agent, which contributes to the sensory complexity and the quality of wine as follows:

- Buttery impact (Diacetyl production):
  - Moderate to high in Sequential Inoculation
  - Low in Co-inoculation
- Banana and honey structure
- Barrel fermented structure
- Varietal aromas
- Structure increases general perception of fruitiness

This sensory contribution can be further supported by the combination with an appropriate selected yeast and timing of ML bacteria inoculation.
INSTRUCTIONS FOR USE

SEQUENTIAL INOCULATION (Post-alcoholic fermentation)

1) Mix and dissolve contents of the activator sachet in drinking water (temperature between 18 and 25°C) according to the table below (1 in table).

<table>
<thead>
<tr>
<th>1-Step Kit</th>
<th>Volume of drinking water (L)</th>
<th>Volume of wine (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>For 100hL</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>For 500hL</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>For 1000hL</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

2) Add content of the lactic acid bacteria sachet and dissolve carefully by gently stirring. Wait for 20 minutes.

3) Add to this suspension the appropriate volume of wine (see table above; 2) pH > 3.5, total SO$_2$ < 45 ppm, no free SO$_2$ (temperature between 18 and 25°C). Wait for 18 to 24 hours. If malic acid content is < 1.2 g/L, wait only for 6 to 10 hours.

4) Transfer the activated malolactic bacteria starter culture into the wine according to the volume indicated on the kit.

Recommended temperature range:

- White wine / rosé wine: from 16 to 20°C.
- Red wine: from 17 to 25°C.

If limiting conditions (high alcohol > 14.5% vol, or low pH < 3.1, or high SO$_2$ > 45 ppm): from 18 to 22°C, check malolactic fermentation activity (malic acid degradation) every 2 to 4 days.

CO-INOCULATION

(Simultaneous alcoholic fermentation)

The 1-Step® activator and lactic acid bacteria can be used in co-inoculation without waiting 24 hours when the conditions and must are suitable (pH > 3.4 and sulphite addition to the grapes < 8 g/hL).

1) Mix and dissolve content of the activator sachet in drinking water (temperature between 18 and 25°C) according to the table below.

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</table>

2) Add content of the lactic acid bacteria sachet and dissolve carefully by gently stirring. Wait for a maximum of 2 hours.

3) Transfer the rehydrated mix (activator and lactic acid bacteria) into the fermenting must/wine 24 hours after the yeast is added.

4) Check malolactic fermentation activity (malic acid degradation) every 2 to 4 days, as well as volatile acidity.

In the case of must with pH < 3.4 or sulphite addition > 8 g/hL, it is recommended to use the 1-Step® activator and lactic acid bacteria after alcoholic fermentation.

Recommended temperature range:

Carefully monitor must temperature, which must be below 30 °C at lactic acid bacteria inoculation (alcohol < 5% vol) and below 27°C when the level of 10% of alcohol is reached.