

Development of Block-type Nonwoven Filter Media for Rapid Liquid Filtration

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1. Introduction

As the environment legislation is stricter and the global water situation is steadily worsening, many concerns are focusing on the water treatment. Water quality is very important because it is a close connection with product quality and manufacturing process in almost industrial fields such as food, beverage, semiconductor, medicine, dyeing/finishing, and so on. In recent, rapid and effective filtration becomes a key technology in water treatment which can be defined as the manipulations of water from various sources to achieve a water quality.

In this study, block-type filter media which is distinctly different from typical filter media was prepared using coarse staple fibers. This unique filter media was characterized and tested in suitability for rapid removal of suspended solids in waste water. This media could be used in a compact system(Fig. 1) which can achieve the rapid filtration.

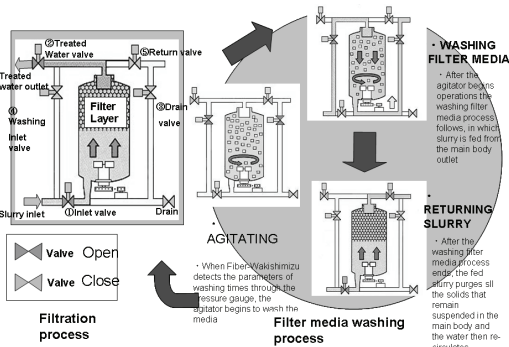


Fig. 1. The operating sequence of rapid filtration (ref.: Read and Zinc 2008).

2. Experimental

Two kinds of fiber media are prepared from several staple fibers. One is floating on water and the other is submerging. Floating media consisted of PP staple and PP/PE bi-component fiber with various mixing ratio and submerging media consisted of PET, PP/PE and RM(rapid melting) fiber. The production process for block-type filter media is in series of 1)fiber spinning, 2)fiber mixing, 3)nonwoven

process (carding, cross-lapping, needling), 4)air through bonding and 5)cutting the nonwoven in blocks. The properties of filter media such as porosity, pore size, pressure drop and so on were characterized.

3. Results and Discussion

The media for rapid filtration should have high porosity, high removal efficiency, low pressure drop and high bonding strength between component fibers. To achieve those properties, many conditions such as nonwoven weight and thickness, fiber kind, mixing ratio, bonding method were controlled. Fig. 2 shows the 5mm×5mm block-type filter media prepared in floating and submerging on water.

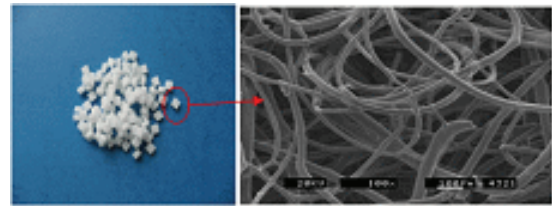


Fig. 2. Block-type filter media(left) and its SEM photo(right).

Fig. 3 shows a pressure drop with water flow. The media has a low pressure drop indicating the media prepared could be suitably applied in rapid filtration system for removal of suspended solids in water.

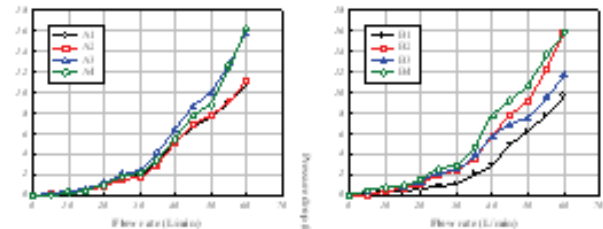


Fig. 3. Pressure drop vs. flow rate.

4. REFERENCES

[1] J. C. Crittenden et al; "Water Treatment: Principles and Design", John Wiley & Sons, Inc., New Jersey, 2001.