Title: **Determination of phenolic compounds in water samples by gas chromatography. Development of a laboratory practice for a teaching guide.**

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Phenolic compounds are organic substances made up of one or more hydroxyl groups attached to a benzene ring, which may be substituted by diverse functional groups (e.g., halogen, nitro and alkyl groups). These compounds, which constitute a huge group of dangerous organic pollutants, have received great attention and concern because they exhibit high persistence in the environment and cause adverse effects in both terrestrial and marine ecosystems. In addition, these compounds show high toxicity and bioaccumulation capacities and are known to be carcinogens. Phenolic compounds are released into the environment due to a great variety of industrial, domestic and agricultural activities and also from treated wastewater discharges. For this reason, it makes necessary to control and monitor (or eliminate) their presence in the aquatic environments since they cause harmful effects in wildlife and humans.

In this work, an analytical method for the determination of phenolic compounds at trace levels in water samples has been developed, optimized and validated, to propose a laboratory practice in the teaching guide of the subject of Analytical Chemistry Laboratory from the Bachelor of Chemistry. The proposed method consists of a simple liquid-liquid extraction followed by a determination of the analytes by gas chromatography with flame ionization detection (GC-FID). The developed method was carefully optimized, evaluating the most relevant parameters that affect the chromatographic separation and detection of the target compounds. The method provided good figures of merit with excellent sensitivity, linearity, precision, and trueness, achieving low instrumental limits of detection. The applicability of the established methodology was evaluated by analyzing spiked water samples, achieving recoveries higher than 93%, except for phenol (60%), and low method limits of quantification ranging from 0.4 to 5.4 μg L^{-1}, demonstrating the good performance of the developed method.

Keywords: Phenolic compounds, liquid-liquid extraction, gas chromatography-flame ionization detector, water analysis, environmental pollution, laboratory teaching practice.