

# DETECTING, SENSIBILIZATION AND MEASURING MICROPLASTICS IN THE ENVIRONMENT: A GUIDEBOOK OF PRACTICAL ACTIVITIES FOR PRIMARY AND SECONDARY SCHOOLS

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Plastic pollution is so pervasive that it has become a severe threat to natural ecosystems, biodiversity, and human health. The integration of plastics issues into the educational system of both primary and secondary schools will increase in early age the awareness about such serious environmental problem. Moreover, the activities embrace four of the Sustainable Development Goals (SDGs):

3 (Good health and well-being), 4 (Quality Education), 6 (Clean Water and Sanitation) and 12 (Responsible Consumption and Production).



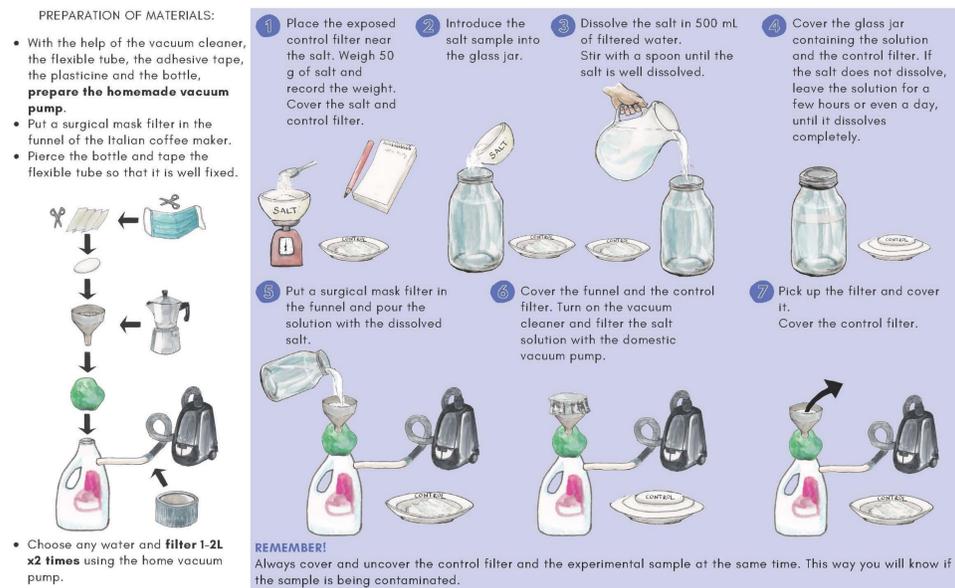
**Key words:** EARTH SCIENCES, GEOLOGY, PRIMARY SCHOOL, SECONDARY SCHOOL, TABLE SALTS.

## OBJETIVES

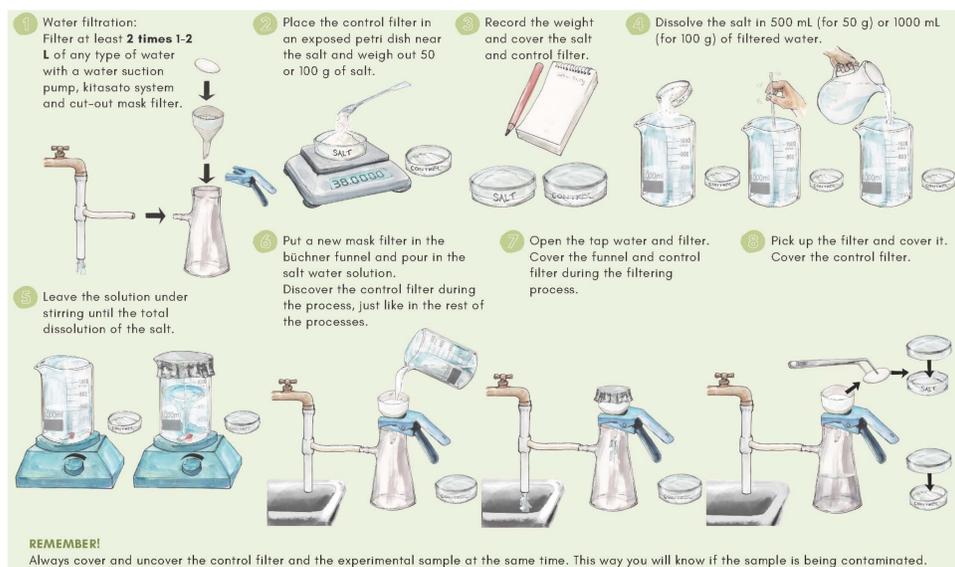
Our main objective is to empower students to use experiments and a collaborative work to address the impact of microplastics on Earth's environments, wildlife and even their health, with the study of table salts, a simple, daily, cheap and common product (which was treated as gold in past centuries).

## METHODOLOGY

The activities proposed in this guide can also be used in extracurricular activities since experimentation at different levels is proposed, using everything from laboratory material to material that we usually have at home. For this reason, different activities and protocols have been carried out according to the age of the student and the environment where the activities will be carried out, from the common classroom to the laboratory.



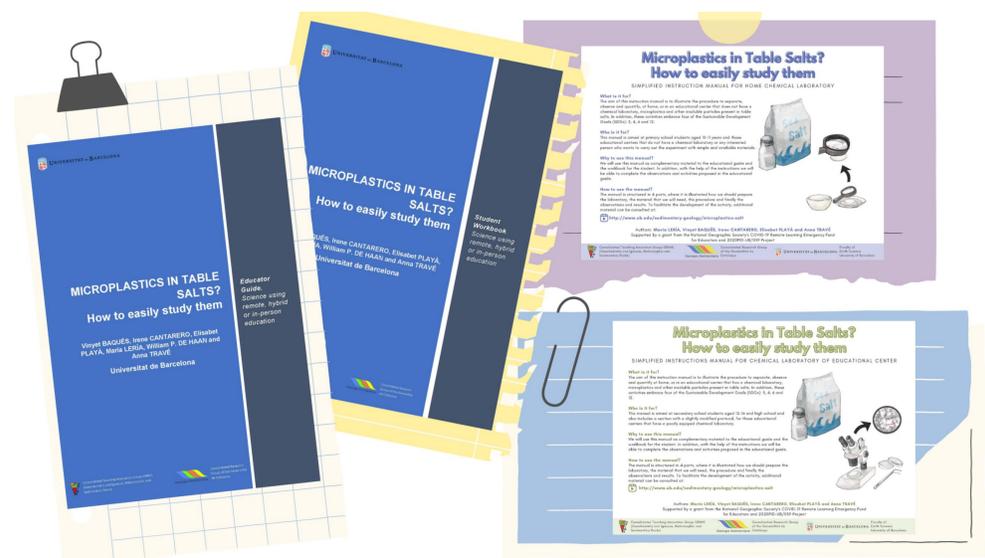
**Figure 1.** Graphic manual of instructions designed for Primary Schools. The image shows the procedure to perform the experiment at home, or in an educational center that does not have a chemical laboratory.



**Figure 2.** Graphic manual of instructions designed for Secondary Schools. The image shows the procedure to perform the experiment in an educational center that has a chemical laboratory.

## RESULTS

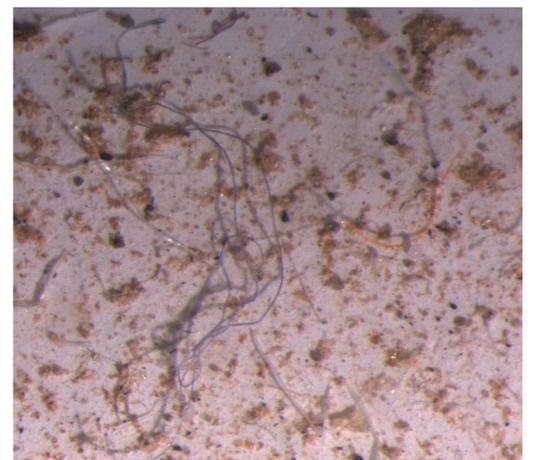
The guidebook offers different activities concerning microplastics in table salts as well as the following theoretical aspects: (a) General scientific aspects, on how to set up an experiment to resolve a scientific hypothesis; (b) Technological aspects, related to the origin and typology of plastics; (c) Chemical aspects such as chemical reactions (salt dissolution, saturation of a solution), or the importance of a good design of the laboratory protocol to avoid contamination during sample handling; (d) Geological aspects, such as the formation of salt as sediment and evaporite rock or why salt contains particles that are not salt. The project can be viewed at <http://www.ub.edu/sedimentary-geology/microplastics-salt>, and is freely available to any individual or educational center.



**Figure 3.** Guidebook for the educator, student workbook and laboratory procedures for Primary and Secondary schools.



**Figure 4.** Secondary school students doing the filtering process with a water suction pump, the kitasato system and mask filter.



**Figure 5.** Magnifying binocular image showing different MP fibers in salt samples, obtained according to the protocol of institutes.

## CONCLUSIONS

The collaboration between teachers of geology and fine arts has resulted in a educator guidebook, student workbook and two visual guides, useful for different levels, both of knowledge and resources. Work has been done in favor of goals 3, 4, 6 and 12 ensuring the increase of the awareness of the plastic we generate, and it ends up being ingested by living beings.

## ACKNOWLEDGMENTS