

DETERMINATION OF BOD₅, KMnO₄ AND TOC IN SURFACE WATERS

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Abstract

The onset of industrialization combined with rising living standards and population growth has led to increased consumption, water contamination, and a threat to the already unequal distribution of this most valuable resource. The amount of freshwater consumed worldwide has doubled in the past 50 years, according to UNESCO, and amounts to roughly 3600 cubic kilometers annually, or 9.86 billion cubic meters of fresh water every day. Of this, 70% comes from agriculture (from crop irrigation), 20% comes from industry (from industrial processes, cooling, etc.) and 10% comes from households, drinking water, and sanitation and hygiene services. It was once thought that groundwater could never be contaminated, however this is untrue. The water may still be contaminated or absorb the pollution even when it has been greatly cleaned by evaporation and condensation or by reaching the aquifer through the ground. As a result, all water areas require quality monitoring and analysis.

Rivers, lakes, streams, and other watercourses that are subject to different pollution sources such as wastewater, agricultural practices, and atmospheric precipitation are all considered surface water. Human health, living conditions, and general quality of life are all greatly impacted by water quality, which also supports the socio-economic growth of local communities. Physical-chemical, biological, and microbiological indicators are used to evaluate the quality of water to make sure it is safe for agriculture, industry, and human use. In this work, surface water sampling was carried out at five sites in Varaždin County, Croatia (Lonja, Presečno, Ljubelj, Ljuba voda, and Korusčak) between April 2023 and March 2024. The following indicators were measured: total organic carbon (TOC), potassium permanganate consumption (KMnO₄), and biochemical oxygen demand after five days (BOD₅). While BOD₅ was noticeably greater in the Korusčak and Ljubelj locations, suggesting the presence of organic materials, the greatest values of TOC were found at the Ljuba voda and Korusčak locations, especially during the summer. Additionally, there was variation in KMnO₄ consumption, with higher values at warmer seasons indicating higher levels of organic pollution.

Keywords: *surface waters, water analysis, total organic carbon, potassium permanganate consumption, biochemical oxygen demand after 5 days.*