Trituration of gel particles as a function of the viscosity of the spinning solution is shown in Fig. 2. "Trituration time" in this case means the time the gel particles remain in the velocity gradient field where they undergo deformation $\varepsilon = 1$. The shear strength of the gel particles is set equal to 10^8 dyne/cm^2 (~ 1 kgf mm^2). The velocity gradient is 10^3 sec^{-1}. The practically applicable duration of treatment, equal to 2-10 sec, is attained for a viscosity of $(10-50)10^3$ P.

The ultrapure acrylic spinning solutions for spinning PAN fibres and twists used as the precursor in production of high-strength carbon fibres can probably be fabricated with the above scheme, i.e., by trituration of gel particles in a highly viscous spinning solution. É. A. Pakshver and L. M. Beder came closest to this in proposing dissolution of suspended PAN powder in dimethylformamide induced by generation of heat due to internal friction in a screw-type apparatus. The spinning solution was heated to 70-80°C due to the high viscosity and high shear rate. This method can be used for dissolving PAN powder obtained by suspension polymerization, which is suitable for production of high-strength carbon fibres only to a limited degree due to the unfavorable molecular-weight distribution.

In summarizing the above, we note that it is possible in principle to significantly increase the degree of purity of spinning solutions by hydrodynamic treatment in a high velocity gradient or with high shear stress. Preference should be given to processing with high shear stress. The gel particles contained in the spinning solution have shear strength (viscosity) of 1 kgf/mm^2 (10^8 dyne/cm^2) and can be destroyed with a spinning solution viscosity of 10^5 P.

The arguments reported in this article can probably equally be extended to polymer melts, in which it is also necessary to remove gel particles.

ERRATA

To the article "Effect of Preliminary Loading on the Deformation and Strength Properties of High-Strength Fibres" by E. S. Tsobkallo, O. I.Nachinkin, and V. A. Kvartskheliya (Fibre Chemistry, Vol. 30, No. 3, pp.168-171, May-June, 1998).

Figure 3 and its caption on page 170 is incorrect. The correct figure and caption are given below:
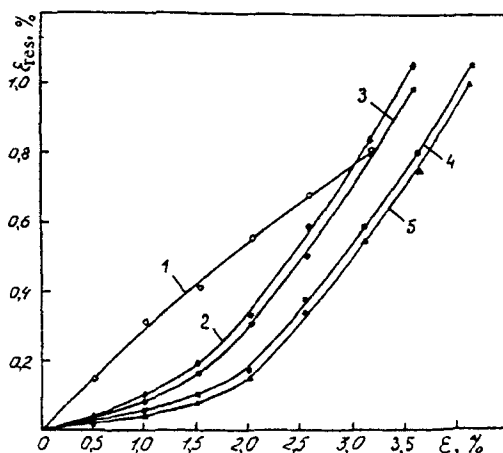

Fig. 3. Residual vs. previously defined deformation of fibres:
1) high-strength PE; 2) Kevlar; 3) Terlon; 4) Armos; 5) SVM.