

# Effect of different washing conditions on the removal efficiency of surface and matrix contaminants in selected materials

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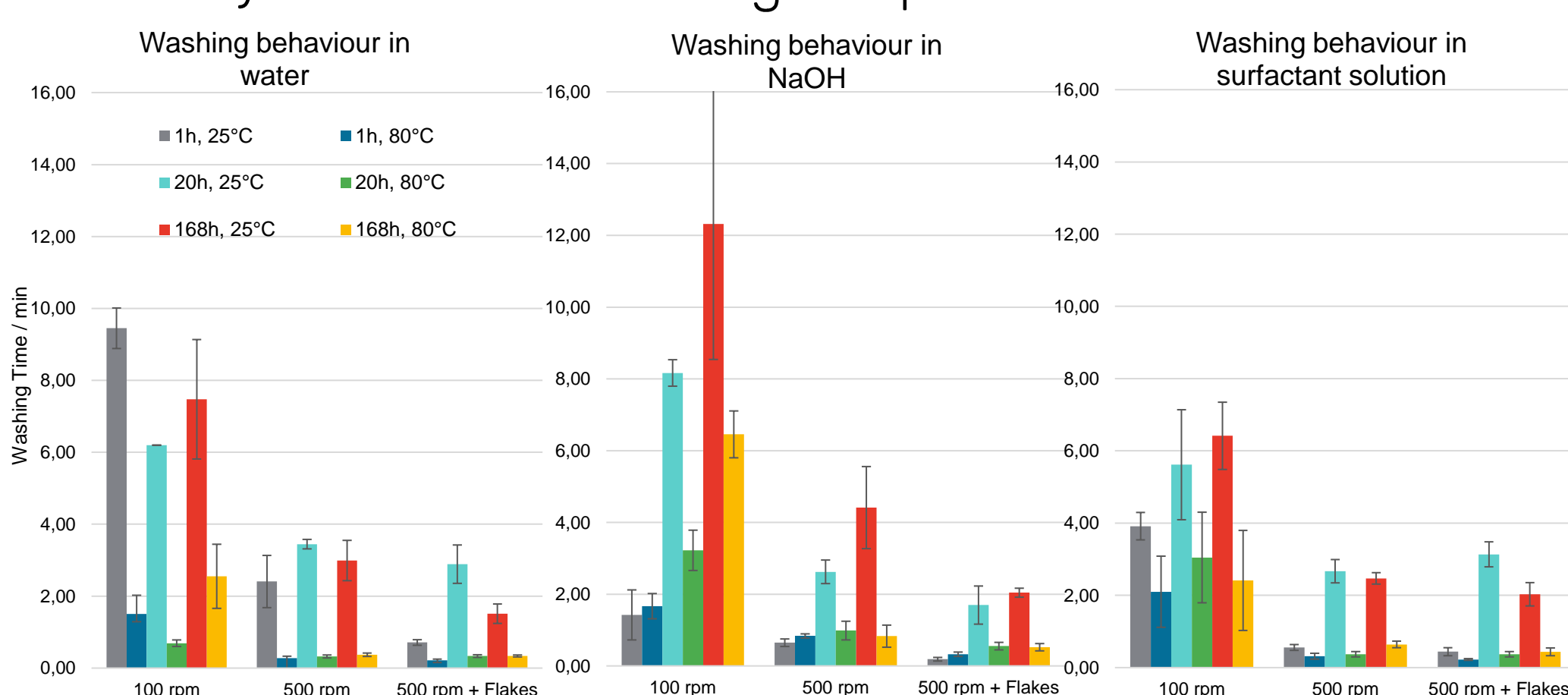
## Introduction:

In 2020, about 24.5 million tonnes plastic waste were generated in Europe, however only 14 % were recycled. This gap poses a major problem to society [1]. In research, different aspects of recycling have thoroughly been investigated in the last years. However, little has been published concerning the washing process as part of the pre-treatment [2]. Principally, the cleanness of the feed material is essential for the quality of the recyclate. Due to the various applications of plastic products, the likelihood of a significant contamination degree with different contaminants is high [2,3,4].

Since polyolefins are widely used, it is essential to improve the recycling process in order to achieve the aim of the European Union to reach a 50 % recycling rate by 2030 [5]. In this study, polyolefins are intentionally contaminated with a defined amount of a selected model compound. To require a profound understanding of the removal process of these contaminations, the influence of different parameters, such as temperature, medium etc., on the washing efficiency are evaluated.

## Washing behaviour of Surface Contaminants:

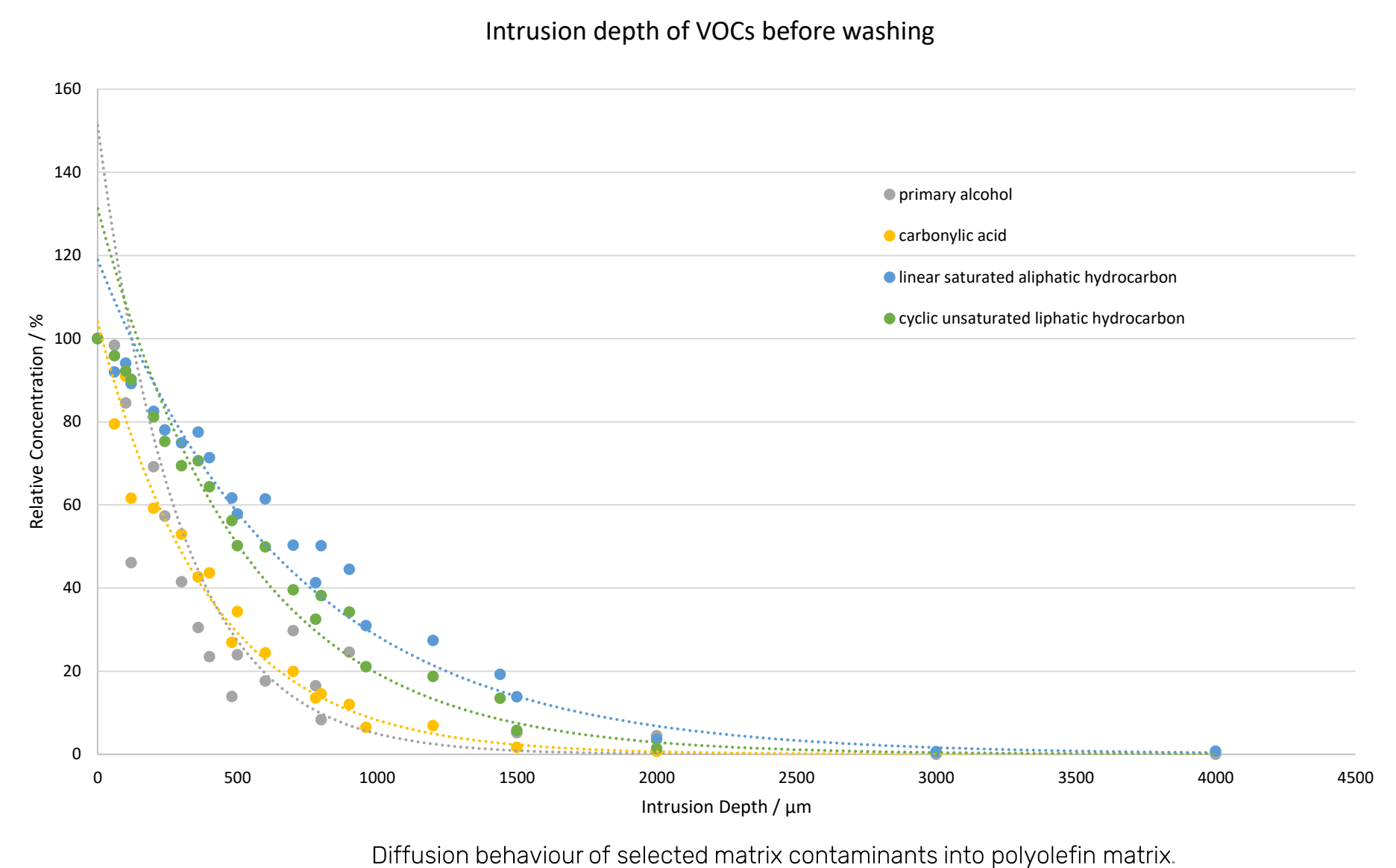
- Significant effect of drying time during sample preparation
- Significant positive effect of washing temperature
- Insignificant effect of medium and friction (high flakes load) at elevated washing temperatures



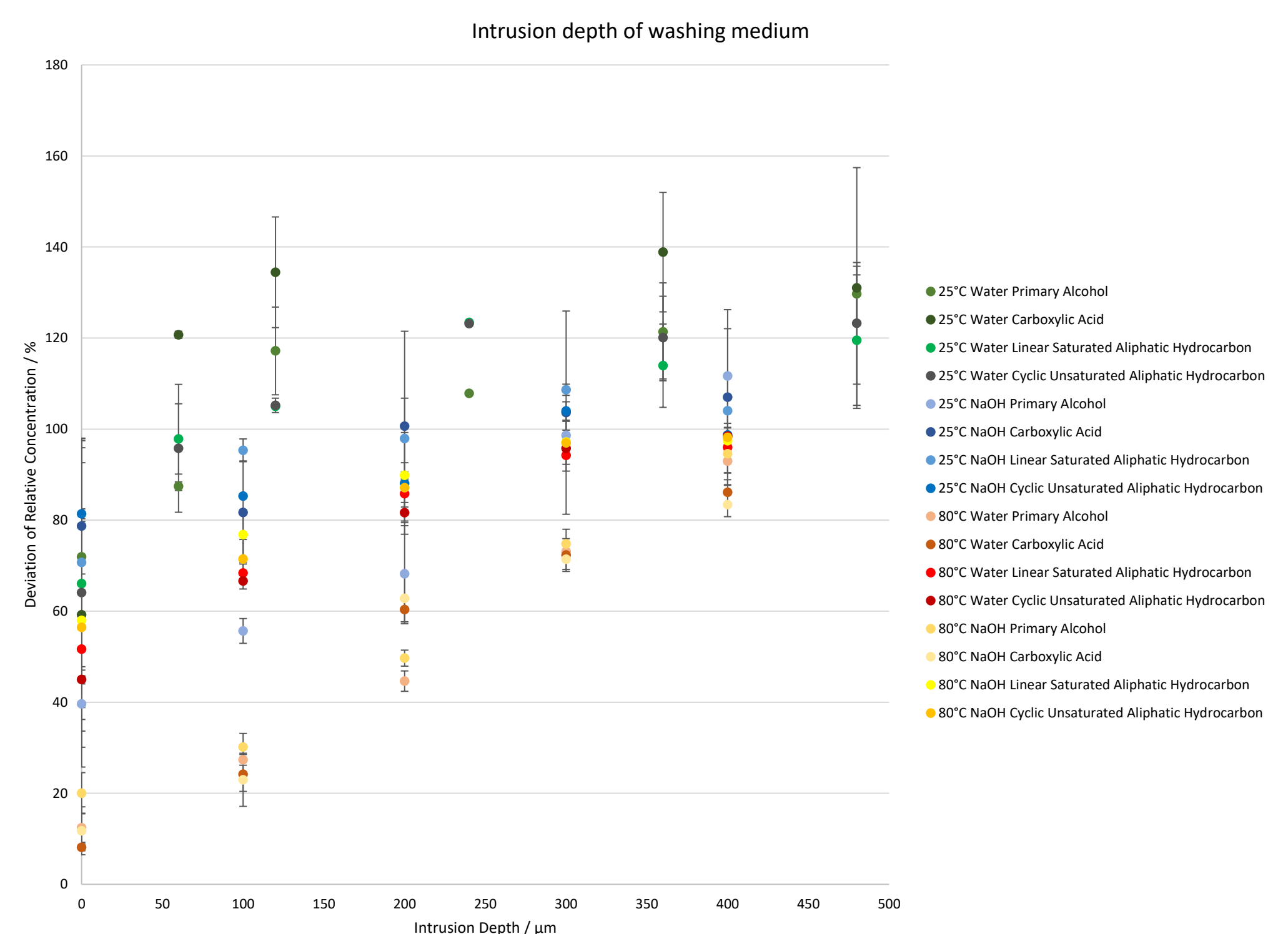
- 1 PlasticsEurope, <https://www.plasticseurope.org/en/resources/publications/4312-plastics-facts-2020>, 2020.
- 2 Soto, J. M., Martín-Lara M.A., Blázquez G., Godoy V., Quesada L., Calero M., J. Clean. Prod. 2018, 203, 777.
- 3 Xia, D., Zhang F.-S., J. Clean. Prod., 2018, 171, 1472.
- 4 Soto, J. M., Martín-Lara M.A., Blázquez G., Godoy V., Quesada L., Calero M., Process Safety and Environmental Protection, 2020, 139, 315.
- 5 Horodytska O., Cabanes A., Fullana A., Chemosphere, 2020, 251, 126373.

## Washing behaviour of Matrix Contaminants:

- Effect of functional group on intrusion (polarity)



- Removal of all contaminants mainly from the surface
- Significant effect of increase in temperature
- Positive effect of medium for certain contaminants



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