

# **A small-molecule vanillin inhibits biofilm formation by multi-species wastewater culture**

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## **Abstract**

This study investigated the effects of vanillin on the formation and disassembly of biofilm of mixed culture and its mechanism, and also explored the feasibility to control membrane fouling using vanillin. The results showed that vanillin could effectively inhibit the microbial attachment and biofilm formation, and the inhibition efficiency increased with the increase of vanillin concentration. After treatment with vanillin (300 mg/L) for 24h, biofilm inhibition rate attained 51.96%. Vanillin could retard bacterial adhesion and destruct biofilm matrix by reducing exopolysaccharides and exoprotein associated with bacteria instead of growth inhibition. Exopolysaccharides and exoprotein associated with the suspended microorganisms were significantly reduced by  $17.23 \pm 1.58\%$  and  $28.48 \pm 9.00\%$  after treatment with vanillin (300 mg/L). Vanillin had no effect on the disassembly of pre-formed biofilm. Furthermore, vanillin can be used to retard membrane pore blocking during membrane filtration, reduce transmembrane pressure and membrane fouling resulted from microorganisms. Therefore, vanillin also shows the potential application in environmental membrane fouling control.