IODOPHOR

By Robert Arguello

Among the wide range of sanitizing agents available to home brewers, one of the more popular products is a halogen sanitizer/germicide called Iodophor. In spite of the fact that iodophor is a product that most home brewers have used at one time or another, there is an amazing amount of confusion and misinformation about the product. No one seems to agree on the proper concentration, the required contact time, or even what "no-rinse" means. I decided to go directly to the source and called the maker of a popular brand of iodophor… "B-T-F", which is manufactured by "National Chemicals Inc." of Winona, MN. I was connected with the company's General Manager, Dr. L. Charles Landman Sr.

Dr. Landman, who holds a Ph.D. in Medical Microbiology, graciously granted me a rather extended phone conversation. The text of this article is based largely on that interview.

Iodophor is a federally approved contact sanitizer that is used widely by the food service/production industry and is most commonly available to home brewers in 4 oz. and 1 liter bottles.

Having used iodophor as my sanitizer of choice for a number of years, I thought that I had a pretty good handle on what iodophor actually is and I certainly felt confident that I used it properly. I did learn, in the course of this interview with Dr. Landman, that even I suffered from some misinformation on the product and its usage.

Not the least of these revelations was that I have been overusing the product. B-T-F Iodophor is effective at a concentration of 12.5 ppm. and at that strength, is an effective sanitizer with a contact time of 60 seconds. My practice has been to add 3 capfuls of iodophor to a 5 gallon container of tap water. As it turns out, the cap on a one liter bottle of iodophor has a capacity of ¼ ounce. This means that I was using a concentration of approximately 19 ppm of titratable iodine. To obtain an effective sanitizer, no more than 2 capfuls, (1/2 oz.), need be added to 5 gallons of water. This creates a solution at 12.5 ppm. At the local, retail cost $11.00 per liter, I am very grateful to know that I can cut my consumption by 30%!

I asked Dr. Landman about iodophor and its usage in the dairy industry as I had read that iodophor was used predominately in that field. He acknowledged that iodophor was indeed a popular dairy germicide but that iodophor is widely used in the general food industry and that breweries were included in that long list. He told me of the original formulation of iodophor sanitizers and I was interested to learn that the original iodophor sanitizers were formulated with acids, (phosphoric and others),. This was done to help in the release of the iodine ion into solution. The "older" iodophor formulations used needed the lower pH to work properly. This low pH was also beneficial to the dairy industry because it also helped them combat a problem they have with "milkstone" that forms on dairy equipment. The "newer" formulations of idophor, (such as B-T-F Iodophor), do not require the low pH to work properly.

I asked Dr. Landman about the "shelf life" of B-T-F Iodophor and he related a story about one of their distributors who had found a case of the product that had been forgotten for 5 years and returned it to the manufacturer. NCI tested the 5 year old product and found that it still met standards. This was, of course, undiluted iodophor that had been well packaged and protected from exposure to light, air etc.

Regarding iodophor that has been diluted to a working solution, Dr. Landman explained that

there are a number of things that work to degrade the products' efficacy. Chlorine and protein load were the two mentioned first, but Dr. Landman agreed that both sunlight and exposure to the atmosphere may very well be factors. Iodophor is very stable in it's undiluted form, but will begin to degrade, (albeit slowly), once it has been diluted to a working solution. In either case, it is far more stable than chlorine which begins to degrade immediately upon being manufactured. The color of the iodophor solution is a rough guide to it's effectiveness as a sanitizer. If the solution still has its amber color, it is most likely still active. It is recommended that a fresh solution should be mixed when the color fades or after 24 hours.

I asked about contact time and was told that 60 seconds was adequate. Dr. Landman went on to comment that it is not necessary to keep the surface completely immersed in the solution for 60 seconds. He explained, by way of example, that to sanitize a 5 gallon carboy there is no need to prepare 5 gallons of solution. Swishing a gallon of solution, (at 12.5 ppm), around the inside of the carboy for a minute or two will do the job.

There is much discussion among home brewers about the dangers of scratches in the walls of plastic fermenters. Dr. Landman agreed that scratches in plastic can lead to problems, but that the real problem is in inadequate cleaning. Organic material can imbed in scratches in any material. If that material is allowed to remain, no sanitizer can be expected to prevent bacteria from forming. Iodophor is not a cleaning agent. Items to be sanitized must be thoroughly cleaned beforehand. Chlorine is no more effective at sanitizing dirty items than is iodine.

Robert's, (not terribly scientific), **NO RINSE Experiment**

Before discussing this experiment, some background information…

"NO RINSE" is a phrase that is frequently used in conjunction with iodophor. Manufacturers of iodophor claim that, when used in a solution of 12.5 ppm., there is no need to rinse the solution from items. They say that the item should be merely air dried. Dr. Landman opined that air drying wasn't really necessary. I, for one, have never been comfortable with that concept. The odor of iodine from a freshly sanitized carboy is far too intense for me to believe that there would be no deleterious effect upon contact with my beer. No way am I going to take 5 gallons of carefully crafted wort and throw it down that stinking hole! Neither have I been willing to "air dry" the sanitized carboy. First off, I would have to build or buy some sort of holder to keep the carboy inverted for the extended drying period, secondly, I can still smell that iodine even after it has dried and thirdly… how do I know that the carboy won't become contaminated at some time after drying?

With the above reservations in mind, I have always rinsed items after sanitizing them. My water is chlorinated after all, and I shouldn't have to worry that my tap water contains beer spoiling bacteria. Dr. Landman explained that while my tap water may be chlorinated by the city, that does not mean that my faucet, hoses or plumbing are not capable of harboring bacteria. He went on to say that he has never had a brewer complain of iodophor odor or flavor manifesting itself in finished beer when the container has been at least well drained.

Not air dried….just drained? Horse Puckey! We'll just have to put this to the test…

I filled a 5 gallon carboy with water and added ½ fluid ounce of iodophor to provide 12.5 ppm. of titratable iodine. I let the solution sit for about 20 minutes, then poured off 1 quart of the solution into a clean mason jar and sealed it tightly. I would use this to contaminate samples for the taste test to follow. I then picked up the carboy and dumped the rest of the contents. I let the carboy drain until it dripped very slowly, put the carboy upright, covered it with a piece of aluminum foil and left it alone for 15 minutes. After 15 minutes, I found that approximately 1 tsp. of solution had collected in the bottom of the carboy. I removed the aluminum foil and gave the inside of the

carboy a sniff. As expected, it reeked of iodophor. I had emptied the carboy as I normally would, and had let it drip no longer than I felt I was willing to do on a "normal" and ongoing basis.

The question is now … will one teaspoon of iodophor, (at a strength of 12.5 ppm), be detectable to a discerning palate when mixed into 5 gallons of beer? I don't want to "contaminate" that much beer to find out, but am willing to sacrifice say… a quart.

Ok. My exemplary math skills and well-oiled logic tells me…

1 tsp. in 5 gallons = 1/20th tsp. in 1 quart.

Cool, now who has a 1/20th tsp. measure? I don't, but I do have some 1 ml. pipettes. Lets see… a teaspoon is 5 milliliters and 1/20th of that is 0.25 ml. Voila! I need to add 0.25 ml. of the iodophor solution to a quart of beer to obtain the same level of "contamination" that would exist in a 5 gallon batch that had been contaminated with 1 teaspoon of iodophor solution.

Please recall that we are adding 1 ml. of the 12.5 ppm solution to the sample, not 1 ml. of undiluted iodophor.

But, think I, "What the hell", let's make this a real test!" I decide to start the test at 4 times the "normal" amount. The equivalent of 4 teaspoons of iodophor solution left in the carboy. To make it even more unfair, let's taste-test it in distilled water before we test it in actual beer!

So I did. I enlisted the help of two folks who are known to me to have excellent and discerning palates. I placed before each of them three samples of water that had been commercially treated by distillation, reverse osmosis and filtration. One of the three samples was poured from a quart of that same water that I contaminated with 1 ml. of the iodophor solution that I had previously collected from the carboy. The samples in front of each taste tester were numbered 1 to 3 and to avoid the testers accidentally giving "clues" to each other, their contaminated samples were not in the same position.

To my surprise, both testers immediately nailed the contaminated sample. Surprised because as I was adding 1 ml. of the iodophor solution to the quart of distilled water, I was impressed by just how small an amount that 1 ml. actually was. I could see absolutely no color change as a result nor could I detect any odor. The testers could not detect a color variation or odor either. They both detected the contaminated sample by a very slight astringency on the top of the tongue… a "dryness". " My tongue just doesn't feel as wet on top", explained one tester. Again, this was at a level of contamination FOUR TIMES greater than I would expect to find in a batch of beer.

I repeated the experiment using 0.50 ml. of iodophor solution to contaminate the sample water. The samples were rearranged in different positions in front of the testers. In this test, which represented TWICE the amount of iodophor that would have actually been left in the carboy, neither of the testers could detect the contaminated sample.

I then repeated the test using Sierra Nevada Pale Ale instead of distilled water.

For this "beer" test, I doctored the contaminated sample with EIGHT TIMES the amount of iodophor that would be expected and neither of the testers could even guess at which sample contained iodophor.

Summary

Both testers easily detected iodophor in distilled water when the level of iodophor was 4 times "normal".

Neither tester could find the iodophor in distilled water at twice the "normal level".

Neither tester could detect iodophor contamination in SNPA at 8 times the "normal level".

NOTE: by "normal level", I mean the amount of iodophor that would be present when draining, (but not air-drying), a carboy as described earlier in this article.

Conclusion

I guess I won't be rinsing carboys after sanitizing with iodophor anymore! There just isn't any need to. Simply draining the carboy of the iodophor solution left only 1 teaspoon of solution behind and no tester could detect iodophor even when the samples were contaminated with the equivalent of 8 teaspoons.

Iodophor and Yeast

I also had some reservations about using iodophor, (without rinsing), when sanitizing the bottles I use to make yeast "starters". Iodophor is deadly to yeast. To find out if a problem actually exists, I prepared two starters. These starters were prepared in exactly the same manner, (one quart mason jars), except one of the jars was rinsed after sanitizing while the other was merely "emptied", then inverted and shaken a few times to encourage excess liquid to fly off.

I added 8 fluid ounces of wort to each jar and inoculated each with 1/2 fluid ounce of yeast slurry collected from the bottom of a primary fermenter. 12 hours later, both starters appeared healthy and active.