

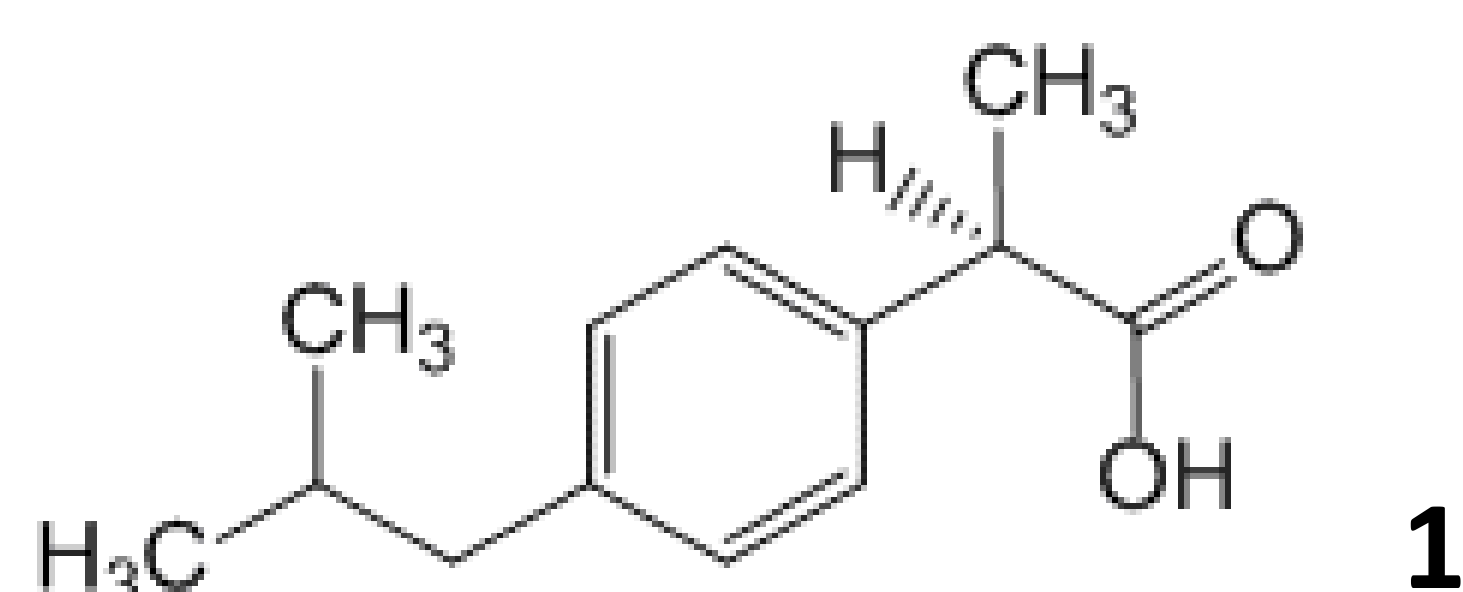
# Eco-friendly approaches to the choice of analytical methods for the pharmaceutical development and quality control of ibuprofen combinations

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**Introduction.** Ibuprofen (1) is a well-known drug from the group of non-steroidal anti-inflammatory drugs, a derivative of propionic acid.



For various diseases, ibuprofen is recommended as first-line treatments. Known combinations of ibuprofen with other APIs with proven effectiveness. To increase the therapeutic effectiveness and the possibility of reducing the dose, the dextrorotatory isomer of ibuprofen - dexibuprofen was introduced into medical practice. And the side effects of ibuprofen prompt scientists and manufacturers to look for opportunities to reduce the manifestation of such effects, in particular through the use of original combinations. Such a trend requires optimization of approaches to the development of analytical methods to reduce the impact on the environment and production personnel.

**Materials and methods.** Data collection and analysis.

**Results and discussion.** We analysed different approaches for the possible greening of analytical methods without loss of correctness and accuracy. Based on data from the literature and our own research, we chose as the main approaches the need for the simultaneous determination of components and the choice of the most ecological method, taking into account the specificity of the method, energy and labor consumption, the duration of sample preparation and analysis, as well as the reagents used. Due to modern understandings and literature data we have planned for this some steps.

1. Analysis data about analytical method for ibuprofen.
2. Analysis of data about analytical method for main markers (sum of markers) of BAS extracts.
3. Searching for the possibility of simultaneous determination of both ibuprofen and plant BAS by different methods.
4. Selection of conditions for simultaneous determination of both ibuprofen and plant BAS by different methods.
5. Estimation of suitability of the method for stability assessment.
6. Calculation of the "greenness" of the methods in proposed conditions as choice.
7. Method validation.

**Conclusions.** An algorithm for choosing analytical methods for pharmaceutical development and quality control of combined drugs on the base of "green chemistry" approaches is proposed using the example of ibuprofen.

## References

1. Becker, W. J. et al. Guideline for primary care management of headache in adults. *Can. Fam. Phys.* 61(8), 670–679 (2015).
2. Haag, G. et al. Self-medication of migraine and tension-type headache: Summary of the evidence-based recommendations of the Deutsche Migräne und Kopfschmerzgesellschaft (DMKG), the Deutsche Gesellschaft für Neurologie (DGN), the Österreichische Kopfschmerzgesellschaft (ÖKSG) and the Schweizerische Kopfwehgesellschaft (SKG). *J. Headache Pain* 12(2), 201–217 (2011).