tween the salt and sugar solution suspensions. It was destroyed within 30 minutes at 50°C. and 5 minutes at 55°C. *Oidium lactis* resisted 60°C. for 30 minutes in all suspensions.

In general, these results agree with those of previous investigators, that, although species of molds vary slightly in their thermal death times, a temperature of 60°C. for 5 minutes is usually sufficient to assure complete destruction. Exceptions were observed in *Aspergillus niger* and *Oidium lactis*. *Aspergillus niger* resisted 60°C. (140°F.) for 10 minutes in some cases, and *Oidium lactis* survived after 30 minutes exposure. From the data it seems that the molds studied react differently towards sugar and salt. In some cases, the sugar protected the organisms more than the salt did, *e. g.*, *Aspergillus niger* and *Rhizopus nigricans;* and in the others, the salt protected more than the sugar did, *e. g.*, *Mucor mirus* and *Alternaria solani*. *Trichothecium* species acted practically the same way in both salt and sugar solution suspensions. As a general rule, the suspensions in distilled water and cherry juice acted very much like those in salt solution. From the former observation, one might conclude that the salt itself was neither harmful nor beneficial to the molds, and consequently, that the sugar exerted a protective action in some cases or a destructive one in others, depending on the nature of the mold. According to Rahn[5] the effect of sugar is protective, the sugar causes a dehydration of the organism, making it more resistant. However, the heat penetration studies of Bigelow[6] lead one to believe that heat penetration might play an important part in this protective action of sugars. The fact that there was no difference between the different sugar solutions, however, presents an argument against this explanation.

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The Action of Carbon Filters.

S. P. KRAMER. (Introduced by J. H. Northrop.)

If one filters 100 cc. of a 1% solution of bichloride of mercury through a filter made of 5 gm. of finely divided activated carbon there is no mercury in the filtrate. If one filters through such a filter

[5] Rahn, O., *Canning Age*, August, 1928, 705.

[6] Bigelow, W. D., *et al.*, Bull. 16 L, Research Lab. Nat. Canners Assn., 1920.

100 cc. of a 1% solution of ferric chloride there is no ferric chloride in the filtrate but 92.5% of the iron is in the filtrate in the form of ferrous chloride. The carbon in both cases has reduced the perchlorides; in the case of mercury the mercurous chloride is insoluble and remains in the filter carbon; in the case of iron the ferrous chloride is soluble and passes through the filter.

Solutions of the toxins of the tetanus, diphtheria and *Botulinus bacilli* respectively were filtered through carbon and in each case the filtrate, when injected into guinea pigs in doses corresponding to 5000 M.L.D. were found to be innocuous. In each case some of the carbon through which the toxins had been passed was injected into guinea pigs.

In the case of the diphtheria toxin-carbon the animal showed no symptoms. In the case of the tetanus and botulinus toxin the animals died with the lesions and symptoms characteristic of the respective toxin.

The tetanus and botulinus toxins are formed under anaerobic conditions and are "immune" to reduction; they are adsorbed by the carbon but not destroyed by its reducing action.

The diphtheria toxin is formed under aerobic conditions and is both adsorbed and rendered innocuous or destroyed by the reducing action of the carbon.

If 50 cc. of a ½% solution of strychnine sulphate is filtered through such a carbon filter the filtrate is free of strychnine to the taste and gives no test for alkaloid, nor does it affect the frog.

The same thing is true of the carbon through which it has passed. One can get no taste, and when injected into the frog in amounts corresponding to a hundred fatal doses, no reaction takes place. Strychnine cannot be recovered from the carbon by acids, alcohol, nor any other solvent.

These filters are made by placing 5 gm. of carbo-raffin, dry, in a glass tube ¾ of an inch in diameter; one end of the tube contains a perforated stopper carrying a glass tube and on the orifice of the tube is a layer of cotton to retain the carbon. The carbon is compressed while still dry by means of the vacuum pump. Filtration is carried on under 750 mm. pressure.

Since this work has been done I have seen the note by Saunders, Schochet and Lackner[1] that strychnine, brucine, adrenalin, tyramine, and histamine were inactivated by carbo-raffin.

[1] Saunders, Schochet and Lackner, PROC. SOC. EXP. BIOL. AND MED., 1931, **28**, 564.