RAINSHOW'R MFG. TECHNICAL SERIES

TECHNICAL ESSAY NO. 1: KDF 55 AND THE USEFUL LIFE OF A SHOWER FILTER

INTRODUCTION

This is the first in a series of technical discussions on the performance and general expectations of dechlorination devices at high flow rates in small, consumer used devices. The technical discussions will cover shower filters, bath dechlorinators, garden and hydroponic filters.

These discussion papers are presented in an outline format.

Let me give you some helpful information.

1.   We began the development of a non-carbon shower filter in 1988.

2.   In 1989 our company introduced the all KDF-55 shower filter to the market.

3.   KDF is a 50/50 alloy of copper and zinc. This alloy, atomized brass, is used in a granular mesh form (0 to 100 mesh) to reduce free chlorine (CL_2) in water treatment.

4.   It accomplishes this by creating an electro-chemical environment as a result of the molecular tension between these two dissimilar metals. How much electricity is created by this galvanic action? Perhaps as much as 1100 millivolts of electricity.

5.   This level of electrical charge is just enough to re-establish the electro-chemical action that separated chlorine (CL_2) from sodium (NA) in a brine solution.

6.   Free Chlorine (element # 17) is extremely reactive and wants to combine with something when CL_2 is in its free state. In the absence of an electrical

charge it combines with organic matter.

7.   About 140 years ago science discovered that by injecting Free Chlorine into water, thereby creating a hypochlorous acid (HOCL), the chlorine would naturally combine (or attack) the organic matter which is the cell structure of pathogenic bacteria like cholera and typhoid. It is our view that the chlorine, which is a hyperoxidant in its natural gaseous form, oxidizes the outer shell of the bacterium, exposing its DNA structure and thereby making it impossible to reproduce.

8.   While chlorine is effective in killing pathogens in water, it will also attack other organic organisms it encounters such as your skin and hair in a shower. That means you have to eliminate or reduce it. But, how?

9.   Since chlorine gas was formed in an electro-chemical environment, you need to create a similar environment to reverse the action.

10.   The electro-chemical environment created by the granular KDF-55 becomes the means. This galvanic action allows two ions of Free Chlorine gas to combine with some prevalent metal such as calcium, zinc, etc. to create another harmless chloride salt which is soluble and washes out of the shower.

11.   The ability of the KDF-55 in the shower filter to generate this galvanic action is a function of how clean the granular surface of the KDF can be maintained.   As solid particulate matter, calcium, magnesium etc. flow through the filter, some amount adheres to the granular surface of the KDF media reducing its ability to generate electricity. As the surface of the media becomes covered over or occluded, the galvanic charge is reduced from its high of about 1100 millivolts to 1000, 900, 800, 700 or fewer, until there is not enough   electricity generated to convert and reduce the chlorine.

12.   How long does that take and therefore how long will your filter last? It

depends entirely on the quality of your water. The greater the amount of occluding matter the sooner it will need replacement. To put it simply, the more "gunk" you introduce into the filter the sooner it reduces its ability to generate the required galvanic action. A shower filter in Bangor, Maine will last longer than one in Taos, New Mexico. Why? Desert areas like Arizona and New Mexico were at the bottom of an ocean at one time. As a result the local water is ladened with calcium, magnesium and other alkaline substances which make the water hard and often cloudy. That is not good for a shower filter.

There are, unfortunately, those manufacturers who, because they do not understand chemistry or physics, will say that their shower filters will last X, Y or Z number of gallons. You simply cannot predict how long a persons filter will last because you know nothing about the quality of the water where it is being used.

It is not fair to the consumer to make such claims since they rely on the manufacturer's integrity when performance claims are made. Rainshow'r has tested CQ-1000 shower filters in rigorous long term testing with professional laboratories. Our shower filters have been tested to 50,000 gallons before they dropped to 90% or less in Free Chlorine removal. But, we do not and will not advertise or publish these results because we cannot guarantee that the water in your shower is exactly the same as the lab where it was tested.

Nevertheless, our users want and need some sort of guideline as to when to replace a cartridge type filter (CQ-1000 series) or the non-cartridge filter (RS502 series).

We recommend, in general, that a family of three or four change the cartridge in the CQ-1000 about every six to nine months depending on water conditions.

The RS502 can be back-flushed and has slightly more internal capacity. Therefore, we generally recommend replacing it between nine and twelve months.

13.   It is important that the reader understands that a high flow (2 gpm) filter containing atomized brass (KDF-55) can only be relied upon to (a). Reduce Free Chlorine, (b). Maintain a bacteriostatic environment in the filter and perhaps (c). To reduce fungus growth in the shower stall.

Regardless of any other claim, shower filters cannot remove heavy metals such as lead, calcium, arsenic and mercury. Any such claim is untrue.

Also, it cannot remove or reduce any synthetic organic contaminants (SOC) such as pesticides and herbicides or volatile organics (VOC) such as gasoline, benzene, chloroform, etc. Again, any such claim is untrue.

Remember, a shower filter using KDF can inhibit bacterial growth (bacteriostatic) but it is NOT bactericidal.

We will be expanding our technical comments on what can be accomplished by shower, bath and garden filters in future technical papers.

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