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Study of the Physicochemical Characteristics of Liquid Effluents from the El Jadida Wastewater Treatment Plant

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Abstract : Rapid industrialization and population growth are currently the main causes of energy and environmental problems associated with wastewater treatment. Wastewater treatment plants (WWTPs) aim to treat wastewater before discharging it into the environment, but they are not yet capable of treating non-biodegradable contaminants such as heavy metals. Toxic heavy metals can disrupt biological processes in WWTPs. Consequently, it is crucial to combine additional physico-chemical treatments with WWTPs to ensure effective wastewater treatment. In this study, the authors examined the pretreatment process for urban wastewater generated by the El Jadida WWTP in order to assess its treatment efficiency. Various physicochemical and spatiotemporal parameters of the WWTP's raw and treated water were studied, including temperature, pH, conductivity, biochemical oxygen demand (BOD5), chemical oxygen demand (COD), suspended solids (SS), total nitrogen, and total phosphorus. The results showed an improvement in treatment yields, with measured performance values of 77% for BOD5, 63% for COD, and 66% for TSS. However, spectroscopic analyses revealed persistent coloration in wastewater samples leaving the WWTP, as well as the presence of heavy metals such as Zn, cadmium, chromium, and cobalt, detected by inductively coupled plasma optical emission spectroscopy (ICP-OES). To remedy these staining problems and reduce the presence of heavy metals, a new low-cost, environmentally-friendly eggshell-based solution was proposed. This method eliminated most heavy metals such as cobalt, beryllium, silver, and copper and significantly reduced the amount of cadmium, lead, chromium, manganese, aluminium, and Zn. In addition, the bioadsorbent was able to decolorize wastewater by up to 84%. This adsorption process is, therefore, of great interest for ensuring the quality of wastewater and promoting its reuse in irrigation.

Keywords : WWTP, wastewater, heavy metals, decoloration, depollution, COD, BOD5
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