

Improvement of the diphenylamine-based spectrophotometric method for nitrate determination

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Description

The previously published diphenylamine (DPA)-based method (DPAM) for nitrate determination was investigated for its applicability using model solutions. First, the response surface methodology (RSM) was applied to elucidate whether the independent variables i.e. pH (x_1) and initial nitrate content (NC) (x_2) of samples influence the relative error (RE = dependent variable) of the method or not. The model found (in coded variables) is of the type: $RE = 11.12 + 0.46x_1 - 15.61x_2 - 1.20x_1x_2 + 7.44x_1^2 + 7.69x_2^2$. So, based on the response surface and iso-response curves related to model solutions, it becomes possible to minimize the RE value (<20%) by adjusting the sample pH to about 4. Based on these first results, some improvements were attempted which allowed us to reach recovery rates of $(83.9 \pm 9.0)\%$ and $(87.3 \pm 8.9)\%$ in the case of spiked spinach stalk and dam drinking water, respectively.