

Study on primary microplastics used as scrub materials in facial scrub products

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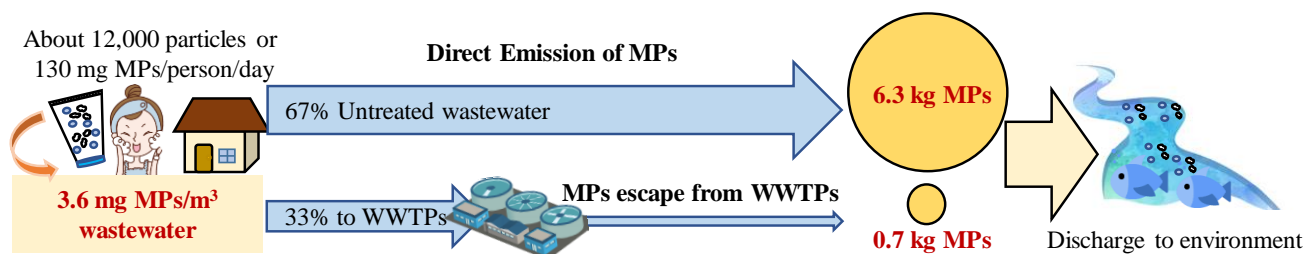


Figure 1: Estimation of daily MPs emission from facial scrub products in Bangkok, Thailand

1. INTRODUCTION

Microplastics (MPs) are plastics particles that smaller than 5 mm. MPs were abundantly founded in both marine and freshwater. To prevent MPs emission, one of the approaches was focused on primary MPs especially MPs from personal care and cosmetics products (PCCPs) as they are point sources and directly discharged to wastewater. This study focused on investigation of MPs in facial scrub products. Main objectives of this study are (i) to investigate characteristics of MPs in facial scrub products, (ii) to estimate emission of MPs from facial scrub products, and (iii) to investigate changes of MPs in Japanese facial scrub products after self-regulation

2. MATERIALS AND METHODS

52 facial scrub products were purchased during 2016-2019 from various countries. Scrub materials were extracted and identified components by a Fourier Transform Infrared Spectroscopy. Products were categorized base on scrub materials. Products with only MPs were examined size distributions by a Laser Diffraction Particle Analyzer. Number of MPs was estimated from size, concentration, and volume of MPs. For products contain MPs mix with other materials, sizes and number of MPs were measured and counted under stereomicroscope with Motic Image Plus 2.3S program ($N=3$). A questionnaire survey was distributed online in Bangkok, Thailand. to estimate MPs emission by using modified equations from (1) and (2).

3. RESULTS AND DISCUSSION

Total of 28 facial scrub products were detected MPs (all are polyethylene). Alternative materials were charcoal, cellulose, silica etc. Size of MPs ranged from 24 to 1,039 μm with average of $300 \pm 102 \mu\text{m}$. Student T-test revealed no significant difference ($p > 0.05$) were founded between all three shape of MPs; bead, irregular, and mix shapes (contained both bead and irregular). While number of MPs was ranged from 33 to 14,890 with average 5,433 particles/g product. Average MPs concentration was 59.1 mg MPs/g product. Thus, daily MPs emission from facial scrub per person in Bangkok estimated to be about 12,000 particles or 130 mg and annual MPs emission was estimated to be about 2.6 tons from both untreated and treated wastewater (**Figure 1**). In addition, results of Japanese products were used in track changes after self-regulation for phase out MPs in PCCPs were announced in 2016. Results showed that although percentage of products that used MPs was decreased over years. MPs concentration was not significantly decreased over years. Thus, we recommended ban policy and long-term assessment for MPs prevention in PCCPs.

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