Valorisation of olive mill effluents by recovering high added value bio-products

A pilot plant for the valorization of olive mill wastewaters by recovering of water, extraction of high value bio-molecules and production of biogas

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LAY-OUT the plant is near the olive oil mill

CAPACITY 1 m³/h
IN THIS PHASE IS AIMED TO REMOVE **OIL AND SOLIDS** AS THEY WOULD CREATE PROBLEMS IN THE MEMBRANE FILTRATION PHASES.

THE AIM IS TO **INCREASE THE PERMEABILITY AND REDUCE THE MEMBRANE FOULING**.
The combined action of a current of compressed air and of the addiction of flocculants and coagulants determines the separation of:

- sedimentable solids (bottom)
- suspended solids and oil (top).
2 functions: remove solids from the effluent (after the flotation) and reduce the water content in the sludges (separated in the flotation and in the centrifugation phases), which are then added to the pomace.

A software manages the different flows that feed the decanter.
The clarified effluent, after the decanter, is further centrifuged in a vertical centrifugal separator with high rotation speed, in order to remove the less sedimentable solid component.

It is equipped with a timed discharge device, which discharge the solids automatically at 5’ intervals.

The separated solid component is added to the pomace.
In order to reduce the turbidity and eliminate any colloidal solids which may be remained suspended, the effluent is filtered in a filter press on a siliceous filter aid.

The OMWW is pumped within plates covered with filtering cloths, on which the diatomaceaous filter aid is stratified.

The pre-treated OMWW are sent to the membrane filtration section.
6 vessels with 1 membrane 8” each vessel
Membrane surface 32.5 m²
Cut off 100 kDa

2 vessels with 2 membranes 8” each vessel
Membrane surface 32.5 m²
Cut off 500 Da

2 vessels with 2 membranes 8” each vessel
Membrane surface 32.5 m²
Rejection MgSO₄ 94%
the feed stream moves parallel to the membrane surface;
the permeate passes through the membrane pores and is collected in the central permeate collector;
the retentate (the materials excluded by the membrane pores) continues through the recirculation loop.

Unlike normal flow filtration, cross flow filtration continuously sweeps the membrane surface by circulating the feed stream across it. This circulation minimizes blinding of the membrane pores and promotes consistent, long-term productivity.
6 vessels with 1 membrane 8” each vessel
Membrane surface 32,5 m²
Cut off 100 kDa

2 vessels with 2 membranes 8” each vessel
Membrane surface 32,5 m²
Cut off 500 Da

2 vessels with 2 membranes 8” each vessel
Membrane surface 32,5 m²
Rejection MgSO₄ 94%
50 kg – 62 liters
Selection of the adsorbent resin

- Non ionic adsorbent resin
- Highly cross-linked
- Very high internal surface area
- Particularly suited for the adsorption of organic molecules with high molecular weight present in industrial wastewaters

**Macronet MN-202**
Purolite Adsorbent Polymer

**TYPICAL PHYSICAL & CHEMICAL CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polymer Structure</td>
<td>Polystyrene/Divinylbenzene</td>
</tr>
<tr>
<td>Physical Appearance</td>
<td>Spherical beads</td>
</tr>
<tr>
<td>Particle Size</td>
<td>0.3-1.2 mm</td>
</tr>
<tr>
<td>Shipping Weight</td>
<td>655-885 kg/m³</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>1.04</td>
</tr>
<tr>
<td>Specific Surface Area¹</td>
<td>800-1100 m²/g</td>
</tr>
<tr>
<td>Pore Volume</td>
<td>1.0-1.1 ml/g</td>
</tr>
<tr>
<td>d35 micropores</td>
<td>15 Å</td>
</tr>
<tr>
<td>d50 macropores</td>
<td>800-950 Å</td>
</tr>
<tr>
<td>Moisture Retention</td>
<td>55-62 %</td>
</tr>
<tr>
<td>Temperature Limitation</td>
<td>120°C (250°F)</td>
</tr>
<tr>
<td>pH Limits</td>
<td>None</td>
</tr>
</tbody>
</table>

¹ single point BET
² multi point BET
³ mercury intrusion for pores ≥ 100 Angstroms
ANAEROBIC DIGESTER

Capacity: 3 m³

Substrate: reverse osmosis concentrate and nanofiltration concentrate after adsorption on resins.

PROCESS PARAMETERS

• Temperature: 37 °C (mesophilic conditions)
• pH: 6 – 8
• Batch process
• Inoculum: cattle manure or sludges from a working digester
It is a biological process. In anaerobic conditions, the organic substance is converted in biogas by a heterogeneous bacterial population.
Project RE-WASTE
«Recovery, recycling, resource.
Valorisation of olive mill effluents
by recovering high added value bio-products»

THANK YOU FOR YOUR ATTENTION