**Course 8, “Wastewater Treatment of Pulp & Paper Mills,” Final Quiz**

**Complete the following form and take the quiz to receive a certificate of course completion. Please enter your information in the way you would like it to appear on your certificate. Send your completed form (in WORD or PDF format) as an email attachment to hubbe@ncsu.edu.**

**Your full name (print carefully or type):**

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**Having taken this course will help me to…**

**This course could be improved by…**

**My idea for a future course in this series would be…**

FINAL QUIZ FOR COURSE 8 (ten questions)

1 – What process within an integrated kraft pulp and paper mill is often the biggest source of lignin-related compounds, color, solids, and either very high or low pH values?

1. Paper machines
2. Bark removal operations
3. Bleach plants
4. Mineral additive systems

2 – Which of the following quantities is related to the solid materials suspended in wastewater, either before or after its treatment?

1. BOD
2. AOX
3. TOC
4. TSS

3 – What are the units used for standard turbidity tests?

1. Total suspended solids (TSS)
2. Consistency (%)
3. Opacity (%)
4. Nephelometric turbidity units (NTU)

4 – Which of the following lists is in the correct chronological order for primary wastewater treatment that is done with two chemical additives?

1. Settling 🡪 Coagulation 🡪 Flocculation
2. Coagulation 🡪 Flocculation 🡪 Settling
3. Flocculation 🡪 Coagulation 🡪 Settling
4. Coagulation 🡪 Settling 🡪 Flocculation

5 – What do bacteria and fungal microbes present in aerated wastewater treatment system release to the water phase to speed up the breakdown of various organic chemicals, ultimately resulting in their conversion to carbon dioxide and the energy needed for growth of organisms that eventually will make up the sludge?

1. Enzymes
2. Acidity
3. Hydrogen peroxide
4. Oxygen

6 – In addition to the water coming from a primary wastewater treatment stage, what else is most commonly added to a mixture for aerated treatment of wastewater (conventional secondary wastewater treatment)?

1. Some of the sludge from the secondary treatment
2. Some of the sludge from the primary treatment
3. Activated carbon to adsorb pollutants from the solution
4. A coagulant such as alum or a polyamine, and optionally a flocculant

7 – Mainly what flammable gas comes out of the top of an upflow sludge blanket reactor system during its operation?

1. Methanol
2. Methane
3. Hydrogen
4. Oxygen

8 – Which of the following types of ions is more likely to be retained on a conventional ion-exchange material, as was discussed in the lecture (with negatively charged surface groups)?

1. Calcium ions (divalent)
2. Sodium ions (monovalent)
3. Hydrogen ions (at near-neutral pH)
4. Neutral ions (nonvalent)

9 – What is the procedure in which the cleanest water is used to clean the cleanest pulp, and then the rinse water is used to clean the next dirtier pulp, and so on?

1. Displacement washing
2. Stagewise cleaning
3. Counter-current washing
4. Saveall operation with filtrate segregation

10 – What type of advanced wastewater treatment system involves iron ions and hydrogen peroxide?

1. Fenton oxidation
2. Electrocoagulation
3. TEMPO-mediated oxidation
4. Reverse osmosis