Combination Filters

Simply defined, a combination filter is one that does at least one other processing job at the same time as filtering a suspension. The classic example, of course, is the packed bed of activated charcoal, which acts as a remover of chemical impurities from the suspension, as well as removing dust particles - although this is actually not a very good example, because it is primarily an adsorber, which also acts as a filter. Another example would be the canister filter of a respirator, which has a piece of filter medium, with a separate layer of adsorbent or reactive material

What is preferably meant here is a relatively simple filter, whose filter medium has been adapted in some way to carry out an additional cleansing function, and which should probably be termed a *combination medium filter*.

The combination filter medium consists of a relatively standard material, either woven or one of several different types of nonwoven, carrying some additional substance that enables it to perform the extra task. This substance will normally be in finely divided form, embedded in the material – which means that woven media would have to be made from staple or multifilament yarn. An extreme case of a combination medium is the one made from charcoal cloth, which has been treated before activation in such a way as to make it effective with a number of different impurities.

The extra function is most likely to be the adsorption of a gaseous impurity (such as an odor removal), or of impurities dissolved in a liquid (such as offensive taste or color), including substances such as ammonia, mercury vapour and radioactive iodine. Other additional functions include:

- chemical reaction with the embedded material, especially an oxidation reaction, using, say, potassium permanganate;
- biocidal action, using a silver coating on the medium; and
- catalytic action, causing reaction between two impurities or between an impurity and the carrier fluid.

Some very large applications exist for combination filtration, such as point-of-use drinking water treatment, breathing air, and cabin air cleaning, so it is an important part of the filtration business.

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