

Dr. McCulloch.
Quartermaster Empson
started speech by stating it
would be full of half baked
ideas & misconceptions

In some cases it is hard on
the hands but no greater
probability of hurting hands than
chlorine.

1 part in 1500 in milk permitted
organisms to grow, effective in
1-30000 in water.

In milk will allow rotting
organisms to survive.

Don't know efficiency on any
respiratory organisms - viruses.

Field test either too complicated
or too costly.

Dr McCulloch stated they do not offer
more protection to public than chlorine

Dr McCulloch summed up
his speech by stating.

Quaternary Am. Compounds are not
as good as heat.

More costly than chlorine.

A convenient test is not
available.

Bac. tests will have to replace
field tests.

Coli will have to be used as a
standard for tests.

Will add materially to the
problems of sanitary control.

Quaternary Ammonium Compounds.

E. C. McCulloch, Ph. D., Professor of Bacteriology, State College of Washington.

Report of Special Research Committee Appointed by

Arthur L. Ringle, M. D., C. P. H., Director, Washington State Department of Health.

The new type Cationic Bactericide.

Testing done under 17 headings:

1.-Toxicity:

Found to be very low. No reasonable amount has killed or made animals ill. The hands of continued users sometimes show hypersensitivity on prolonged contact--Chlorine also.

2.-Origin:

A Synthetic chemical using Fats and Oils of assumed good quality. Certainly better than some soaps and powders .

3.-Mode of Action and Effect in Food:

Based on 400 tests, the compound was found not to remain distributed throughout the solution. The "hold-together" force is only 35-49, where water is 70. Added to water, they leave the solution in the container and pile up on the surface of the container. We speak of it as "Units" of compound to Units of surface area, rather than p.p.m., or p.p. thousand. The solids in milk add surface to be surrounded, so that with four parts compound in 1,000,000 water, some kill was bad; while one part in 1500 of milk permitted organisms to grow as in a culture. The surface matter in milk utilized the Quaternary Compound. Particles of material in a solution under treatment gives much surface and will take more compound for effective treatment.

4.-Effect of Acids or Alkalis:

Compounds go into solution better in Acid solution, but lose killing power as acidity increases. The reverse true with Chlorine. Most beverages on Acid side. Should be no worry about use of Quaternary Compounds as preservative, because of this and because of solid matter in other foods.

5.-Effect on Organisms:

Staph. and Strep., easily killed, but Coliform organisms often escape. Blue-green puss organism survives.

6.-Dilution Factor:

A little higher than Chlorine.

7.-Coefficient of Temperatures:

Hot solutions usually give better action with most chemicals. Quaternary Compounds can be used hot or cold, but allow a little more time, if cool.

(Cont'd.)

8.-Reliability:

NOT ENOUGH DATA yet, to say or to approve. Strep:O.K.; Staph:O.K.; Diphtheria about one-half kill; Polio and Trench-mouth doubtful.

Our function is to protect the Public's health; can these products protect the public from all types of organisms? Too much stress on plate counts and swabs is sometimes put on by us.

What about the effect on the virus; are they too small for this chemical to effect? Again, use caution and approach tests slowly.

9.-Effect of Alkali:

There is evidence that detergents and this compound will not work effectively together. It appears to be neutralized by anyonic compounds like Acids and Alkalis. Some Alkalinity may increase effectiveness, but too much precipitates it. The addition of T. S. P. may be made to a reasonable extent, but not other Alkalies, to nearly the same degree. Soap gives a neutralizing effect, so that if alkalis in a solution with fat, some saponification takes place and therefore, neutralization. Organic matter in a washing water will also have the effect of neutralizing effectiveness.

Dr. McCulloch felt Quaternary Compounds should not be used in less than a three compartment sink, and then only, if the washing procedure was proper.-(not the opinion of Dr. Mallmann). Tendency is to use two compartments, the second to be called on to do the work neglected in the first. There is no substitute for preliminary cleaning. A small grease film will stop the effectiveness of this and other compounds. The operator must prepare for sterilization by proper cleaning first. There is no shortcut to sanitization.

10.-Stability:

Quat. Compounds much more stable than Chlorine in storage. Chl. in store window may lose all it's strength.

11.-Constancy:

Uniformity has been proven by tests.

12.-Corrosive Action:

Will not corrode; will not tarnish silver. This is a big advantage over Chlorine.

13.-Cost:

Higher, but it can be argued that saving on equipment may prove to bring costs down to the same level.

14.-Flavor in Foods due to Carryover:

Carryover greater than with Chl., but no odor or flavor or chemical activity detected. Big advantage over chlorine, when used on cups, beer glasses, milk bottles and drinking glasses. Although Quat. Comp. may reduce the "head" of beer due to breaking of surface tension, the beer parlour looks to be the best place to introduce the compound.

15.-Ease of testing:

Field testing methods are not yet satisfactory and are too complicated, e.g. Stone Marshal test papers appear O.K., but show a reaction to normal milk when no compound is present. A milky rinse water may also therefore give inaccurate results. Don't use test papers blindly and don't use in discolored water.

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16.-Presentation of Sales People:

Large companies have been doing a good job and are cooperating with Health Departments to find all the answers. Small companies may spring up using stock concentrates and mixing with detergents under phoney names and claims without testing. Complications may therefore arise for the P.H. worker.

17.-Is the Compound Esthetically desirable?

General. Neither Chl. or Quat. Comp. gives the protection a good heat treatment does. Don't use too little or in dirty water and expect best results. Bacteria tests will be more important than field tests if the use of these compounds becomes general.

Discussion:

Dr. Mallmann:

In a practical test, using Chlorine, Chloramine T. and a Quat. Comp. in a three compartment sink of 5 gallons each; Tank one-used a brush and detergent; tank 2-clear running water; tank 3-one of the three sterilizers. Glasses were passed through the three tanks at the rate of 20 sec. a batch. Results:

1.-With Chlorine; Chl. strength at start 185 P.P.M., after 700 glasses, 40 P.P.M., left rim count at end of 700 glasses mostly zero, some 10-30.

2.-Without a sanitizing agt. the count increased from 500 to 3000.

3.-With Chloramine T; Chl. strength at 190 P.P.M., reduced to 30-40 after 700 glasses. Rim count 500 to 600 at end of day. Results were not good.

4.-With Quat. Comp. using a strength of 1 to 6,400, results as with No. 1 obtained.

Speed of kill of Q. C.

1-20,000 dilution killed in 5 seconds.

1-10,000 dilution killed coli-(resistant) in 5 seconds.

Comparable to Chlorine at 200 P. P. M.

Experiments with a two-tank sink gave some results as with three. Wash water without detergent, and using Chl. or Q.C., and a running water rinse, gave good and comparable results.

Effect of Organic Matter:

See "Soap-July".

Shows that Q.C. can be run steadily into wash tank with detergent and shows that count drop from 35,000 to zero at the end of the run. However, it is better to use the system of Dirt plus Bacteria plus Q.C., rather than Dirt plus Q.C. plus Bacteria (from recontamination) from a sanitizing point of view. The public is more likely to use Q.C. rather than Chl. A food limit should be put on a tank of solution...use brushes for washing to remove film. A new Detergent Sanitizer (by Park-Davis) is proving good for hands. Combination is also good for milking machines. Pyro Phosphate, T.S.P. and Q.C. gives good results.

In swab testing, poor results may be had in testing stored glasses, due to recontamination.

Mr. Lehn (Turco Co.).

Many Fluid Milk Plants in California are using Q. C. almost entirely.

In one experiment, 15 stations in a Plant were selected. Three swab tests a day of each, were taken for 14 days. First tests gave counts of 15,000 and at the end of 14 days, most counts were zero. Compound is easy to apply and Plant men like to use it--should consider human element.

50 Taverns under test showed a high percentage of violators of regulations, due to high counts, at the end of the test, using Q.C., the percentage dropped heavily.

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Roccal Representative.

Advises against combining Q.C. with detergents as a sanitizer. First product along Q.C. line was Zepherin Chloride for pre-operative skin medication and for surgical instruments, a 1-100 solution. Later, it was found that it had industrial applications and a 10% conc. was made up. This was permitted by the Chemical Society if it was called "technical", and marked "not for surgical use". Zepherin Chloride is a little more refined than the technical.

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Questions:

Water Purification:

Not practical; cost too high because concentration requirement too high.

For Pools:

Dr. Mallmann says it should not be used, except, perhaps, to control algae.

Difficulties in Bacteriological Work:

Plating is extremely difficult. Much care must be taken. The charted log shows a preliminary rush in the decrease, followed by a very slow rate of kill. Rate is 40 times as great in the first two minutes as between 80 to 100 minutes. There is not nearly the uniformity as with other agents. Q.C. action must be neutralized before platings in dilution 1:100 with anyotic detergents. May also treat agar, but agar itself gives inert effect.

Dr. Ordal:

Not all Q.C. known, are germicidal, and there are other related products that are germicidal on the other hand. All of these Q.C. should be tested for Toxicity, because some are much more toxic than others. Q.C. are inert soaps, that have an oil soluable link and a water soluable link.

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