THE FATE OF PLASTICS IN THE ENVIRONMENT

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Abstract. Much progress remains to be made to reduce environmental pollution by plastic waste, even if it has been collected as much as possible from users. In 2016, Europe produced around 60 million tonnes of plastic, 40% of which was used as packaging. These are generally only used once and their useful life is short, most often less than a year (Geyer et al., 2017). They are then considered as waste, which is collected and transported to sorting centers. That same year, 27 million tonnes of plastic waste were collected, of which around 60% came from packaging. When sorting centers leave, only 30% of the plastics collected are intended for recycling. This is complex because highly selective sorting is essential and only a very small fraction of them (less than about 10%) will actually be recycled in a closed loop. A little over half will be reused after mechanical or chemical recycling in low-cost products. The rest will be lost, either incinerated or released into the environment.

Keywords: polymer, plastic,chemical, solid, biogeochemical, ingredients.

Introduction. As Europe has limited recycling capacity, some of the waste was exported to countries that could theoretically recycle it, but where environmental constraints were weak. Thus, from 2008 to 2016, 31 million tonnes of plastic waste were exported to China and countries in Southeast Asia (Brooks et al., 2018). Since 2018, China has banned such imports, India did the same in 2019 and these bans are becoming more widespread. Given the poor quality of waste management conditions in developing countries, any transfer of waste from industrialised countries to less developed countries is incompatible with a sustainable development objective for human societies. In net terms for Europe, most plastic

waste is either incinerated (around 40%) or stored in controlled landfills (around 30%)[1].

All plastics degrade as soon as they are manufactured. Their chemical composition is therefore theoretically chosen so that degradation only occurs after their expected period of use. However, this is often much shorter than the lifespan of waste released into the environment. There, they therefore continue to deteriorate under the influence of solar radiation, but also of micro-organisms. This is the case, for example, of surgical or respiratory protection masks which are made from polypropylene and which resist degradation for several decades. Plastic bottles, for their part, take one to ten centuries to degrade, bags around 400 years and polystyrene a millennium. Many ingredients are added to polymers to improve their properties: additives to improve resistance to shocks, UV rays or fire, antioxidants, plasticizers to make plastics softer and more flexible, etc[2]. The degradation products of plastics and their ingredients pass into the environment and they are far from all biodegradable. Plastic waste enters the environment from the continents where it is discarded after use. It can be trapped in soils or lakes, but most of it is carried by winds and rivers to the ocean. During this transfer, the largest waste fragments and degrades. Smaller debris is also dumped into wastewater but is not retained by treatment plants and thus reaches rivers and streams, then the marine environment. Beyond these qualitative considerations, the biogeochemical cycle of plastics is not known with the precision necessary to assess the consequences of this pollution on the environment and living beings[3].

Impact studies on wildlife and human health are still very qualitative and deserve to be further developed. In particular, it is necessary to:

• study the impact of this debris on aquatic, marine and freshwater wildlife. Attention has long been drawn to the effects of large waste on macrofauna (birds, mammals, etc.), but the disruption to zooplankton, which forms the basis of the marine food chain, has only been the subject of summary studies;

• study the impact of micro- and nanoplastics on all living beings, particularly marine organisms, and human health, by working at the concentrations actually existing in the natural environment, as it is currently polluted, and by taking into account the secondary products of plastic degradation;

• supplement this work with epidemiological research, while being aware of its difficulty;

•significantly increase research efforts into micro-organisms likely to degrade plastics, while ensuring that invasive strains that pollute the natural environment are not introduced.

It remains essential to better control the economy of plastics by preventing them from being dispersed into the environment or burned at the end of their life. Recycling is by far the best use[4]. In this context, the inclusion of plastics in construction materials should be studied carefully: in fact, these materials are, in quantity, the most used on our planet. Already, some high-performance materials in the world of construction include organic materials as additives; for example, Ductal (a very high-performance concrete) contains around 5% of polymers in the form of fibres. Research will have to be launched on the incorporation of polymer waste into very high-tonnage mineral materials. This would be a way of preventing plastic waste from being either burned or dispersed into the environment[5]. It is also a way of storing CO2 by ensuring that plastics (largely derived from petroleum derivatives), by being stored for very long periods in construction materials, no longer contribute to CO2 emissions.

Conclusion

Difficult to recycle and difficult to digest by microorganisms, they are a source of pollution for the environment when they are produced on a massive scale for short-term uses, often less than a year, or for single use. Considered as waste, they are thrown into landfills, often poorly controlled, or transported to sorting

centers where only a small fraction will actually be recycled. A large proportion of the plastics used are released into the environment where they degrade and pollute continents, fresh water and oceans. Plastics, polymers of highly variable composition, have become everyday objects. But they are now recognized as a source of pollution for the environment. They affect the entire planet, even the most remote regions, such as the polar ice caps or the deepest ocean trenches. In this report, the Environmental Sciences Committee of the French Academy of Sciences takes stock of the role of plastics in everyday life and the extent of the pollution for which they are responsible. It presents recommendations for the rational use of these polymers and for an ambitious research program aimed, on the one hand, at understanding the fate of plastic waste abandoned in the natural environment and assessing its impact on living beings and, on the other hand, at developing compounds that provide the same services to society while being recyclable or easily degradable so as to no longer pollute the natural environment.

References

1. Karimovich, D. N., & Ibrahimovich, K. R. (2024). DEVELOPMENT OF A NEW DESIGN OF AN EXHAUST DEVICE AND STUDY OF ITS OPERATION. JOURNAL OF ENGINEERING, MECHANICS AND MODERN ARCHITECTURE, 3(2), 10-14.
2. Ibrahimovich, K. R., & Nurmamatovich, R. T. (2025). USE OF WASTE PAINT MATERIALS. Science, education, innovation: modern tasks and prospects, 2(2), 67-69.
3. Karimovich, D. N., & Ibragimovich, K. R. (2024). OPTIMIZATION OF PARAMETERS OF A LINE OF SPINNING OF SPINNING MACHINES. TADQIQOTLAR, 30(1), 72-79.
4. Adaxamjonovich, O. Z. A. (2024). PRODUCTION OF COMPOSITE MATERIAL USING INDUSTRIAL WASTE. *AMERICAN JOURNAL OF MULTIDISCIPLINARY BULLETIN*, *2*(3), 129-136.

5. Tursunali o‘g‘li, Y. F. (2025). KUKUN METALLURGIYASI TOMONIDAN ISHLAB CHIQARILGAN ALYUMINIY ASOSIDAGI METALL MATRITSALI KOMPOZITSIYALAR BO ‘YICHA TADQIQOTLAR. *INNOVATION IN THE MODERN EDUCATION SYSTEM*, *5*(48), 44-47.

6. Muxammadzokir o‘g‘li, R. M. (2025). IMPROVING THE STRENGTH OF THERMOPLASTIC POLYMER MATERIALS. *INNOVATIVE DEVELOPMENTS AND RESEARCH IN EDUCATION*, *3*(35), 105-109.

7. Baymirzaev, A. (2024). New Methods of Obtaining Bearing Material from Steel. Web of Semantics: Journal of Interdisciplinary Science, 2(4), 25-28.

8. Rustamjan o’g’li, A. B., & Adhamjon o’g’li, A. A. (2025). STUDY OF ITS CHEMICAL PROPERTIESIN OBTAINING ШХ15 MATERIAL FROM SECONDARY MATERIALS. Science, education, innovation: modern tasks and prospects, 2(2), 92-95.

9. Umidbek Turg‘unboy o‘g, X., Islombek Turg‘unboy o‘g, X., & Muxammadamin o‘g‘li, M. A. (2024). PROSPECTS IN THE USE OF THERMOELECTRIC GENERATORS FOR VEHICLES. *Ta'limning zamonaviy transformatsiyasi*, *6*(1), 62-66.