The Application of Oscillographic Polarography in Some Textilchemical Investigations (V) Study on the Effect of Experimental Factors on Modified Melamine-Formaldehyde Synthetic Resin Precondensates

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The oscillopolarographic method had been used for the investigation of some modified melamine-formaldehyde precondensates. The building in of the modifying poly(ethyleneglycol)s and the effect of some conditions of the reaction may be followed with certain limits with this method.

In earlier publications some applications of A. C. oscillographic polarography in textilchemical investigations had been shown [1—6]. As a further example for the applicability of this method here some results will be summarised having been obtained in course of the study of certain modified melamine--formaldehyde synthetic resin precondensates.

Some experiments were made for modifying the Melaform 150 [8] by building in poly(ethyleneglycol) in the oligomeres of the precondensates instead of ethyleneglycol. The purpose of the oscillopolarographic measurements was to explaine the effect of the experimental conditions (pH, temperature, time) and the concentration of the modifying agents.

Experimental

For the oscillopolarographic measurements a similar instrumentation had been used as in the previous communication of this series.

The $dE/dt = f(E)$ curves had been studied. The supporting electrolyte in all oscillopolarographic measurements was the same: 1 M-KCl. 0.03 % was the concentration of samples in the cell.

The samples had been prepared by the usual technology of the melamine-formaldehyde precondensates [7].

The oscillopolarographic behaviour of formaldehyde [9], poly(ethyleneglycol)s [1] and methylol compounds [10, 11] is known but it was necesarry to clear up that of the melamine and some unmodified melamine-formaldehyde precondensates.

The melamine causes three incisions at the $dE/dt = f(E)$ curve of the 1 M-KCl solution at Q 0.16, 0.26 and 0.28 (Fig. 1).

The Cassurit MLP (Casella) does not causes incision at the oscillogram only the charakteristic deformation of the cathodic branch which had been observed [12] at somewhat different models containing oligomers of ideal quality.

At the oscillogram of Melaform 150 (United Chemical Works) this deformation goes over to an incision at Q 0.83 (Fig. 2).

Results and Discussion

It is supposed that the building in of the glycols yields ether-type bonds between the glycol and the methylol groups of the precondensates. This etherification may be followed by the cut-in of the poly(ethyleneglycol)s

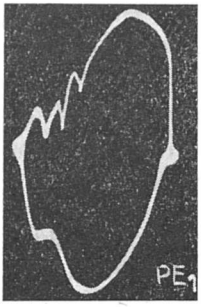

Fig. 1. $dE/dt = f(E)$ curve of 10^{-3} M melamine solution in 1 M-KCl.

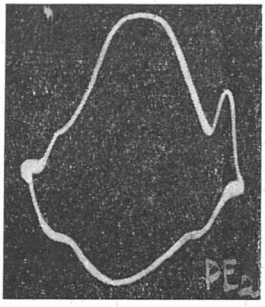

Fig. 2. $dE/dt = f(E)$ curve of Melaform 150.

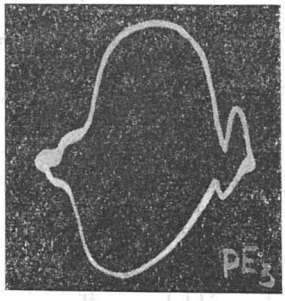

Fig. 3. Precondensate with poly(ethyleneglycol) P 18.

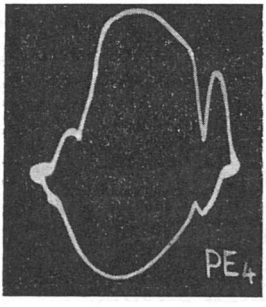

Fig. 4. Precondensate where the methylol groups are not completly etherificated.

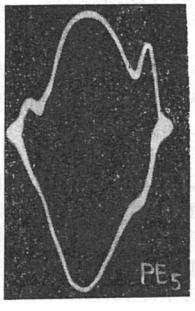

Fig. 5. The effect of pH on the final product [modif. with poly(ethyleneglycol) P 6]; pH 7.6.

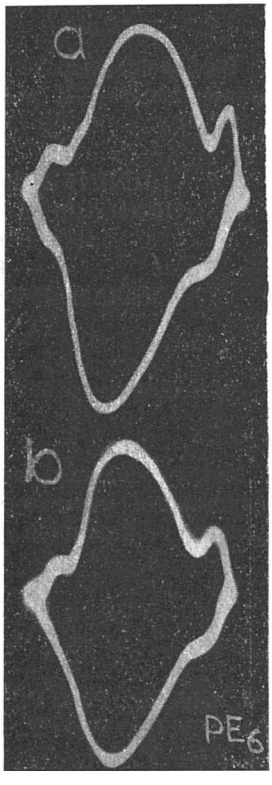

Fig. 6. The effect of time of the reaction at a precondensate modif. with poly(ethyleneglycol) P 6. *a*) 1 hour; *b*) 2 hours.

(Fig. 3). At compounds where the building in of the glycols is not complete the both the incisions of the glycol and the methylol group [12] appear (Fig. 4).

The effect of pH is well observable too. The building in of the glycols is better at higher pH values as it is visible from the oscillograms of Fig. 5.

The reaction temperature in the range of 90—101 °C does not show any effect at the oscillogram of the final product.

In some cases the reaction time has a pronounced effect on the precondensates (Fig. 6).

If these results are compared with those of the textile technical measurements a good agreement is obtainable. The best quality is shown by those products where the building in of the glycols is the most advanced.

APLIKÁCIA OSCILOGRAFICKEJ POLAROGRAFIE V TEXTILNEJ CHÉMII (V) ŠTÚDIUM EXPERIMENTÁLNYCH FAKTOROV OVPLYVŇUJÚCICH PREKONDENZÁCIU SYNTETICKÝCH ŽIVÍC TYPU MELAMÍN-FORMALDEHYD

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Oscilopolarografická metóda sa využila na stanovenie modifikovaných melamín-formaldehydových prekondenzátov. Skúmali sa pozmenené podmienky tejto reakcie.

ПРИМЕНЕНИЕ ОСЦИЛЛОГРАФИЧЕСКОЙ ПОЛЯРОГРАФИИ К НЕКОТОРЫМ ТЕКСТИЛЬНОХИМИЧЕСКИМ ИССЛЕДОВАНИЯМ (V) ИЗУЧЕНИЕ ЭКСПЕРИМЕНТАЛЬНЫХ ФАКТОРОВ, ВЛИЯЮЩИХ НА ПЕРЕКОНДЕНСАТ МЕЛАМИН-ФОРМАЛЬДЕГИДНОЙ СИНТЕТИЧЕСКОЙ СМОЛЫ

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Метод осциллографической полярографии был применен для определения модифицированных меламин-формальдегидных переконденсатов. Исследовали измененные условия этой реакции.

Preložil I. Smoleň

REFERENCES

1. Pályi Gy., Péter F., *Magyar Textiltechnika* ***14***, 277 (1962).
2. Pályi Gy., Péter F., *Magyar Textiltechnika* ***15***, 283 (1963).
3. Péter F., Pályi Gy., *Magyar Textiltechnika* ***15***, 462 (1963).

4. Pályi Gy., Péter F., *Lecture. XIXth Congress of the IUPAC*, 10.—17. July 1963, London.
5. Péter F., Pályi Gy., *Lecture. Hauptjahrestagung*. Chemische Gesellschaft in der DDR, Leipzig 1962.
6. Péter F., Pályi Gy., *Magyar Textiltechnika* **14**, 294 (1962).
7. Robinson T., *Nekrčivá úprava textílií*. Slovenské vydavateľstvo technickej literatúry, Bratislava 1956.
8. Ipari Segédanyaggyár (now: United Chemical Works) Munkaközössége: Textil- és Böripari Segédanyagok. Ipart Segédanyaggyár Kiad., Budapest 1956.
9. Heyrovský J., Kalvoda R., *Oszillographische Polarographie mit Wechselstrom*, 118. Akademie-Verlag, Berlin 1960.
10. Gy. Gergely Á., *Chem. zvesti* **16**, 358 (1962).
11. Gy. Gergely Á., *Final Research Account. Research Institut for Textile Industry*, Budapest 1962.
12. Pályi Gy., Szentirmay Á., *Final Research Account*. United Chemical Works, Budapest 1962.

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