## Assignment 8

The deadline for submitting this assignment is 11 PM on 06/19/2018.

4. A leaf filter has an area of 2 m² and is operated at a constant pressure drop of 250 Pa. The following results were obtained during testing with an air permeability of 0.05 m²/s.

<table>
<thead>
<tr>
<th>Time in min</th>
<th>0.0</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume of filtrate collected in mL</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

Assume that the mass of solids per unit volume of filtrate is 2.0 g/mL and the temperature of filtrate is 20°C (density 1050 kg/m³). Complete the following calculations for specific cake resistance and filter medium resistance (for slope calculation use two points).

1. Evaluate the slope (S in S/min) required for the calculation of specific cake resistance and filter medium resistance.

2. From the slope and intercept, calculate specific cake resistance.

3. From the slope and intercept, calculate specific cake resistance.

4. Select the appropriate choice for column A from column B.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Darcy’s Law</td>
<td>(a) Darcy’s Law</td>
</tr>
<tr>
<td>(b) Poiseuille Equation</td>
<td>(b) Poiseuille Equation</td>
</tr>
<tr>
<td>(c) Benedict Equation</td>
<td>(c) Benedict Equation</td>
</tr>
<tr>
<td>(d) Sieder-Tate</td>
<td>(d) Sieder-Tate</td>
</tr>
</tbody>
</table>

5. Airflowing a liquid bed at 20°C (density 1050 kg/m³) contains a small amount of dust with particle size between 0.1 cm and 1 cm. The particle density is 3000 kg/m³. Calculate the terminal velocity (in m/s) for the smallest particle.

6. What is the Reynolds number for this fluid particle system?

7. Pick the appropriate filter regime from the following list.

- | Laminar
- | Turbulent
- | Transition

8. If the dust were allowed to settle in a large rectangular chamber with a depth of 1 m, what residence time (in min) would be needed to get complete dust removal? (Round to the nearest minute.)

No, the answer is incorrect. Score: 0

No, the answer is incorrect. Score: 0

No, the answer is incorrect. Score: 0

No, the answer is incorrect. Score: 0

No, the answer is incorrect. Score: 0

No, the answer is incorrect. Score: 0

No, the answer is incorrect. Score: 0

No, the answer is incorrect. Score: 0