Membranes With Superhydrophilic Zwitterionic Polymers For Water Purification  

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**Background:**  
Increasing need for reusing wastewater due to:  
- Population increases rapidly  
- Living quality improves  
- Excess consume fresh water reserved

**Overview**

**Potential Method:** Polymeric Membranes because of:  
- High energy efficiency  
- Low cost  

Reverse Osmosis is a widely-use method in wastewater purification.

**Current Membranes limitation and Potential Solution**

**Limitation:** Membrane external and internal fouling after long term run. Fouling reduces the water flux and further reduces the efficiency.

**Solution:** Hydrophilic coating layer on the surface to reduce fouling.

**Approach:** Free-standing Membranes

**Materials:**
- **Solute** (Mass ratio is varied between Zwitterionic Monomer and PEGDA)  
- **Solvent** (Mass ratio between Water and Ethanol is kept as 1:1)

**Results**

**Samples:**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Solute (Monomer+Crosslinker)</th>
<th>Solvent (Water+Ethanol)</th>
<th>Initiator (HCPK) (%)</th>
<th>Get Membrane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure PEGDA</td>
<td>0 50 PEGDA (%)</td>
<td>25 25</td>
<td>0.2</td>
<td>√</td>
</tr>
<tr>
<td>1:4</td>
<td>10 40</td>
<td>25 25</td>
<td>0.2</td>
<td>√</td>
</tr>
<tr>
<td>1:3</td>
<td>12.5 37.5</td>
<td>25 25</td>
<td>0.2</td>
<td>√</td>
</tr>
<tr>
<td>1:2</td>
<td>16.7 32.3</td>
<td>25 25</td>
<td>0.2</td>
<td>√</td>
</tr>
<tr>
<td>1:1</td>
<td>25 25</td>
<td>25 25</td>
<td>0.2</td>
<td>√</td>
</tr>
<tr>
<td>2:1</td>
<td>32.3 16.7</td>
<td>25 25</td>
<td>0.2</td>
<td>√</td>
</tr>
<tr>
<td>3:1</td>
<td>37.5 12.5</td>
<td>25 25</td>
<td>0.2</td>
<td>√</td>
</tr>
<tr>
<td>4:1</td>
<td>40 10</td>
<td>25 25</td>
<td>0.2</td>
<td>√</td>
</tr>
</tbody>
</table>

**Density decreases with increasing ratio of Zwitterionic Monomer**

**Water Sorption shows the ability the membrane to hold the water molecules. It maximizes at 1:1 ratio.**

**Conclusion, Future Work and Acknowledge**

**Conclusion:**  
- The density of membrane increases with increasing ratio of Zwitterionic Monomer  
- Zwitterionic membranes have appropriate Zwitterion inside.  
- Zwitterionic membranes have good ability to hold water molecule.

**Future Work:**  
- Evaluate salt diffusivity of some samples.  
- Make flat samples for contact angles.  
- Measure water permeability.

**Acknowledge:**