Monsanto

FROM ANNISTON, ALABAMA CC:

DATE February 27, 1968

SUBJECT MINUTES OF AROCLOR PROCESS REVIEW MEETING

REFERENCE

TO Those Attending:

C. E. Anagnostopoulos
D. C. Armstrong
J. G. Bryant
W. B. Dunlap
J. C. Landwehr
V. R. Haupt
W. H. Howard
R. A. Haydel
D. C. Malm
G. W. Miller
W. B. Papageorge
W. R. Richard
H. Ray
W. F. Taffee
H. L. Williams
C. E. Woodward

H. Williams opened by stating that the purpose of the meeting was to review production and quality goals for Aroclor at the Anniston and WGK plants.

G. Miller discussed the quality of our competitors' chlorinated biphenyls and the Monsanto quality targets. At present the only competition lies with foreign suppliers, such as Bayer in Germany, Prodelec in France, and Kanekafuchi in Japan. Our present goal of 10,000 x 10^9 ohm cm resistivity was set to match the quality of 15,000 found in Bayer's material and 10,000 of Kanekafuchi. This goal is of most immediate importance on our being able to meet competition in Aroclor sales to Mexico and South America. Our goal for thermal chemical chlorides (TCC) is 0.10 ppm, while the current Anniston material is 0.17 ppm. This compares with a 0.07 for Bayer and 0.08 for Kanekafuchi. The goal on color is 10 APHA, compared to the present value of 15 for our Aroclor and 5 for our competitors.

C. Anagnostopoulos inquired as to how much implementing the latest technology would add to the cost of Aroclor. H. Williams indicated that the new porocel columns which will be installed to upgrade quality will actually decrease costs since manpower savings over the present earth treatment will be realized. He also stated that depreciation of the new capital equipment is the only process cost increase in the new upgrading.

D. Armstrong reviewed the scope of the divisional program concerning Aroclor. He stated that in a meeting in November 1966 it was concluded that it was not possible to produce and deliver high quality Aroclor with the technology available. The PR&D effort was then split up into programs: (1) measurement of electrical properties to be investigated by R. Munch at Organic Research, (2) stability improvement by J. Gloeckner at WGK, and (3) electrical properties improvement by J. Bryant at Anniston. D. Armstrong has been investigating the effect of using Esterhazy KCl in chlorine production since this has led to a $1 M/yr. savings, although it produces a higher bromine content in the chlorine. He stated that there appears to be approximately a 250 ppm threshold effect before bromine affects Aroclor quality. Laboratory chlorinations have indicated some instability with a higher bromine content. With an increase in chlorination temperature from 150 to 195°C and an increase in catalyst concentration from 0.05 to 0.2%, good

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TCC stabilities have been realized even with increased bromine contents. Armstrong also pointed out the importance of the biphenyl quality and how different batches can lead to different TCC stabilities as indicated by laboratory data.

J. Bryant next outlined the program which has been carried out in Anniston. A new cell cleaning technique was developed which gives a more reproducible electrical measurement than was previously achieved. Since the laboratory cell requires considerable time to clean and measure, an in line cell was developed which is virtually free of cleaning variations and will give routine and continuous measurement of the electrical properties on stream. The cell and associated electronic instrumentation can be designed into a portable unit which can be used to check the quality of Aroclor in the drum or tank car. It is possible this may be accepted as an ASTM test in the future.

Tests on upgrading the electrical properties led to the development of a porocel adsorbent column to replace the earth treatment now in use. This column delivers consistent high quality Aroclor and requires less operator time than in the past. For example, the column now in use treated 750,000 gallons of Aroclor and the filter at the base of the column required no operator attention. The earth treatment on the other hand requires changing of the filter press after each treatment. The porocel column is capable of delivering 30,000 x 10^9 ohm cm resistivity material within 36 hours of start-up. The TCC, as well, appears to be somewhat improved by the column treatment.

C. Anagnostopoulos inquired as to whether column treatment is being used by our competitors or whether foreign patents have been issued concerning such treatment. Bryant stated that we have no definite knowledge as to whether porocel columns are in use and that there appears to be only one patent covering the use of an adsorber for treating oils.

W. Richard asked about what problems we are having with electrical quality of mixes. He expressed the need to improve the purity of the Unox 206 additive. G. Miller stated that we are definitely limited by the quality of the Unox 206. Improvements might be realized if we required a higher purity of the Unox supplied by Shell Oil Co., or develop some method of pre-treating the Unox.

D. Armstrong reviewed the PR&D developments at WGK. He showed data which demonstrated that TCC values can vary from 0.10 to 0.55 by only changing the biphenyl batch. Although increasing catalyst concentration up to 0.2%, or increasing chlorination temperature from 150 to 200°C will improve TCC, their combined influence is not exactly additive. By employing these process changes the TCC has been reduced from 0.5 to 0.3 with the batch process. Further improvements should be realized when WGK goes to a continuous chlorination in December.

The WGK laboratory chlorinated samples would not pass G.E. specifications as indicated by differential IR scan. The isomer distribution also is changed somewhat but has not been correlated to TCC changes.

W. Richard emphasized the importance of making Aroclor of the same quality at both plants.

W. Dunlap described how the Anniston quality surveillance is effective in spotting trends in Aroclor quality. Resistivities which range from 1,000 to 5,000 x 10^9 ohm cm fall short of the 10,000 quality goal. TCC's have dropped from 0.3 in 1966 to 0.17 now, due to general improvements in the process. Resistivities at present drop from 30,000 out of the column to 2,000 - 4,000 in the tank car. Part of the drop is shown to be due to the lower values reported by the lab test as compared to the PR&D and in-line test methods.

W. Papageorge brought up the question of how we can see to it that the customer is able to measure the increase in quality which we plan to supply. J. Bryant pointed out that the in-line analyzer will be the solution to this problem since it is less subject to human error than laboratory measurements.

V. Haupt described the batch and continuous chlorination process at Anniston. He stated that ferric chloride catalyst levels have been ranging from 0.01 to 0.03%, or slightly below the scheduled level of 0.05%. Plans for blanketing the Aroclor during the entire process were described. This procedure will greatly reduce the possibilities of contamination from fumes and moisture from the air. It will also be necessary to purify and dry the air used to blow out the HCl after the chlorination. Vacuum degassing would also help avoid contamination during this process.

W. Howard pointed out that the catalyst is extremely hydroscopic and is poisoned to some degree by the moisture to which it is exposed during storage and while being transferred to the biphenyl mix tank.

H. Williams stated that a continuous distillation is a much needed improvement which would be the best solution to the varying gravity which we now observe during the ten batch distillation before drawing bottoms.

W. Richard suggested that N. Miller could help in designing a continuous distillation system.

J. Bryant next discussed plans for delivering a high quality Aroclor in drums and tank cars. Various drum liners have been tested but Dalbon and a clear epoxy phenolic appear to be the most promising. A design for automatic flushing and filling of the drums is being developed and will be installed in the new facilities now under construction. Improved tank car loading and cleaning procedures which will be necessary to meet increasing quality specifications were also described.

W. Taffee stated that the Aroclor department at Anniston will undergo a 10% increase in capacity in 1968 at a cost of $1.4 M. Twelve new storage tanks, as well as blend and solvent storage tanks, will be installed in the new warehouse along with new product loading facilities. Depending upon the hardware made available there is a potential for a reduction of five men in production and two in the warehouse.

H. Ray showed that the $1.5 M expansion at WGK involves a capacity increase of 30 M lb./yr. to 70 M lb./yr. This expansion will include new continuous chlorinators, stills, storage tanks, and a new control center.

C. Anagnostopoulos reviewed the long range plans for functional fluids. The financial objectives are to increase sales over 15% per year while maintaining a return on investment of 50% over divisional averages. To achieve these objectives

we must: (1) maintain and expand our present position in hydraulic fluids, lubricants, and Aroclor; (2) acquire three new businesses to realize a $5-10 M/yr. added sales by 1972; (3) effect manufacturing cost savings of $1.5 M by 1972; (4) reach a 25% excess annual capacity; and (5) achieve a greater customer satisfaction and recognition of Monsanto products.

C. Woodward detailed the present status of the waste heat recovery program. Therminol losses are still above the target of 50 ppm. If the process is proved workable, a potential sales of $1 M/yr. for therminol can be realized. A target date of midsummer is set for deciding upon the feasibility of the process. The type unit designed has the potential for recovering waste heat from gas fired furnaces but not for coal or oil.

W. Richard raised the question of whether the therminol fumes released into the air would pass the tightening requirements for pollution control. It was agreed that this matter would be given careful consideration and all existing regulations on air pollution checked.

R. Haydel outlined the biphenyl manufacturing process from the benzene raw material to the end products of biphenyl and Santowax. A capacity increase will be made possible with the modification of the tubular units now planned. If the yield were increased by faster feed rates, there would be a corresponding increase in the Santowax to biphenyl ratio. This would require an increase in sales in the HB-40 made from the Santowax which is now produced at a rate of 1 M lb./yr. more than the sales. A new separator will be added to more effectively separate the quaterphenyls, etc. from the terphenyls. This improved separation will result in a $200,000 a year savings in chlorine to produce solid Aroclors and will make possible an HB-40 of improved color.

W. H. Howard

W. H. Howard

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