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# EFFECT OF NANOFIBER TYPE ON FILTRATION PERFORMANCE OF COALESCING FILTERS

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The objective of this work is to study the effect of nanofibers type on the filtration properties of coalescing filters. For this purpose, Polyacrylonitrile, Nylon6 and polystyrene, as three polymers with different polarity and surface tension, were selected and electrospun separately onto nonwoven sublayers. To achieve the ultrafine nanofiber layers in the same range of diameter and porosity the electrospinning parameters were examined. The nanofiber's diameter and porosity of the nanofibers layers as well as the sublayers were studied. SEM images showed that the diameter of nanofibers produced of different polymers was in the range of 200-350 nm and the fiber average diameter of sublayer web was about 15 μm. Also after nanofibers web was electrospun on the sublayers, the average pore diameter of the filter decreased from about 70 μm to about 10 μm. Three-layer filters composed of a nanofibers layer (up to 1 μm thickness) sandwiched between two nonwoven layers of micron sized fibers were tested with an oil in water emulsion containing 1000 ppm kerosene under a flow rate of 180 lit/hr. overall filtration efficiency, coalescing efficiency and pressure drop across the filters were measured using TOG/TPH analysis, Laser Particle Size Analyzer and manometer during the filtration, respectively. The obtained results showed that by adding the nanofibers web to the sublayers and also increasing the thickness of nanofibers layer the filtration efficiency and pressure drop increased and in comparison with the sublayer, the filtration efficiency of filters having 1μm thickness of PAN nanofibers layer, has increased 30% whereas for PA6 and PS was 22% and 11%, respectively. The indirectly characterization of the wettability by contact angle measurements of the surface coated with the films of PAN, PA6 and PS and calculation of their spreading coefficients revealed that the higher surface energy and wetting fibers provide better coalescence.