WORKING GROUP I - Heavy Duty Wood Preservation
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# ALKYL AMMONIUM COMPOUNDS

## CURRENT STATUS - NOVEMBER 1987

In November of 1985, Peter Schaeufele of Lonza Inc. presented a paper to this Association on the chemistry of alkyl ammonium compounds. This paper was given in an attempt to differentiate between the various forms of alkyl ammonium compounds available and focus on those which are most applicable to wood preservative applications. This talk is being presented as an update of the current market status of alkyl ammonium compounds and specifically the didecyl dimethyl ammonium chloride, which is the most preferred product of the group.

## APPLICATION AREAS

The greatest use of didecyl dimethyl ammonium chloride in wood preserving applications is in sapstain control. This usage has gained in popularity during the last two years and currently represents the largest wood related application area for this chemical compound. The product is old in combination with an iodocarbamate from Troy Chemical as the two major components of NP-1 of Koppers, Inc..

In Canada, didecyl dimethyl ammonium chloride (Bardac 2280) has recently been granted provisional registration status. Registration for NP-1 will be sought by Koppers as soon as Troy receives provisional registration on their component of the formulation. It is hoped that this provisional registration for NP-1 will be granted some time towards the end of the first Quarter of 1988.

In anticipation of the usage of Bardac 2280 containing sapstain control products in Canada, our analytical personnel are currently developing procedures that will allow for the detection of parts per billion on effluent waters. These procedures will be used to develop standards in line with Environment Canada's recent effluent run-off standards on pentachlorophenol and other sapstain control products. It is hoped to have these analytical procedures available by mid 1988.

Interest in alkyl ammonium compounds for sapstain control applications is not limited to the United States or Canada. Didecyl dimethyl ammonium chloride is currently being used on a limited basis for sapstain control applications in France and is being registered in Iberia and Scandanavia at the present time. A research project has recently been instituted by the pallet industry in Holland for the evaluation of new sapstain control products for use on fresh cut lumber used to manufacture pallets in the Benalux countries. The alkyl ammonium compounds will be evaluated in this program.



## PRESSURE TREATING APPLICATIONS

The alkyl ammonium compounds are currently suitable for use in above ground applications. The American Wood Preservers Association has recently included didecyl dimethyl ammonium chloride in their standard for above ground pressure treating applications. Retention levels will be established at some future date. Application areas appear to be developing in the pressure treating of wood roofing shingles and window joinery treating by the double vacuum process.

Dialkyl dimethyl ammonium chlorides appear to be quite suited for treatment of joinery using the double vacuum process. The second vacuum of the process fixes the active ingredient at very high concentrations at the grain end of the joinery. This provides maximum protection at the areas of maximum susceptibility to microbial attack.

For effective control of pressure treated articles in in-ground environments, it is recognized that the alkyl ammonium compounds by themselves are not as effective as other preservative treatment. Combination products will be required to gain effective control. One such combination product is dialkyl dimethyl ammonium chloride/copper salts as are described in a number of patents issued to Domtar. These should be available for use some time within the next two to three years.

One area currently under development is the use of didecyl dimethyl ammonium chloride as the pressure treated preservative for wood blocks used to manufacture industrial floors. For this usage, Bardac 2280 is diluted with diesel fuel.

Didecyl dimethyl ammonium chloride is currently approved by the U.S. FDA for indirect food contact applications. Their acceptance in this area would lead one to believe that Bardac 2280 pressure treated lumber would have direct food contact acceptability. Information is currently being gathered in this regard so that the necessary evaluations can be performed to gain this acceptance by the Canadian authorities.

## THE NEW ZEALAND SITUATION

Information presented at the British Wood Preservers meeting this past summer was discussed and the current failures of wood in service that had been pressure treated with alkyl ammonium compounds and used for above ground applications in New Zealand. I would like to address this point in order to try and establish some clear guidelines on how this information should be viewed.

It is our understanding, based upon limited information, that only 1-1/2 percent of the treated lumber is showing signs of failure. This lumber was probably produced by a small number, or perhaps even one, treating plant. The alkyl ammonium compound used for treatment was an alkyl dimethyl benzyl ammonium chloride at a pressure treating retention level

of .2 lbs per cubic foot. This level is too low to provide adequate protection (as has been demonstrated by laboratory results over the last couple of years). We also question the type of quaternary that was used for treatment.

Aklyl dimethyl benzylammonium chloride quaternaries, in addition to being structurally different, are not nearly as effective against standard micro-organisms as is the dialkyl compound. For example, alkyl dimethyl benzyl ammonium chloride will require 400 parts per million active ingredient to control staph and/or Salmonella and 800 parts per million versus psedudomones. The dialkyls will control these organisms at 300, 300 and 500 parts per million, respectively. The alkyl dimethyl or ADBAC quats require between 1000-1400 parts per million to control (P. Ovale), while the dialkyls require 200 parts per million. ADBAC quats require 900-1000 parts per million to control T. interdigitali and C. Albacans, while the dialkyls can control these fungi with concentrations of 150 parts per million.

In addition to a reduced efficacy against organisms on an "as is" basis, the ADBAC quats are highly susceptible to deactivation by hard water. At 200 parts per million active quaternary, the ADBAC quats will be deactivated by waters of between 300-400 parts per million hardness. At the same active quat level, the didecyl dimethyl ammonium chloride will be effective up to 1600 parts per million hard water.

In addition to susceptibility to hard water, deactivation of the ADBAC quats are also caused by protein and other anionics. The dialkyls have much greater tolerance for these impurities.

As previously stated, our current state of information on the situation in New Zealand is quite sketchy; however, the above difference factors should be taken into consideration when viewing the results obtained with alkyl ammonium compounds in this application.