The appropriate Topic III: **Sustainable Production and Resource Efficiency**
The preferred method of presentation: Either Oral or Poster

A CHEMICAL SUBSTITUTION STUDY FOR A WET PROCESSING TEXTILE MILL IN TURKEY

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EXTENDED ABSTRACT

In textile processing industry, large amount of water is used during dyeing and finishing processes. While Integrated Pollution Prevention and Control (IPPC) Reference Document on Best Available Techniques (BAT) for the Textiles Industry indicates that water consumption varies from 70 to 250 l/kg fabric depending on the techniques applied, many sources from South Africa indicated that the specific water intake for the textile industry varies from 95 to 400 l/kg fabric depending on the type of processes used and water efficiency. While, 20–230 m^3 of water is needed to produce 1 ton of textile fabric in Turkish factories. The total quantity of chemicals used in textile mills varies from 10% to over 100% of the weight of the cloth [6] and the chemical loads are generated mainly due to the residues from preparation, dyeing, finishing, sizing, and other operations. Therefore, the amount of water discharged and the chemical load of textile effluents are the major environmental concern in the textile industry.

Textile manufacturing generates solid, hazardous and air pollutant wastes, on the other hand, wastewater, by far, is the largest waste stream. For the textile industry, in general, the effluent is highly-colored, high in BOD and COD, has a high conductivity and is alkaline in nature. These factors combine to present numerous operational problems in municipal wastewater treatment works, which are biological processes and not intended for the breakdown of complex organic molecules. The presence of metals and other dye compounds inhibits microbial activity and in some cases may cause failure of biological treatment systems. Therefore, substitution of chemicals having lower hazard potential for chemicals having higher hazard potential should be a main focus for pollution prevention. Literature indicates that pollution prevention by replacing sizing agents, surfactants, urea, solvent, acid, and reducing agents used in textile industry with environmentally friendly chemicals can be achieved.

The objective of this study was to implement a chemical (material) substitution which is defined as “the replacement or reduction of hazardous substances in products and processes by less hazardous or non-hazardous substances, whilst achieving an equivalent functionality via technological or organizational measures”.

This study has led to the following conclusions;

- There were totally 8 out of 128 chemicals identified as environmentally problematic. The total monthly consumption of these problematic chemicals is about 50 tons. This value represents the 5% of the total monthly consumption amount of all chemicals used in the factory.
- By substituting the dyestuff A with a lower sulphide product, reduction in amount of sulphide (due to the use of sulphur dyes) discharged to WWTP is achieved up to 76%. That is, this substitution decreases the inhibition risk on microorganisms in the WWTP and consequently prevents a possible fail in WWTP system due to use of sulphur dyestuffs.
- Substitution of Complexing Agent C* for C has led to improvement of the biodegradability of wastewater samples collected from the first post-washing tank just after the dye bath by at least 25% (from 38% to 64%). Also, by this substitution monthly 3100 kg of COD load to the WWTP is prevented.

Key Words: Pollution Prevention, Chemical Substitution, Textile Industry, Integrated Pollution Prevention and Control

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