

**PERFORMANCE OF SERIM™ MONITOR™ FOR QAC
IN VARIOUS BRANDS OF QUATERNARY AMMONIUM SANITIZERS
USED IN THE FOOD PROCESSING INDUSTRY**

Serim™ Monitor™ for QAC test strips were designed to indicate the concentration of the quaternary ammonium compound(s) in aqueous solutions. The test consists of an indicator pad mounted onto a non-reactive plastic handle. The indicator pad is impregnated with a solution of one or more chemicals and indicators. When the test strip is dipped into a QAC solution, the indicator pad absorbs the sample and reacts with the impregnated chemicals. The indicator binds with the large molecule QAC, causing a color change that is proportional to the concentration of quaternary ammonium compounds present in the sample. Results are determined by matching the color on the indicator pad to the graduated color blocks provided on the bottle label.

OBJECTIVE:

The objective of this study was to evaluate the performance of Serim™ Monitor™ for QAC test strips in various commercially available brands of QAC sanitizers to determine how well the reacted test pads matched the color blocks on the bottle label over the range from 0 to 1000 ppm (parts per million).

PROCEDURE:

Stock solutions of various brands of QAC containing 1000 ppm were prepared for dilution to working levels. (At 1000 ppm, SANIQUAT™ is identical to MAQUAT® MQ2525M-80%, and S.S.4 QUAT is identical to MAQUAT® MQ624M.) The following QAC solutions were used in the evaluation:

1. SANIQUAT™ (National Chemical Laboratories, Inc.): Active ingredients (10%), blend of benzyldimethylalkyl and 4-ethylbenzyldimethylalkyl ammonium chlorides.
2. S.S.4 QUAT (Saratoga Specialties): Active ingredients (10%), blend of benzyldimethylalkyl and dimethyldialkyl (dioctyl, octyl decyl, & didecyl) ammonium chlorides.
3. S.S.4 ACID QUAT: S.S.4 QUAT with 30% phosphoric acid.
4. MAQUAT® MC1412-80%E (Mason Chemical Company): Active ingredient (80%), benzyldimethylalkyl ammonium chlorides.
5. MAQUAT® MQ2525M-80%: Active ingredients (80%), blend of benzyldimethylalkyl and 4-ethylbenzyldimethylalkyl ammonium chlorides.
6. MAQUAT® MQ624M: Active ingredients (80%), blend of benzyldimethylalkyl and dimethyldialkyl (dioctyl, octyl decyl, & didecyl) ammonium chlorides.
7. MAQUAT® 4480-E: Active ingredient (80%), dimethyldidecyl ammonium chloride.
8. Hyamine 1622 (Benzethonium chloride): 4-(tert-octyl) phenoxyethoxyethyl dimethyl-benzyl ammonium chloride. (This QAC was mentioned in the LaMotte QAC test kit but is not usually included in QAC sanitizing formulations.)

Serim Monitor strips were dipped into samples and removed immediately, then compared to the color blocks within 10-15 seconds after dipping. Results were recorded as estimated concentration (ppm-parts per million) values.

RESULTS:

		SAMPLE #							
QAC ppm	Color	1	2	3	4	5	6	7	8
0	L. yellow	0	0	0	0	0	0	0	0
50	Chartreuse	55	50	55	50	50	45	50	0
100	L. green	100	95	100	95	100	100	100	50
200	Green	200	200	220	200	200	190	200	100
400	Green-blue	400	400	400	400	400	460	400	200
1000	Blue-green	1000	1000	1000	1000	1000	1000	940	400

TABLE 1

DISCUSSION:

There was concern that the acidic pH of the S.S 4 ACID QUAT sample would adversely affect the performance of the Serim Monitor test strip. However, this was not the case as the strip performed acceptably (refer to Sample #3 in Table 1).

With the Hyamine 1622 (refer to sample #8 in Table 1) there was a downward shift of one color block for each ppm level, with no distinction between 0 and 50 ppm.

CONCLUSION:

With the exception of Hyamine 1622, Serim Monitor for QAC test strips can be used to estimate QAC levels with the majority of generations and combinations of quaternary ammonium chloride formulations used as sanitizers in the food processing industry.