

## CASE STUDY # 058

# BEST PULPING WASTEWATER DEGRADATION- COD REMOVAL WITH MICROCAT-XP BIOAUGMENTATION

- SUBJECT:** To compare, using laboratory microbial respiration testing, pulping/papermaking bioaugmentation products for biomass oxygen uptake and chemical oxygen demand (COD) removal.
- PRODUCT APPLIED:** **MICROCAT-XP Microbial Pulp and Paper Waste Degradar**  
**MICROCAT-XPCW Microbial Pulp and Paper Waste Degradar plus cold weather bug**



- OBJECTIVE:** To determine if bioaugmentation with **MICROCAT-XP** and/or **XPCW** enhances biomass oxygen uptake and improve COD removal rates for a pulp and paper facility, compared to two other commercial products using laboratory microbial respiration testing. **MICROCAT-XP** and **XPCW** were compared with the other microbial products at two different temperatures.
- EXPERIMENT DESIGN:** A microbial respiration study used to compare the performance of the indigenous microbial population against the indigenous biomass augmented with four specialized microbial products. The products included in the study included **MICROCAT-XP**, **MICROCAT-XPCW** with cold weather bugs added, and two commercially available products from two different suppliers. Two nearly identical microbial respiration tests were performed. The only difference was one run at 15 degrees C, and the other at 25 degrees C. Each test was run with the same reactor setup and microbial supplements (See Table 1) A 75/25 volume ratio mixture of the aeration basin mixed liquor to raw influent was added to one-liter respiration vessels along with the

commercial microbial inocula. The 25 degree C experiment was allowed to run for 90 hours and the 15 degree C experiment for a period of 216 hours. Both were operated under positive dissolved oxygen conditions.. The inoculum added for each product was 10 ml of the supernatant from an agitated 5% aqueous suspension of the commercial products.

### Experimental Setup

Reactor No.	Inoculum	Wastewater	Temperature °C
1	None	75% lagoon / 25% influent	25/15
2	None	75% lagoon / 25% influent	25/15
3	Microcat XP	75% lagoon / 25% influent	25/15
4	Microcat XPCW	75% lagoon / 25% influent	25/15
5	Microcat XPCW	75% lagoon / 25% influent	25/15
6	Supplier A Product	75% lagoon / 25% influent	25/15
7	Supplier A Product	75% lagoon / 25% influent	25/15
8	Supplier B Product	75% lagoon / 25% influent	25/15

### First run (25 °C) COD results after 90 hours

Reactor Content	COD initial (mg/l)	COD final (mg/l)	COD reduction (mg/l)	% Reduction	Oxygen Consumption After 90 hours
Control	<b>282</b>	<b>203</b>	<b>79</b>	<b>28</b>	<b>176.9</b>
Microcat-XP	<b>402</b>	<b>251</b>	<b>151</b>	<b>38</b>	<b>244.4</b>
Microcat-XPCW	<b>414</b>	<b>219</b>	<b>195</b>	<b>47</b>	<b>253.0</b>
Supplier A	<b>403</b>	<b>222</b>	<b>181</b>	<b>45</b>	<b>269.4</b>
Supplier B	<b>372</b>	<b>229</b>	<b>143</b>	<b>38</b>	<b>223.8</b>

### Second run (15 °C) COD results

Reactor Content	COD initial (mg/l)	COD @117 hr (mg/l)	COD final 216 hr (mg/l)	COD reduction 216 hr (mg/l)	% Reduction	Oxygen Consumption After 216 hours
Control	<b>295</b>	<b>253</b>	<b>214</b>	<b>81</b>	<b>27.5</b>	<b>178.4</b>
Microcat-XP	<b>438</b>	<b>282</b>	<b>201</b>	<b>237</b>	<b>54.1</b>	<b>283.0</b>
Microcat-XPCW	<b>427</b>	<b>258</b>	<b>209</b>	<b>218</b>	<b>51.0</b>	<b>281.3</b>
Supplier A	<b>451</b>	<b>265</b>	<b>237</b>	<b>214</b>	<b>47.5</b>	<b>276.0</b>
Supplier B	<b>400</b>	<b>249</b>	<b>214</b>	<b>186</b>	<b>46.5</b>	<b>247.6</b>

**RESULTS: 25°**

All of reactors augmented with microbial product outperformed the controls. **MICROCAT-XP** and **MICROCAT-XPCW** showed the most rapid onset of oxygen consumption. **MICROCAT-XPCW** showed the greatest % COD reduction at 47%, 19% greater than the controls. The Supplier A product showed the greatest overall oxygen consumption at 269.4 mg/l with a COD reduction of 45%. The supplier B product showed the least amount of COD removal with the lowest amount of oxygen consumption overall.

**15°**

In the 15 degrees C experiment, the overall elapsed time was 216 hours. All of the reactors augmented with microbial product outperformed the controls. **MICROCAT-XP** and **MICROCAT-XPCW** achieved the quickest onset of oxygen uptake. After 40 hours, the supplier A product overtook **MICROCAT-XP** and **MICROCAT-XPCW** in oxygen consumption. **MICROCAT-XPCW** yielded the highest COD removal of the group.

**CONCLUSIONS**

In both experiments, all of the reactors augmented with microbial products outperformed the controls in COD removal and oxygen consumption. In addition, overall **MICROCAT-XPCW** outperformed **MICROCAT-XP** and the products from Supplier A and Supplier B.

