

Testing Compatibilities of Filtering Media with Liquids

The first quality of a liquid filtering media is its permeability, i.e. how easily a liquid can flow through the filter. The second quality is its efficiency, i.e. its ability to capture particles.

But neither permeability nor efficiency can be ensured during a filtration process if the media and the liquid materials are not compatible, i.e. if they interact with one another with the consequence of changing their intrinsic properties.

Therefore the first question to answer when choosing a filtering media is: is it compatible with the liquid? Typical media/liquid interactions are:

- partial dissolution of one or several chemical compounds of the media within the liquid,
- partial adsorption of one or several chemicals of the liquid on the surface or within the pores of the media,
- release of media particles within the filtrate,

Or reciprocally: is the liquid compatible with the media? Typical liquid/media interactions are:

- deformation or change of some mechanical properties of the media due the chemical interaction of some compounds of the liquid with some of the media,
- deformation or change in the media structure due to temperature,
- deformation or change in the media structure due to pressure
- partial degradation of media compounds,

Evaluation of these compatibilities generally consists in three steps:

- measuring one or several properties of the new liquid or filtering media in known conditions
- putting in contact the liquid and the media in known conditions, generally ones which accelerate the interaction (higher temperature, higher concentration, higher frequency, higher pressure, shorter cycles, ...)
- measuring again the same property(ies) as measured initially and quantify any change.

The decision to declare compatibility then depends on the value of this change, taking into account experimental measurement errors.

Two examples are:

- a) resistance of silica sand to attrition sustained during air/water backwashing:
 - measure the grain size distribution by sieving and report effective size (d_{10}), uniformity coefficient ($CU=d_{60}/d_{10}$), and minimum grain size (TMG)
 - submit the sand sample (1 kg) to an attrition test either with the rotating disc or the Beris attritioneur for a period of 8h
 - measure the grain size distribution and report the same parameters as initially observed
- b) release of silica through a filtering cartridge use a ultrapure water circulation loop validated by checking the silica blank level after 72h circulation at 85°C.

- install the test filtering cartridge and let the ultrapure water circulate within the loop for 72h at 85°C.
- regularly dose silica in the test water so as to ensure the absence or quantify the silica release over time.

Because of the strong impact of experimental conditions on the behavior of the test liquid/filtering media, several industrial sectors have agreed on standard test conditions. Thus national, European and International standard test methods are available to measure, check or certify the compatibility of a filtering media with the liquid it will clarify or, *vice versa*, of the absence of negative impact of the filtering media on the quality of the liquid it will decontaminate.

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He joined the Institute of Filtration and Techniques of Separation at its creation in 1981, and has been appointed Managing Director in 1986.

Major Activities:

Administrator of professional Societies: Société Française de Filtration (French Filtration Society), Aquitaine Pole of the Technologic Advisers, CRITT Chemical Environment of "Ile de France", Member of the Filtration Society UK and of the Board of Directors of the American Filtration and Separations Society (AFS). Vice President of the Aquitaine Region Innovation Agency (INNOVALIS).

Founder and dynamic force behind several French and European standardisation committees; French delegation Chief to several International Standardisation committees ; Project leader to the drafting of about 10 ISO and NF filter testing and particles and suspensions characterisation standards.

Organiser of scientific and technique shows as the 6th World Filtration Congress (Nice, 1990).

Author or co-author of more than fifty lectures and articles in international journals and congresses.

Inventor of several filter testing and suspension characterisation concepts, methods and equipments.

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