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Proposed movement of large amounts of power from Labrador to Canada and the U.S.A. requires large numbers of power capacitors with better low temperature characteristics than from Aroclor 1242. Similar requirements are called for in Sweden.

Aroclor 1242 capacitors can be switched with reasonable satisfaction down to - 40 or perhaps - 45° C.

The new requirement calls for switching down to - 60 and probably - 65°C. Westinghouse Canada are the most urgent, but others are also asking what does Monsanto have to offer.

Dr. Dakin of Westinghouse suggested possibility of Aroclor 1242 cut with 15 to 25% of chlorobenzene.

Our best suggestions are:

1. The same as Dr. Dakin's above
2. Aroclor 1232

But no one knows what happens to these things after long standing at - 50°C. to - 70°C. In addition to capacitance drop, the more serious consideration is possible crystal formation. Such crystals would not redissolve readily and the capacitor would be abnormal.

TCB forms crystals at +10°C.; TTCB at 0°C. to minus 15°C.; Aroclor 1232 has to be made by blending Aroclors 1221 and 1242 to avoid crystal formation above 1°C.

Chlorobenzene solubility in Aroclor 1242 at low temperature seems limited to around 25%. If this solvent comes out of solution, the components, namely chlorobenzene and Aroclor 1242 are obviously unsatisfactory, when separated. This is one of the reasons why we feel that something like Aroclor 1232 without chlorobenzene should be considered.

However, the Underwriters' turned down Aroclor 1232 when we sought

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approval for fire-resistance, regards calling this material an askarel dielectric. The blends of Aroclor 1242 and chlorobenzene would classify as askarels.

At this time there is not enough data at hand to estimate what the best thing available may be for this low temperature capacitor use. However, to get started for making a judgement, we list the following approximate low temperature data and economic values for items we now make or would make, promptly:

Product	Approximate Sale Price	Pour Point °C.	Cracking Temp
Aroclor 1242	15¢ Deliv.	Minus 19	Minus 60
Aroclor 1242 + 20% TCB	15¢ F.O.B.	" 32	" 80
Aroclor 1242 + 20% TTCB	15¢ F.O.B.	" 35	" 80
Pyranol 1481 (75% Aroclor 1254 + 25% TCB)	15¢ F.O.B.	" 24	" 70
Inerteen 54201 KA (70% Aroclor 1254 + 30% TCB)	13¢ F.O.B.	" 30	" 75
Aroclor 1232	15¢ Deliv.	" 35	" 70
Aroclor 1242	15¢ Deliv.	" 19	" 60
Aroclor 1254	15¢ Deliv.	Plus 10	" 30

The cracking temperatures are merely estimates and the time of cooling to arrive at them is quite questionable. The pour points were determined with reasonable accuracy.

Obviously Pyranol 1481 is not being suggested. It is merely included as a "bench mark". This blend was developed to meet low temperature requirements for JAN-C, "F" characteristic. This allows capacitance drop of not over 30% from 25°C. to minus 55°C. The point to note is that Aroclor 1242 barely fails to meet this requirement. Accordingly, question arises about a "straight" Aroclor such as Aroclor 1232 at such extremely low temperature as minus 65°C.

While we would like to sell Aroclor without chlorobenzene, e.g. Aroclor 1232 the questions about it are:

1. Lack of fire resistance
2. Capacitance drop
3. What are the low temperature properties at minus 65°C. for a relatively long period of time?

Looking at the blends the data at hand does not give much choice.

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The Inerteen 54201 KA blend would seem to hold most concern about separation down around minus 65° C. If it separated, the Aroclor 1254 which alone cracks at minus 30° C, would be a problem.

Aroclor 1242 plus chlorobenzene may also involve separation and crystal formation at minus 65° C. for long periods of time. However, as Aroclor 1242 seems to crack around minus 60° C. this problem would not be as great as with Aroclor 1254.

The Aroclor 1242 - chlorobenzene blends are known to be very sensitive to contamination. The chlorobenzenes we buy from Hooker are not known for "purity". Both factors present commercial handling difficulties not to mention that chlorobenzenes are real capacitor impregnation problems because of their volatility. No one seeks to use them.

Dr. Dakin's best thought seems use of Aroclor 1242 thinned with TCB. If Westinghouse want to buy this we will certainly supply. However, this seems such a mundane transaction that Westinghouse really seek our judgements whether indeed this may be the best solution to their problem, about which performance data appears lacking.

Before replying to Westinghouse shortly, please give us your thoughts from Research.

Thank you.

P. G. Benignus

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