

Solidification Points, Degrees Centigrade

Beef tallow	38-46	Palm oil	36-45
Mutton tallow...	41-48	Cocanut oil	20-25
Lard	34-42	Palm-nut oil	20-25
Horse fat	33-7	Japan wax	59
Neatsfoot oil ...	26.5	Vegetable tallow...	45-53
Linseed oil	13.17	Olive	17-26
Tung oil	37	Arachis	23-29
Hemp oil	14-16	Cold-liver	18-24
Poppy-seed	16.5	Whale	24
Cotton-seed	32-36	Japanese sardine ..	28
Rape	12-18		

Melting Points, Degrees Centigrade

Oleic	4	Elaidic	51
Oxystearic	84-86	Stearic	69
Iso-oleic	44-45	Palmitic	62

This would readily account for the success of Mr. Garfield in his sludge-pressing and de-greasing work at Bradford. The acid treatment which is in use there, and which I had the pleasure of enquiring into a year ago, is introduced mainly to promote precipitation, the sewage being quite alkaline at the works. Precipitation starts when the sewage is about 8 grains alkaline to methyl-orange. The cost of heating the presses is not so material as one might generally be led to believe, in view of the fact that no evaporation takes place, and it is only the specific heat and the temperature range which has to be taken into count. My recollection is that in Mr. Garfield's plant the total operation of the works required about one ton of coal to forty tons of wet sludge, that is, sludge containing about 82 per cent. moisture. It works out to about one ton of coal to a ton of sludge as it comes from the presses with about 25 per cent. to 28 per cent. moisture, and which is further reduced by the heat of the mass to about 15 per cent. or 16 per cent. moisture by simply piling in the storage yards. This further improvement is assisted by the fact that after coming from the presses the sludge is made into egg-shaped briquettes, as has been indicated by Mr. Allen, which leave plenty of voids for the circulation of air. The introduction of heat has a further benefit in the fact that the viscosity of the water and of the melted fats is very much improved, and they escape readily from smaller openings or with higher velocities from the same opening.

As to the market for grease recovered from sludge, as far as I have been able to determine, there is but one considerable market, and that is for the manufacture of textile soaps. Some years ago it would probably also have been introduced into lubricants, but with our present knowledge of the behavior of the fatty oils in the presence of oxygen, which tends to liberate free fatty acids which have a corrosion action, it would appear that for the future the mineral oils will be used exclusively for that purpose.

The mineral oils do not materially interfere with pressing operations. Lubricating oils and greases which escape to the sewers will not tend to clog the press cloths. They are mainly manufactured from mineral oils and seldom solidify above 15° C. in winter, 5° C. in summer, different classes of oil being thus permitted at different seasons. Their viscosity, however, may be markedly improved by increasing the temperature of the sludge.

It is worth noting that the glycerol content of grease extracted from sewage will be low in view of the fact that fats in the presence of nitrogenous animal or vegetable impurities decompose readily into free fatty acids and

glycerol by enzyme hydrolysis. The acids will, in some of the processes, absorb oxygen and form the oxyacetic. The glycerol is also partially destroyed.

Grease extracted by solvent processes, which is about the only process left when the grease content is not in excess of 20 per cent., limits the market to its use in the soap industry or as adulterant to lubricating oils. The wool-washing industries should advance the art of local recovery, and this type of grease, largely composed of lanolin, cannot be hoped for in our sewage sludges. Lanolin recovered without the use of solvents, as is the practice in all the newer apparatuses, for this purpose has a very high market value. Hitherto it has proven impossible to remove the final traces of solvents which give it odor and preclude its use for certain purposes.

Nothing has been introduced into the paper suggesting the advantages of centrifuging sewage sludge. This should be a fertile field for experimental work in the near future. The type of centrifuge which I expect to see developed will be quite different from the earlier machines, principally introduced in Germany, in which the water was thrown through the sludge, the sludge being held on canvas or metal gauze somewhat similar to the arrangement in the ordinary laundry drier.

Dr. Bartow's experiments at Champaign with a very small centrifuge have shown very good results. The main disadvantage of centrifuges for sludge recovery or dewatering lies in the time required for cleaning operations.

In conclusion, it would seem practicable to group our incinerator and sludge-pressing plants and take some advantage of the heat usually available at such plants, for the English experiments have shown that there is no difficulty in conveying sludge long distances through pipes. The combination of the two will work just as well if centrifuges are introduced and low-pressure steam with vacuum condenser used for motive power.

It is the writer's confident opinion that the utilization of sewage sludge is not by any means a remote possibility, and that we may expect satisfactory returns from its manurial values as soon as we determine its limitations and make its application coincide more closely with soil requirements.

CLASS FOR FEMALE TRACERS

IN Detroit, Michigan, a class has been started at the Cass Technical High School to teach tracing to women.

There are no tuition fees and the necessary equipment is provided free of charge. Class hours are from 8 a.m. to 1 p.m. every day excepting Saturday and Sunday, and the course takes eight weeks. If there are a sufficient number of registrants, other classes will be conducted in the evenings. It is suggested by the school that women between the ages of eighteen and thirty are preferred, although no age limit has been actually established.

Condemnation of well waters as the result of inspections and analyses by the Illinois State Water Survey for the nine-year period from 1907 to 1916 shows that as the depth of the wells increases the percentage condemned as unsafe decreases. During the period named 11,281 wells were examined and of these 5,091, or 45 per cent., were condemned. For wells less than 25 ft. deep the percentage of condemnation was 74; 25 to 50 ft., 63; 50 to 100 ft., 36; more than 100 ft. deep, 14. Of wells with unknown depths the percentage of condemnation was 44, the total number of wells being 636.