Linseed Oils
H-19
H-575
Spencer Kellogg
ADM

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MEMORANDUM REPORT #M-36:

BODYING ECONOMICS OF CATALYZED LINSEED OILS VERSUS H-19

Various attempts to approach the speed of bodying of Chinawood Oil with catalyzed Linseed Oil have been made by several oil companies. H-575, Admolene, from ADM is a catalyzed oil which bodied in plant trials in less than 7 hours to the viscosity of VO-5053, Pale Heavy Litho Oil, in comparison with 9 to 10 hours for H-19, alkali refined Linseed Oil.

Spencer Kellogg has developed a more highly catalyzed oil, trade marked "Kelvitol", which is claimed to body in 3 hours with a fire time of approximately 1 hour and 15 minutes at 585° to 605°F and will hold that temperature without any further addition of heat. The bodied oil has better color, acid number and less loss in cooking than varnish linseed oil would yield. This exothermic reaction is only evident in plant batches of two drums or more. Laboratory batches do not show this exothermic reaction or the speed of bodying.

Also, ADM has just recently introduced a competitive oil, "Special Varnish Oil #27", which is similar to "Kelvitol". Although it is one half cent cheaper than "Kelvitol", it develops on bodying more color, higher acid number and requires about 30 minutes more bodying time than "Kelvitol".

From the above data, approximately three kettles of "Kelvitol" or "SVO #27" could be bodied to VO-5053 in the same period as one of H-19. Using these different bodying rates, the total

cost of production during an equal period of time for each oil was calculated, considering an increase in cost due to the handling of more oil per unit time. From this total cost, unit conversion costs were determined for each VO-5053 analog. Furthermore, the cost due to losses in kettling and in handling the bodied oil were estimated. A summary of these costs is given in the following table:-

Oil ----------	S-K's "Kelvitol"	ADM'S "SVO-#27"	Std. H-19
Book Cost------	$0.1758	$0.1699	$0.1606
Conversion-----	0.0051	0.0060	0.0132
Kettle Loss----	0.0035	0.0040	0.0078
Handling Loss--	0.0018	0.0018	0.0018
Total Cost	$0.1862	$0.1817	$0.1834

On the basis of these costs it is noted that ADM's "Special Varnish Oil #27" is approximately 0.2 of a cent per pound cheaper than H-19 and S-K's "Kelvitol" 0.3 cent per pound more expensive than H-19 to body to VO-5053.

Since there is no savings involved in the use of "Kelvitol", its only advantages would be in increased kettle capacity, good color and acid number. Although there is a saving in cost of bodied oil in the use of "SVO #27", this saving would be offset by its poor color and acid number as compared to H-19.

We are arranging to secure 6 drums of "Kelvitol" to actually determine in the plant its speed of bodying in production of bodied oil and varnishes, thus determining definitely the extent to which we can increase our production capacity by the use of present equipment, in view of possible future interest when the oil quota is increased.

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Cross References:

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H-19
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ADM.

Memorandum Report #

Supplement to Memorandum Report #M-36
Bodying of KH-3437, Kelvitol

During the last year the oil companies have developed highly catalyzed linseed oils which body very rapidly, in about 1/3 the time for regulary varnish linseed oil, in order to compete with the rapid bodying of chinawood oil. The Spencer Kellogg oil is trade marked "Kelvitol" and the ADM oil is called "Special Varnish Oil #27".

Memorandum Report #M-36 summarized the economics of these two catalyzed oils, "Kelvitol" and "Special Varnish Oil #27" versus H-19, Alkali Refined Linseed Oil when bodied to Z-4 to Z-6, the body of VO-5053, based on the claims of each company.

Since these oils develop their exothermic reactions of bodying only in large masses of oil, this rapid bodying can not be carried out in the laboratory. Therefore, "Kelvitol" was bodied in the plant to the body of VO-5053 using same size batch as used when H-19 is bodied.

Chart One indicates the rapid bodying of "Kelvitol." The following Table is an abreviated chart of the bodying of "Kelvitol":

The Bodying of Kelvitol

Start	65°F	1/8L B
62 min.	450°F	1/4H B
92 Min.	581°F	Fire Off
109 Min.	593°F	H
123 Min.	607	Add 4 gal Kelvitol
129 Min.	600°F	1/2# T

146 Min.	595°F	1/2H X
187 Min.	565°F	Z-3
221 Min.	528°F	Pulled from Cook Room

Final Constants	Specifications
Body 1/4L Z-5	Z-4-to-Z-6
Color 4.2	5 Max.
Gal. Wt. 7.99	8.03±0.05
Acid No. 9.24	10 ± 4

From this it can be seen that it is possible to obtain satisfactory bodied oil in about one third the time required for bodying H-19, since it takes approximately 10 hours to body H-19 to Z-4 to Z-6. However, as shown by Memorandum Report # M-36, there is no savings in money involved in use of Kelvitol in place of Alkali Refine Linseed Oil, H-19. The only advantage to be gained by use of Kelvitol would be an increase of kettle capacity with an increase of about a $0.005 per pound over bodied H-19 or V0-5053

In order to get the maximum advantage from Kelvitol a good control of temperature is required. This might be obtained by mechanical or inert gas agitation. The oil should be heated to 580-582°F afterwhich the kettle should be removed from the stack, the temperature of oil should rise to 600-605°F in 20 to 30 minutes, then the temperature should begin to drop. Z-3 should be reached at temperature of 575- 580°F . When finally cool the oil should have satisfatory body. When the temperature of the oil begins to drop the oil could be either kept in the kettle until Z-3 or 4 is reached or could be pumped immediately into storage tank were further bodying to Z-4 to Z-6 would take place. If the latter procedure could be followed the maximum time the oil would be held in the cook room would be 2½ hours which would cut considerable from the time of bodying of the oil as shown above.

In addition to the bodying of Kelvitol to VO-5053 a VC- 950 , grinding Vehicle, was cooked using unbodied Kelvitol The average time of cooking VC-950 using VO-5053, Bodied Linseed Oil, is approximately 8-10 hours. With the use of Kelvitol, VC-950 was cooked in 4 5/4 hours. However, the speed of bodying did not allow sufficient time for complete reaction between the varnish and the lime and as a result there was settling out of lime and soaps with a decrease in body.

An abreviated chart of the cooking of VC-950 with unbodied Kelvitol is shown below.

VC-950- Cooking Cycle

Start	0 Min.	
450°F	30 "	
550°F	37 "	Off Fire
575°F	56 "	Temperature Maintained
580°F	3Hrs.	"1 inch String
572°F	3 " 15 Min.	3 " "
582°F	3 " 30 "	Hair String from Curtain Add G-40
484°F	3 " 42 "	G-40 Melt Out Add G-213
450°F	4 "	G-212/ Kelvitol Added
455°F	4 " 10 "	Start Fire
540°F	4 " 26 "	Off Fire
560°F	5 " 6 "	" I "
570°F	5 " 37 "	" O "
	5 " 44 "	Thinned

	Constants	Specifications
Body	1/4 L K	M-Q
Gal. Weight	7.10	
Solids	46.3	45 1
Color	5.9	

The use of unbodied Kelvitol would increase the kettle capacity in the manufacture of varnishes which at the present time use bodied linseed oil, and in addition there would be a saving of approximately ¾¢ per pound on oil, based on figures quoted in Memorandum Report # M-36. However, certain precautions must be exercised because of its fast catalytic exothermic bodying to prevent too high temperatures and too rapid bodying. Furthermore, certain revisions would have to be made in existing formulas to take care of this rapid bodying of Kelvitol especially in limed varnishes, such as VC-950.

From the above cooking cycle of VC-950, it is seen that there is a too rapid bodying after the addition of the lime to procure maximum lime-rosin reaction. One method of improving this reaction would be to add the rosin at some point before a hair string from a curtain, such as at 1-3 inch string.

It should be recognized that bodied Kelvitol will probably act in a similar way in VC-950 type varnishes. Therefore the necessary revisions should be made in the manufacturing directions when bodied Kelvitol is used.

Kelvitol can be used to increase kettle capacity in the manufacture of bodied oil and of varnishes with an increase in cost of half a cent for bodied oils and a saving of three fourths of a cent for the oil in the manufacture of the varnishes now using bodied oil. However, differences in cooking must be compensated by changing manufacturing directions.

From the above constants its indicated that the lime was not sufficiently reacted to give the necessary soups and thus the body specified. Itsis recommended that