Analytical Chemistry Department

GREEN EXTRACTION METHOD FOR AZO DYES DETERMINATION BY USING SHEEP WOOL

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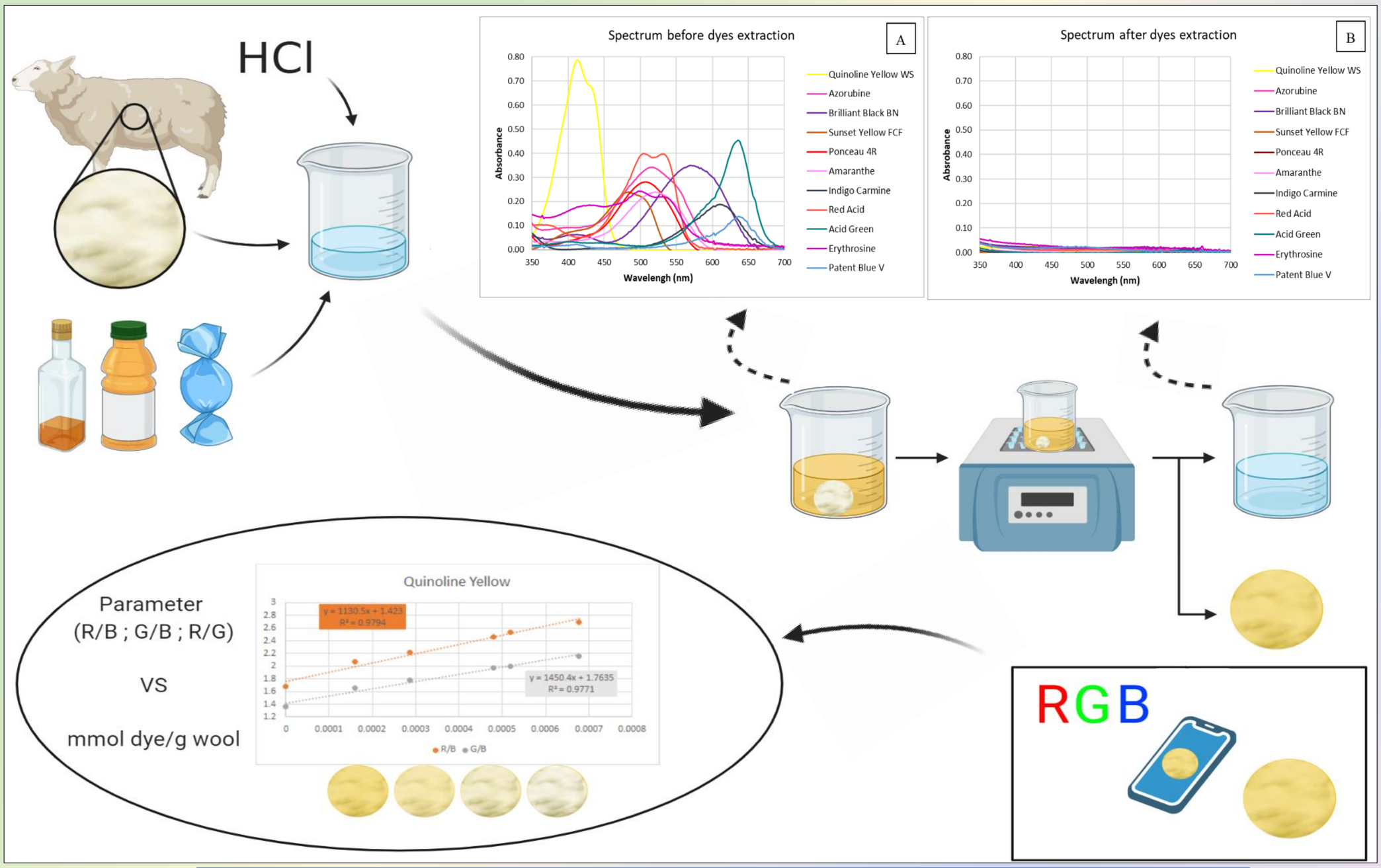
Introduction

Aratta-Posseto method allows the extraction of azo dyes by using sheep wool. In the procedure, the dye was extracted from an acidified solution by using wool and the subsequent retroextraction by employing a base like NH_3. This new procedure permits the determination of azo dyes by image analysis. When the wool is dyed it is possible to take a photo by smartphone and to estimate the content of dye according its color. This method has a lot of advantages comparing it, as a laboratory practice for the degree on chemistry, with other practices that are being used in the degree.



Procedure for the determination of azo dyes by using smartphone and sheep wool. Created with BioRender.com.

Currently Developed Practices

Among the practices that are carried out in the degree, can be highlighted two of them:

-Practice 1: Determination of food dyes by HPLC.

-Practice 2: Determination of iron by image analysis on a solid support using the reaction of thiocyanate-iron complex formation [1].

New Practice

When comparing the use of the new proposed practice with the other two we can find some important points:

The new practice would serve as a method for determining food dyes, as the practice 1, through the use of color analysis on a solid support using an image, as the practice 2.

This new practice would allows to encompass both in only one practice.

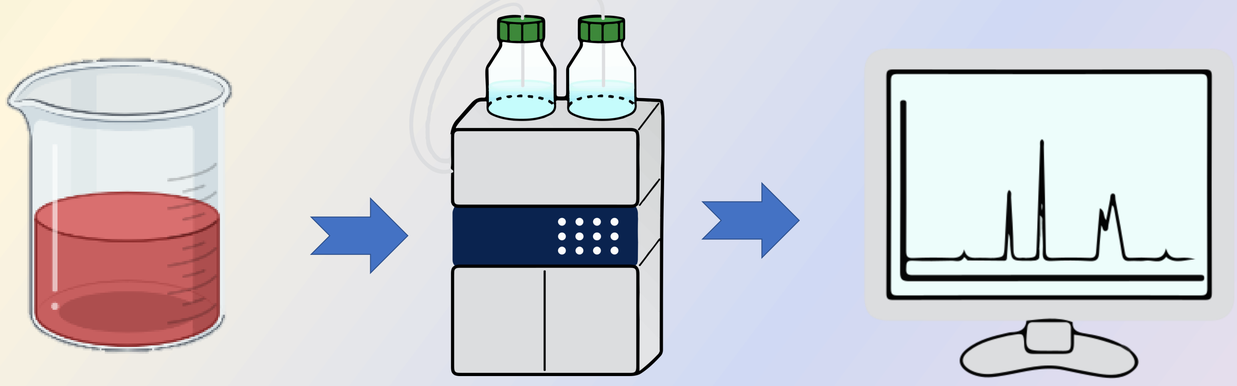
Green Chemistry

The proposed practice is much more sustainable than the other currently developed practices from the green analytical chemistry point of view. This procedure only involves the use of water, food dyes, hydrochloric acid and natural sheep wool, which makes it a simple, safe and faithful method to the principles of green analytical chemistry without generating polluting residues.

On the one hand, the practice of food dyes analysis requires the use of an HPLC equipment, which implies the use of a carrier and solvents (trichloroacetic acid, ammonium acetate, methanol, and acetonitrile) an electrical expense and waste management greater than the practice proposed.

On the other hand, the practice of iron determination by image analysis proposes the use of thiocyanate, which is more polluting than the reagents used in the new practice.

Practice 1



Practice 2

Conclusions

- This method provides a practice that is suitable for students.
- This method allows to develop the fundamentals of different procedures.
- It is a very innovative method.
- It provides results of food dye content in samples agree with reference method ones.

References

[1] Armenta S., Esteve-Turrillas F.A. and Herrero-Martínez J.M. Development and evaluation of paper-based devices for iron (III) determination in an advanced undergraduate laboratory. J. Chem. Educ. 2020, 97, 10, 3852–3857. https://doi.org/10.1021/acs.jchemed.0c00369.

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