TSVETKOV, V.N.; SKAZKA, V.S.; KIRVORUCHKO, N.M.

Relation between the molecular weight and the intrinsic viscosity of stereoregular polymethyl methacrylate fractions in benzene. Vysokom.soed. 2 no.7:1045-1048 Jl '60. (MIRA 13:8)

1. Fizicheskiy institut Leningradskogo gosudarstvennogo universiteta i Institut vysokomolekulyarnykh soyedineniy AN SSSR.
(Methacrylic acid)

86292
S/190/60/002/008/003/017
B004/B054

15.8105 2209

AUTHORS: Tsvetkov, V. N., Boytsova, N. N.

TITLE: Stereoregularity and Optical Anisotropy of Molecules of Polymethyl Methacrylate

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 8, pp. 1176-1187

X

TEXT: The authors discuss the effect of stereoregularity of a polymer on the physical properties of its molecules. They arrive at the opinion that the measurement of optical anisotropy should be a sensitive method of structure determination. In a previous paper (Ref. 29), they had proved that isotactic and atactic polystyrene show considerable differences in optical anisotropy. The present paper studies the effect of stereoregularity of the molecular chain on optical anisotropy in polymethyl methacrylate (PMMA). The following PMMA samples were used: sample A, isotactic, vitrification temperature $T_v = 50^\circ C$; sample B, atactic, $T_v = 110^\circ C$; sample C, syndiotactic, $T_v$ above $110^\circ C$. Samples A and C were dissolved in benzene,

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Stereoregularity and Optical Anisotropy of Molecules of Polymethyl Methacrylate

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centrifuged, and decomposed by precipitation with hexane into fractions which showed a regular dependence of the Kerr effect on the electric field applied. Next, the double refraction $\Delta n$ in flowing benzene solution was measured as a function of flow velocity. A linear dependence $\Delta n = f(g)$ was found. From the reduced double refraction $\Delta n/g\,\eta_0 c$ ($\eta_0$ = viscosity of solvent, c = concentration of polymer), the following relation was calculated by extrapolation of experimental data: $[n] = \lim_{c \to 0} (\Delta n/g\,\eta_0 c)$. Further, the intrinsic viscosity $[\eta]$ was determined. The segment anisotropy $\alpha_1 - \alpha_2$ of the macromolecules was calculated from these values: $[n]/[\eta] = 4\pi\left[(n_{sol}^2 + 2)^2/45 n_{sol} kT\right] (\alpha_1 - \alpha_2)$. These values are given in Table 1: (M = molecular weight)

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| Polymer | Fraction | $M \cdot 10^{-5}$ | $[\eta] \cdot cm^3/g$ | $[n] \cdot 10^8$ | $[n]/[\eta] \cdot 10^{10}$ | $(\alpha_1-\alpha_2) \cdot 10^{25} cm^3$ |
|---|---|---|---|---|---|---|
| isotactic (A) | III | 3.2 | 82 | 1.86 | 2.19 | 26.1 |
| | IV | 2.0 | 58 | 1.20 | 2.07 | 24.7 |
| | VII | 1.15 | 37 | 0.72 | 1.94 | 23.2 |
| | VIII | 0.8 | 28 | 0.50 | 1.78 | 21.3 |
| (C) | III | 4.7 | 66 | 0.09 | 0.13 | 1.4 |
| atactic (B) | not fractionated | 5.2 | 120 | 0.18 | 0.15 | 1.8 |

Further, the optical anisotropy was calculated according to W. Kuhn (Ref.20): $\alpha_1 - \alpha_2 = 7.5(a_{\parallel} - a_{\perp})$. The following values wer found for $(a_{\parallel} - a_{\perp}) \cdot 10^{-25}$ $cm^3$: sample A: 3.3; sample B: between 0.19 and 0.24. Thus, the anisotropy of molecules of the isotactic polymer is 14 times higher than that of the atactic one. This increase in anisotropy on transition from the atactic to the isotactic structure is explained by a change of rotation around the stretching vibrations in the ester side group of PMMA. No differences were observed between the optical properties of the atactic (B) and syndiotactic (C) polymer. Consequently, these samples should have similar

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Stereoregularity and Optical Anisotropy of Molecules of Polymethyl Methacrylate

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microstructures. Double light refraction is a sensitive method of studying the degree of stereoregularity of a polymer. The authors thank A. A. Korotkov and S. P. Mitsengendler for supplying the samples. There are 8 figures, 2 tables, and 39 references: 19 Soviet, 10 US, 1 British, 1 French, 1 German, and 1 Swiss.

ASSOCIATION: Fizicheskiy institut Leningradskogo gosudarstvennogo universiteta
(Institute of Physics of Leningrad State University)

SUBMITTED: March 19, 1960

Card 4/4

S/054/61/000/004/003/009
B108/B138

AUTHOR: Tsvetkov, V. N.

TITLE: Some methods of studying flexibility and shape of macromolecules

PERIODICAL: Leningrad. Universitet, Vestnik. Seriya fiziki i khimii, no. 4, 1961, 39 - 63

TEXT: The author discusses methods of determining the size and the flexibility of molecular chains. Such methods may involve light scattering, viscometry, determination of diffusion coefficient, etc. Solutions of polymers are particularly suitable for these kinds of measurements. However it must be noted that the molecular chains are not branched. Numerical data are given on the length and the equilibrium flexibility of a number of polymer chains. A molecular chain is more or less tangled and has the shape of an ellipsoid when the polymer is dissolved. At the moment the only experimental method of determining the asymmetry of such molecular ellipsoids is that based on the birefringence of a flow of polymer solution (dynamooptical effect). Structure, flexibility, and optical anisotropy of the molecular chains are discussed and a few numerical

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Some methods of studying flexibility... B108/B138

data are given which are mostly taken from other publications. Dynamic flexibility may be studied either viscometrically or by methods involving dynamical birefringence. There are 1 figure, 4 tables, and 115 references: 59 Soviet and 56 non-Soviet. The three most recent references to English-language publications read as follows: W. R. Krigbaum, L. H. Sperling. Wiesbaden symposium, II A I, 1959; P. S. Scherer et al., J. Polymer Sci., 43, 531, 1960; F. Bueche, J. Polym. Sci., 41, 549, 1959. ✓

Card 2/2

S/191/[illegible]/000/00[illegible]/001/010
B101/B2[illegible]

AUTHORS: Tsvetkov, V. N., Kanavets, I. F., Polikarpova, M. P.

TITLE: Study of the swelling process of polyvinyl chloride resins

PERIODICAL: Plasticheskiye massy, [illegible]

TEXT: This paper deals with the problem of plasticizing polyvinyl chloride (PVC) resins used for cable insulation. The effect of the adsorbed plasticizers on the quality of the plasticized resin is discussed. The authors studied processes of swelling to eliminate an excess of the plasticizer and thus increase the efficiency of the extruder. The study was conducted by determining the residual compressibility G of the powdery PVC. G was determined after the resin had been mixed with 30 % of the ВСФ (VSF) plasticizer (phthalate of higher $C_7$-$C_9$ alcohols) at room temperature, heated in a thermostat between aluminum plates (maximum layer thickness: 2 mm), and, after swelling, cooled down to room temperature. The plasticized resin (1.2 g) was then filled into a cylindrical container (diameter: 10 mm) and loaded in an elastometer at a linear piston velocity

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of 27.5 mm/min. for 8-12 sec up to a maximum of 500 kg/cm$^2$. As soon as the maximum was reached, the piston was removed and the initial height $h_1$ of the sample was measured with an error of 0.01 mm. After 5 min. the final height $h_2$ was measured. G was calculated from $G = \Delta V/V = 100 \% (h_1 - h_2)/h_1$, where $\Delta V$ denotes the change in volume within 5 min at a constant load, and V the volume measured when the load of 500 kg/cm$^2$ was reached. The mean error was $\pm$ 3%. PVC resins of type ПФ-спец. (PF-spec.), viscosity $\eta = 2.34$ and 2.46, ПФ-4 (PF-4), and $\eta = 1.78$. All three resins showed comparable results. Non-adsorbed plasticizers had only a slight effect upon the measured value. Two stages are distinguished. The plasticizer first diffuses into the polymer. The viscosity decreases, but the mobility of the polymer chains is still low. Then swelling sets in and the mobility of the polymer chain increases. The process of swelling varies according to the viscosity and structure of the resin and the various admixtures. The time $\tau$ required for heating a resin by a 30 % plasticizer so strongly that G equals 1 %, increases as the initial $\eta$ of the resin increases. The resins PF-4 had been heated up to 70-100°C, and PF-spec. up to 80-120°C before G was determined. $\tau$ decreased as the temperature increased. It was found that $\tau$ in PF-4 heated up to 80-90°C is considerably shorter than that

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B101/B215

Study of the swelling process of...

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of the standard (2 hr). In PF-spec. heated up to 70°C, swelling does not even stop after 4-6 hr. This resin swells very slowly even at 80°C. Above 100°C, $\tau$ of all resins is shorter than the standard time. The time of swelling can therefore be reduced by increasing the temperature in the mixer. The above method of determining G is suited for research work and for quality control of PVC resins. Yu. A. Machikhin is mentioned. The authors thank Ye. Ye. Glukhov for assistance. There are 8 figures, 1 table, and 6 references: 5 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: R. A. Horsley, Plastics Progress, 77 (1957).

Card 3/3

23774

S/190/61/003/006/017/019
B110/B208

15 8103 2209

AUTHORS: Tsvetkov, V. N., Vitovskaya, M. G.

TITLE: Photoelastic effect in the stereoisomers of polymethyl methacrylate. I. Atactic and syndyotactic polymers

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 6, 1961, 931 - 935

TEXT: The sensitivity of the optical anisotropy of polymethyl methacrylate molecules to structural stereoisomerism may also be used for the quantitative determination of stereoregularity if no crystallization results. The optical anisotropy of the phase dispersed in benzene solution of isotactic PMMA is negative (presence of crystallite), contrary to the positive one of dissolved macromolecules. Unilateral elongation should give rise to uniaxial orientation of the chain molecules of the amorphous and crystalline fractions. In the present paper the orientation in the films of some PMMA stereoisomers is studied by means of the photoelastic

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B110/B208

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effect. The following samples were tested: one of the syndyotactic PMMA fractions (sample C), and a non-fractionated atactic PMMA sample (sample B) which had been obtained by complete polymerization at room temperature. Sample C was polymerized by ionic catalysis at low temperatures in the laboratory of A. A. Korotkov, and fractionally precipitated from benzene solutions by methanol. The authors selected 0.1 - 0.3 mm thick, 0.55 cm broad and 3 cm long transparent and optically homogeneous samples without visible crystallites. The molecular weights were determined by the light scattering method (Table). The vitrification temperature $T_{vit}$ was for both samples ~110°C. The measuring device for birefringence was described by the first author in Ref. 2 (Vysokomolek. soyed., 2, 1045, 1960) and in Ref. 3 ( Vestnik Leningradskogo Universiteta, 1956, No. 16 (3), 5). The phase difference $\delta$ caused by elongation under the action of the force F was determined on the penumbral by Brace. The birefringence $\Delta n$ which was formed in the film under stress of the constant elongation weight F was measured. The photoelastic effect $\varepsilon$ was determined according to $\varepsilon=\Delta n/p=\delta(\lambda/F)h_0\alpha-1/2$, where $\Delta n$ = difference of the refractive indices at the elongation stress p; $h_0$ = film width in non-deformed state; $\lambda$ = length

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Photoelastic effect in the...

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B110/B208

of the light wave; $\alpha$ = relative film length under stress. Temperatures were above and below the vitrification temperature, low stresses were applied, in which $\alpha$ differed by $\leqslant 5\%$ from the unit. The curves in Figs. 1 and 2 are similar for atactic and syndyotactic stereoisomers and characteristic of "retarded" photoelasticity. The equilibrium values of the birefringence are proportional to the stress $p_0$ (Fig. 3). The inclination of the straight line of Fig. 3 gives the photoelastic coefficient $\varepsilon$ for each temperature. Fig. 4 shows the temperature dependence of $\varepsilon$. The similarity of the photoelastic properties of the two polymers indicates a relationship of their microstructures. The curves of the time dependence on $\Delta n$ (Figs. 1 and 2) and the proportionality of the equilibrium values $\Delta n$ as a function of stress $p_0$ (Fig. 3) are characteristic of the photoelastic properties of linear polymers in high-elastic state. The birefringence of the two polymers is a typical photoelastic effect which is usually observed in amorphous polymers and which is due to orientation of molecular chains in the direction of elongation. The segmental anisotropy may be calculated from $\varepsilon$ according to the formula of the statistical theory: $\varepsilon = (2\pi/45kT)\cdot[(n^2+2)^2/n]\cdot(\alpha_1-\alpha_2)$. The results are summarized in the Table. The temperature course of the photoelastic coefficient of

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atactic PMMA (Fig. 4) has already been dealt with by the first author (Ref. 1: Vysokomolek. soyed. 2, 1176, 1960; Ref. 4: Zh. tekhn. fiziki, 28, 97, 1958). A change in amount and sign of $\delta$ and $\alpha_1-\alpha_2$ in the high-elastic state (110 - 200°C) may be explained by a change of the elongation character in the lateral ester group. When the temperature is raised, the mean position of the atoms of the ester group is removed from the plane that is normal with respect to the chains of the principal valencies. This results in a decrease of negative anisotropy, change in sign, and increase of the positive anisotropy. The syndyotactic polymers whose microstructure is closely related to the atactic one behave in a similar way. The values of the segmental anisotropy $\alpha_1-\alpha_2$, which were obtained at 190°C in the mass are close to the values of $\alpha_1-\alpha_2$ found in the solutions. There are 4 figures, 1 table, and 7 references: 6 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Institut vysokomolekulyarnykh soyedineniy AN SSSR (Institute of High Molecular Compounds of the AS USSR)

SUBMITTED: November 9, 1960

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25272 S/190/61/003/007/015/021
B101/B226

15.8070

AUTHORS: Tsvetkov, V. N., Vitovskaya, M. G.

TITLE: Photoelastic effect in stereoisomers of polymethyl methacrylate. II. Isotactic polymer

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 7, 1961, 1077 - 1083

TEXT: In a preceding paper (Vysokomolek. soyed., 3, 1077, 1961), the atactic and syndiotactic polymethyl methacrylate (PMMA) had been studied with respect to optical anisotropy. In the present paper, the authors studied isotactic PMMA by the same method. Fig. 1 shows the typical curves of birefringence with constant voltage for three fractions of isotactic PMMA. Figs. 1а, б, в were recorded below vitrification temperature ($T_g$ about 50°C), Figs. 1г, д, е, ж, з above this temperature in highly elastic state of the PMMA films. Therefrom, the following is concluded: (1) Birefringence $\Delta n$ is positive and occurs with retardation when tension is engaged. When the current is switched off, relaxation takes place. (2) In low-molecular fractions, positive anisotropy

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decreases the more rapid above $T_v$, the lower the molecular weight (M), and becomes negative. Negative anisotropy relaxes very slowly. It is assumed that two effects are superposed here. (A) The first effect is caused by orienting the molecular chains of the amorphous part of the polymer, and is analogous to the birefringence of atactic and syndiotactic PMMA. It is called photoelastic effect. The equilibrium value of birefringence $\Delta n$ is proportional to the voltage. Transition to the highly elastic state causes a rapid increase of the photoelastic coefficient $\varepsilon$. At this state, its value is the same for all isotactic fractions ($\varepsilon \cdot 10^{12} = +12.7 - +15.0$ cm$^2$/dyne) and three times larger than in syndiotactic and atactic PMMA. Segment anisotropy $(\alpha_1 - \alpha_2) \cdot 10^{25}$ cm$^3$ was found to be equal to 3.5 - 4.1, and is twice as large as in non-isotactic PMMA. This increase of positive $\Delta n$ is explained by a change of nature of rotation about the valence bonds in the ester side group of the molecular chain. (B) The second component of birefringence of isotactic PMMA is negative. It develops only gradually with permanent application of current. This effect is explained by orienting the molecular chains being bound to crystallites, and called crystallite effect. The films investigated were chiefly of the amorphous type;

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B101/B226

their crystallinity could not be determined by X-ray structural analysis. Measurement of birefringence at a low voltage is thus a sensitive method for studying the crystallinity of polymers, if it cannot be proved otherwise. The crystallite effect becomes noticeable only above $T_v$. It is assumed that the short-range and long-range order being present in the crystalline phase promote inhibition of rotation about the side groups, and increase the negative anisotropy. The data on optical anisotropy previously found (Vysokomolek. soyed., 2, 1176, 1960) in solution by the dynamo-optical method are in qualitative agreement with the data obtained by the study of films. There are 5 figures, 1 table, and 4 references: 3 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Institut vysokomolekulyarnykh soyedineniy AN SSSR
(Institute of High-molecular Compounds, AN USSR)

SUBMITTED: November 9, 1960

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TSVETKOV, V.N., doktor fiziko-matematicheskikh nauk

Determination of the flexibility and form of macromolecules. Zhur.
VKHO 6 no.4:428-434 '61. (MIRA 14:7)
(Macromolecular compounds)

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TSVETKOV, V.N.

Methods for studying the flexibility and shape of macromolecules.
Vest LGU 16 no.22:39-63 '61. (MIRA 14:11)
(Molecules)

18292

S/190/62/004/006/018/026
B110/B138

15.8600

AUTHOR: Tsvetkov, V. N.

TITLE: The asymmetrical shape and optical anisotropy of short molecular chains

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 6, 1962, 894-900

TEXT: In the case of semirigid (short) chains the "persistent" length is $\overline{\cos\theta} = e^{-L/\alpha}$, where $\overline{\cos\theta}$ = mean value of cos θ, which is formed by the direction of the first and last link of the "persistent" chain, and L = length of the chain contour.

$$h^2 = 2a^2(x - 1 + e^{-x}), \qquad (3)$$

$$\overline{r^2} = a^2\left\{\frac{x}{3} - 1 + \frac{2}{x}\left[1 - \frac{1}{x}(1 - e^{-x})\right]\right\}, \qquad (4)$$

hold, where $\overline{r}^2$ = square of the inertia radius of the chain and $\overline{h}^2$ = mean square of the statistical length. With the persistent chain method variations in the asymmetrical shape and optical anisotropy can be studied for

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increasing contour length. The anisotropy is investigated on an extended rotating body having the inertia radius $\bar{r}^2 = \alpha H^2 + \beta Q^2$, $\alpha$ and $\beta$, depending on the model used. By using (3) and (4),

$$\frac{1}{p^2} = \frac{3}{2}\,\frac{(1/3)\cdot x - 1 + (2/x)\,[1-(1/x)\,(1-e^{-x})]}{x - 1 + e^{-x}} - \frac{1}{4}. \qquad (8)$$

is obtained. $p/p_0 = (2h^2LA/x)^{1/2}$ approximates to $x \sim 1$, where $p_0$ = ratio between length and cross section of the real, fully extended molecular chain. The anisotropy of a chain of n homogeneous links under the valency angle $\pi - \vartheta$ is,

$$\Delta b_n = \sum_{i=1}^{n} \Delta b_i = \Delta a \cdot \frac{1 - [{}^1/_2\,(3\cos^2\vartheta - 1)]^n}{1 - {}^1/_2\,(3\cos^2\vartheta - 1)}. \qquad (11)$$

where $\Delta a$ and $\Delta b$ = difference in polarizations. For the anisotropy of a chain with retarded rotation we have

$$\Delta b_\tau = \frac{2\Delta a}{3\sin^2 (} \cdot \frac{\overline{h_\tau^2}}{\overline{h_0^2}}, \qquad (15)$$

where $\bar{h}_{\tau}^2$ and $\bar{h}_o^2$ = the squares of the statistical chain length with and without delay. The effective anisotropy of a persistent chain of length L is: $\Delta b_L = \Delta b_{\infty}(1-e^{-L\beta/\Delta b_{\infty}})$, where $\Delta b_{\infty}$ gives the anisotropy of an infinitely long chain in relation to the axis tangent to the chain at its starting point (persistent anisotropy of the chain). It is proportional to the unit of length of the chain and depends on k and l: $\Delta b_{\infty} = -\beta l/\ln k$. $L\beta$ is the anisotropy of the straightened chain section of length l (contour anisotropy). As an experimental check, the anisotropy of short molecular chains of double optical refraction was investigated on aliphatic alcohols in cyclohexanol. The characteristic value [n] increases with the number of carbon atoms in the chain, but to a lesser degree than calculated. Short molecular chains were found to be more rigid than long chains of normal molecular weight. The accuracy of the method of the theoretical models must be clarified by further investigations. There are 5 figures.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet im. A. A. Zhdanova (Leningrad State University imeni A. A. Zhdanov)

The asymmetrical shape and...

S/190/62/004/006/018/026
B110/B138

SUBMITTED: April 13, 1961

Card 4/4

RASHEEV, Georgi, dots. inzh.; MIKHAILOV, K.; DOBREV, V.; SOTIROV, Iv.;
STATEV, N.; GUGOV, P.; TSVETKOV, V.

Conditions for the economic distribution of electric and thermal loads in the power system of Bulgaria. Izv Inst energ BAN 2:227-303 '62.

1. Chlen na Redaktsionnata kolegiia i otgovoren redaktor, "Izvestiia na Instituta po energetika" (for Rasheev).

TSVETKOV, V., laureat Leninskoy premii; SAFRONOV, S., inzh.

Silicate concrete in rural construction. Sel'. stroi. no.7: 5-6 '62. (MIRA 15:8)

(Sand-lime products)

35294

S/190/62/004/004/010/019
B117/B138

5.4100
15.8050

AUTHORS: Tsvetkov, V. N., Klenin, S. I., Frenkel', S. Ya., Fomicheva, O. V., Zhuze, A. G.

TITLE: Hydrodynamic properties of poly-β-vinyl naphthalene macromolecules in benzene

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 4, 1962, 540-545

TEXT: Diffusion constants, sedimentation coefficients and intrinsic viscosity of 10 fractions of poly-β-vinyl naphthalene (P-β-VN) in benzene were studied. The Mark - Kuhn - Houwink relations in this solvent were found to have the form $D = 3.5 \cdot 10^{-4} \cdot M_{S,D}^{-0.57}$ for the diffusion coefficient, and $[\eta] = 6.6 \cdot 10^{-5} \cdot M_{S,D}^{0.71}$ for the intrinsic viscosity. The molecular weight $M_{S,D}$ was determined from Svedberg's equation. The hydrodynamic behavior of P-β-VN, which is determined by viscosity and diffusion, is completely normal and confirms the universal character of the empirical constant $A = \eta_o D(M[\eta])^{1/3}T^{-1}$. It's mean value was $(3.1 \pm 0.1) \cdot 10^{-10}$ erg/degree. This

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Hydrodynamic properties of ...

corresponded to the value of this constant determined for other polymers and
again confirmed the usual correlation of hydrodynamic properties of P-β-VN
during translation and rotation. The estimate of the relation between
dimensions of P-β-VN molecules in benzene and their dimensions during free
rotation $(\bar{h}^2)_\theta^{1/2}/(\bar{h}^2)_f^{1/2}$, which characterizes the hardness of the molecular
structure, made by means of the previously determined swelling parameter
(Ref. 9: V. Ye. Eskin, K. Z. Korotkina, Vysokomolek. soyed., 2, 272, 1960)
$\alpha^3 = ([\eta]/[\eta]_\theta) = 1.2$, produced a mean value of 2.6. $((\bar{h}^2)_\theta^{1/2} = (\bar{h}^2)_D^{1/2}/\alpha$
are undisturbed dimensions of the macromolecule). This amount, which
slightly exceeds the corresponding values for most of the linear polymers,
showed (e. g. in comparison with polystyrene) that the substitution of the
benzene ring by naphthalene increases the thermodynamic hardness of the
macromolecule. It was found that the dependence of the diffusion coefficient
D on the concentration of one of the P-β-VN fractions with $M = 3.5 \cdot 10^6$ is
only slight in $CCl_4$ and more marked in benzene. This confirms that the
dependence on the concentration is mainly determined by the thermodynamic
interaction between polymer and solvent. (Ref. 13: V. N. Tsvetkov, S. I.
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B117/B138

Hydrodynamic properties of ...

Klenin, Zh. tekhn. fiziki, 29, 1393, 1959). The quantity $A = \eta_0 D(M[\eta])^{1/3} T^{-1}$, calculated for the fraction investigation in $CCl_4$, amounted to $3.50 \cdot 10^{-10}$ erg/degree, and was thus close to the mean value of the constant A. There are 4 figures and 2 tables. Two English-language references are: P. Debye, A. Bueche, J. Chem. Phys., 16, 573, 1948; P. J. Flory, Principles of Polym. Chem., New York, 1953.

ASSOCIATION: Institut vysokomolekulyarnykh soyedineniy AN SSSR (Institute of High-molecular Compounds AS USSR)

SUBMITTED: March 10, 1961

Card 3/3

36297
S/190/62/004/004/013/019
B117/B138

15.8070

AUTHORS: Tsvetkov, V. N., Vitovskaya, M. G., Lyubina, S. Ya.

TITLE: Synthesis and investigation of the structure of catalytic poly-n-butyl methacrylate. II. Optical anisotropy of molecules of the poly-n-butyl methacrylate stereoisomers

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 4, 1962, 577-582

TEXT: Dynamic double refraction in solutions (benzene) and photoelastic effect in films were studied with atactic, syndyotactic and isotactic stereoisomers of poly-n-butyl methacrylate (PBMA). The optical measurements made by the standard method showed that double refraction Δn as a function of the speed gradient is linear for all stereoisomers. Dynamic-optical properties of solutions of syndyotactic and atactic polymers practically coincide. The negative optical anisotropy of these samples proved to be seven times higher than that of isotactic PBMA. The photoelastic effect of syndyo- and atactic polymers was measured at +70 to 0°C and the isotactic polymer at +40° to -25°C. The photoelastic properties of syndyo- and atactic polymers also almost agree. In a highly elastic state negative anisotropy was established for them. In the temperature range investigated, the anisotropy of isotactic

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B117/B138

Synthesis and investigation of...

samples proved to be positive and, in the highly elastic state of the sample, two to three times higher than the photoelastic constant $\varepsilon$ of the two others. Conclusion: The data determined point to a similarity of atactic and syndiotactic microstructures. During transition from atactic to isotactic structure a reduction of the negative anisotropy of the macromolecule takes place which leads to a change of the sign of the photoelastic coefficient. This strong change of anisotropy may be explained by slight change of the rotational character in the ester side group. High sensitivity of the optical anisotropy of molecules to their spatial arrangement seems to be characteristic for polymers of the methacrylate series. It is, therefore, possible that the determination of the optical anisotropy of macromolecules of similar polymeric systems could be used as a sensitive method of investigating their spatial arrangement. There are 5 figures and 1 table.

ASSOCIATION: Institut vysokomolekulyarnykh soyedineniy AN SSSR (Institute of High-molecular Compounds AS USSR)

SUBMITTED: March 18, 1961

Card 2/2

TSVETKOV, V.N.; ESKIN, V.Ye.; SKAZKA, V.S.

Asymmetry of critical opalescence in polymer solutions. Ukr. fiz. zhur. 7 no.8:923-927 S '62. (MIRA 16:1)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR, Leningradskiy universitet. (Polymers) (Solution (Chemistry))

TSVETKOV, V.N.; BOYTSOVA, N.N.; GRISHCHENKO, A.Ye.

Study of the magnitude and orientation of birefringence in a flow of polyisobutylene solutions. Vest. LGU 17 no.4:59-66 '62. (MIRA 15:3)

(Propene--Opitical properties)

KOZLOV, P.V., otv. red.; ANDRIANOV, K.A., red.; DOGADKIN, B.A., red.; DOLGOPLOSK, V.A., red.; YENIKOLOPYAN, N.S., red.; KARGIN, V.A., red.; KOLESNIKOV, G.S., red.; KOROTKOV, A.A., red.; KORSHAK, V.V., red.; LAZURKIN, Yu.S., red.; MEDVEDEV, S.S., red.; MIKHAYLOV, N.V., red.; PASYNSKIY, A.G., red.; SLONIMSKIY, G.L., red.; SMIRNOV, V.S., red.; TSVETKOV, V.N., red.; FREYMAN-KRUPENSKIY, D.A., tekhn. red.

[Adhesion of polymers] Adgeziia polimerov; sbornik statei. Moskva, Izd-vo AN SSSR, 1963. 142 p. (MIRA 16:10)
(Polymers) (Adhesion)

44267
S/190/63/005/001/001/020
B101/B186

15.8100

**AUTHORS:** Tsvetkov, V. N., Magarik, S. Ya., Klenin, S. I., Eskin, V. Ye.

**TITLE:** Synthesis of graft copolymers. II. Dimensions, configuration, and optical properties of the macromolecules of the graft methyl methacrylate - styrene copolymer

**PERIODICAL:** Vysokomolekulyarnyye soyedineniya, v. 5, no. 1, 1963, 3 - 10

**TEXT:** Polystyrene of molecular weight $\approx 2\cdot10^3$ was grafted on polymethyl methacrylate, molecular weight $7\cdot10^4$. Refractometric examination of the copolymer composition showed the molar part of polystyrene to be 0.9. The average-weight molecular weight of $\approx (0.5 - 0.6)\cdot10^6$ was determined by light scattering. Analysis of the diffusion curve proved the content of the low-molecular components to be no more than 5-10%. The optical anisotropy of the copolymer was determined by flow birefringence in bromoform. According to W. Kuhn and H. Kuhn (Helv. chim. acta, 26, 1394, 1943; 28, 1553, 1945), $870\cdot10^{-25}\,\mathrm{cm}^3$ is found for the difference $(\alpha_1-\alpha_2)$ in main

X

Card 1/2

S/190/63/005/001/001/020
B101/B186

Synthesis of graft copolymers. II. ...

polarization capacities of one macromolecular segment of the copolymer; for polymethyl methacrylate, this value is $(2 - 20)\cdot 10^{-25}cm^3$, and for polystyrene it is $(140 - 200)\cdot 10^{-25}cm^3$. Based on Kuhn's theory, the theoretical calculation of the anisotropy of one segment of the principal methyl methacrylate chain with short graft polystyrene chains, proved that $(\alpha_1-\alpha_2)$ is $+220\cdot 10^{-25}cm^3$, when the polystyrene polymerization coefficient is 40 and when the molar part of polystyrene is 0.9. The experimental value, which is four times as high, is explained by the fact that the chain stiffness of the graft copolymer is higher than that of homopolymers. Conclusion: The optical anisotropy of a branched polymer may differ considerably from the anisotropy of its components. There are 5 figures and 1 table.

ASSOCIATION: Institut vysokomolekulyarnykh soyedineniy AN SSSR (Institute of High-molecular Compounds AS USSR)

SUBMITTED: July 1, 1961

Card 2/2

TSVETKOV, V.N.

Optical effect of the form of rigid polymer chains in solutions. Part 1. Vysokom.soed. 5 no.5:740-746 My '63.

Optical effect of the form of rigid polymer chains in solutions. Ibid.:747-753 (MIRA 17:3)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.

KOLESNIKOV, G.S., otv. red.; ANDRIANOV, K.A., red.; DOGADKIN, B.A., red.; DOLGOPLOSK, B.A., red.; YENIKOLOPYAN, N.S., red.; KARGIN, V.A., red.; KOZLOV, P.V., red.; KOROTKOV, A.A., red ; KORSHAK, V.V., red.; LAZURKIN, Yu.S., red.; MEDVEDEV, S.S., red.; MIKHAYLOV, N.V., red.; PASYNSKIY, A.G., red.; SLONIMSKIY, G.L., red.; SMIRNOV, V.S., red.; TSVETKOV, V.N., red.; FREYMAN-KRUPENSKIY, D.A., tekhn. red.

[Heterochain high-molecular weight compounds] Geterotsepnye vysokomolekuliarnye soedineniia; sbornik statei. Moskva, Izd-vo "Nauka," 1963. 246 p. (MIRA 17:3)

KOLESNIKOV, G.S., otv. red.; ANDRIANOV, K.A., red.; DOGADKIN, B.A., red.; DOLGOPLOSK, B.A., red.; YENIKOLOPYAN, N.S., red.; KARGIN, V.A., red.; KOZLOV, P.V., red.; KOROTKOV, A.A., red.; KORSHAK, V.V., red.; LAZURKIN, Yu.S., red.; MEDVEDEV, S.S., red.; MIKHAYLOV, N.V., red.; PASYNSKIY, A.G., red.; SLONIMSKIY, G.L., red.; SMIRNOV, V.S., red.; TSVETKOV, V.N., red.; FREYMAN-KRUPENSKIY, K.A., tekhn. red.

[Carbochain high-molecular weight compounds] Karbotsepnye vysokomolekuliarnye soedineniia; sbornik statei. Moskva, Izd-vo AN SSSR, 1963. 287 p. (MIRA 17:1)

TSVETKOV, V.N.; MITIN, Yu.V.; GLUSHENKOVA, V.R.; GRISHCHENKO, A.Ye.;
BOYTSOVA, N.N.; LYUBINA, S.Ya.

Electric and dynamic birefringence of poly - γ-benzyl-L-glutamate solutions. Vysokom.soed. 5 no.3:453-459 Mr '63. (MIRA 16:3)

1. Institit vysokomolekulyarnykh soyedineniy AN SSSR i Fizicheskiy institut Leningradskogo gosudarstvennogo universiteta.
(Glutamic acid--Optical properties) (Refraction, Double)

TSVETKOV, V.N.

Immediate results of conservative and operative treatments of closed slanting and screw-shaped fractures of both tibias. Trudy SMI 16:146-149 '63. (MIRA 18:1)

1. Iz kafedry gospital'noy khirurgii (zav. - prof. A.N.Kartavenko) Smolenskogo gosudarstvennogo meditsinskogo instituta.

TSVETKOV, V.N.; BOYTSOVA, V.N.

Optical anisotropy of molecules of polystyrene and poly-p-methylstyrene stereoisomers. Vysokom.soed. 5 no.8: 1263-1267 Ag '63. (MIRA 16:9)

1. Fizicheskiy institut Leningradskogo gosudarstvennogo universiteta. (Styrene polymers—Optical properties) (Stereochemistry)

TSVETKOV, V.N.; KALLISTOV, O.V.; KORNEYEVA, Ye.V.; NEKRASOV, I.K.

Stereoregularity and optical anisotropy of polypropylene.
Vysokom. soed. 5 no.10:1538-1542 O '63. (MIRA 17:1)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.

TSVETKOV, V.N.

Birefringence in a stream, and macromolecular structure. Usp. fiz. nauk 81 no.1:51-118 S '63. (MIRA 16:12)

TSVETKOV, V.N.; ESKIN, V.Ye.; FRENKEL', S.Ya.; CHEBOTAREVA, A.V., red.

[Structure of macromolecules in solutions] Struktura makromolekul v rastvorakh. Moskva, Nauka, 1964. 719 p. (MIRA 18:2)

ACCESSION NR: AP4043323 S/0191/64/000/008/0024/0027

AUTHOR: Tsvetkov, V. N., Voronina, M.P., Kurachenkova, L. M., Sokolova, N. A.

TITLE: Development of a method for evaluating the technological properties of polyvinylchloride resins from their maximum rate of dissolution in cyclohexanone

SOURCE: Plasticheskiye massy*, no. 8, 1964, 24-27

TOPIC TAGS: polyvinylchloride, resin, cyclohexanone, tableting, resin mechanical property, resin evaluation, cyclohexanone solubility, polyvinylchloride solubility

ABSTRACT: In order to develop a new testing technique, the technical properties of polyvinylchloride resins were determined and compared with the kinetics of dissolution of microsamples in cyclohexanone. The preparation of the sample and the design of the mold for tableting the resin are described. A disk 16 mm in diameter was cut out from the molded tablet and dissolved in 40 ml of freshly distilled cyclohexanone in a glass vessel at a temperature of 50 ± 0.1C. The weight of the sample before the experiment was 58-60 mg. At 3-minute intervals, for 45-60 min., the weight of the sample was determined to 0.1-0.2 mg. The amount of dissolved polymer (mg) and the rate of dissolution s(mg/min) were then plotted against time in integral and differential curves, respectively. The maximum dissolution rate depended on the average molecular weight of the resin. Two rates appeared

ACCESSION NR: AP4043323

on the kinetic curves: a low and high final rate of dissolution. A polymer having unbranched molecules and a homogeneous molecular-weight distribution (low degree of polydispersity) can be dissolved at a high final rate. The low final rate is due to either high branching of the polymer chains, or high polydispersity. Both factors also impair the processability of the resin. The following characteristics were obtained: s (max. rate) = 1.13 mg/min., final rate = 0.50 mg/min., max. $\tau$ = 36 min., total $\tau$ = 44 min., v (slowing down of the dissolution at the end of the reaction) - 0.064 mg/min.; $s_{final}$, $s_{max}$ and v are thus the most important characteristics. There is a great difference between resins obtained by latex polymerization and those obtained by suspension polymerization. The $f_{final}$, $f_{max}$ and v values are high for latex resins; thus they are very processable. This method is a good control method for making resins, because it simultaneously gives information as to the expected behavior of the polymers during processing. Orig. art. has: 9 figures, 3 tables and 1 formula.

ASSOCIATION: None

SUBMITTED: 00

ENCL: 00

SUB CODE: OC, MT

NO REF SOV: 001

OTHER: 003

Card 2/2

TSVETKOV, V.N.; BYLTOV, V.P.

Orientation of flow birefringence and the kinetic rigidity of chain molecules. Vysokom. soed. 6 no.1:16-21 Ja'64.
(MIRA 17:5)

1. Fizicheskiy institut Leningradskogo gosudarstvennogo universiteta.

TSVETKOV, V.N.; SKAZKA, V.S.; NIKITIN, N.A.; STEPANENKO, I.B.

Sedimentation and diffusion of polymer solutions studied by means of a polarization interferometer. Vysokom. soed. 6 no.1:69-75 Ja'64. (MIRA 17:5)

1. Fizicheskiy institut Leningradskogo gosudarstvennogo universiteta.

TSVETKOV, V.N.; BOYTSOVA, N.N.; VITOVSKAYA, M.G.

Flexibility of the side groups and optical anisotropy of some polyacrylic and polymethacrylic esters. Vysokom.soed. 6 no.2:297-303 F '64.
(MIRA 17:2)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.

TSVETKOV, V.N.; SHTENNIKOVA, I.N.

Flow birefringence of nitrocellulose solutions. Part 3. Vysokom.soed. 6 no.2:304-309 F '64. (MIRA 17:2)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.

TSVETKOV, V.N.; GRISHCHENKO, A.Ye.; DE-MILLO, L.Ye.; ROSTOVSKIY, Ye.N.

Photoelastic effect in swollen polymers. Part 3: Polyvinyl acetate. Vysokom. soed. 6 no.3:384-388 Mr'64. (MIRA 17:5)

1. Fizicheskiy institut Leningradskogo gosudarstvennogo universiteta.

BYCHKOVA, V.Ye.; VLASOV, Yu.I.; TSVETKOV, V.N.

Diagnosis of viruses with asymmetrical particle forms by the method of birefringence in the stream. Trudy VIZR no.21: 57-61 '64. (MIRA 18:12)

TSVETKOV, V.N.; KLENIN, S.I.; MAGARIK, S.Ya.

Optical anisotropy of polymethyl methacrylate - polystyrene graft copolymers. Vysokom. soed 6 no.3:400-405 Mr'64. (MIRA 17:5)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.

TSVETKOV, V.N.; KISELEV, L.L.; FROLOVA, L.Yu.; LYUBINA, S.Ya.

Optical anisotropy and conformation of molecules of soluble (transfer) ribonucleic acid (S-RNA). Vysokom. soed. 6 no.3:568-570 Mr'64. (MIRA 17:5)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.

ACCESSION NR: AP4043773 S/0190/64/006/008/1387/1390

AUTHOR: Tsvetkov, V. N., Vitovskaya, M. G.

TITLE: The photoelastic effect in grafted copolymers

SOURCE: Vy*sokomolekulyarny*ye soyedineniya, v. 6, no. 8, 1964, 1387-1390

TOPIC TAGS: polymer, copolymer, grafted copolymer, photoelasticity, polystyrene, polymethylmethacrylate, polybutylmethacrylate, polymer optical property, polymer film refraction

ABSTRACT: To investigate the extent to which the optical properties of the original parent polymers are preserved in grafted copolymers, the authors measured the photoelasticity of films prepared from 1. three copolymers produced by grafting polystyrene on polymethylmethacrylate, and 2. two copolymers produced by grafting polystyrene on poly-n-butylmethacrylate. The copolymers, prepared by ionic catalytic polymerization, differed in chain length (M=600 · $10^3$ and 200 · $10^3$ in the main chain and 2 · $10^3$ and 24 · $10^3$ in the grafted chain) and in the percentage of grafted polystyrene (13, 80, 86 and 88). The films were prepared by vaporization of benzene solutions. A previously described method was used to examine the behavior of the double refraction of the films in time as a

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ACCESSION NR: AP4043773

function of stretching stresses intermittently applied at temperatures ranging from that of copolymer mechanical softening to that of fluidization. The temperature range of increased elasticity was found to be narrow, with the temperatures of fluidity and vitrification being close and the photoelastic properties of the grafted copolymers showing a pattern markedly different from that of the parent polymers. The double refraction observed in the grafted polymer films is understood to result from the superimposition of positive and negative refractions differing significantly in the relaxation time. "The grafted copolymers were prepared by S. P. Mitsengendler and G. A. Andreyeva in the laboratory of A. A. Korotkov (Institute of High-Molecular Compounds) by ionic catalytic polymerization." Orig. art. has: 1 table and 4 graphs.

ASSOCIATION: Institut vy*sokomolekulyarny*kh soyedineniy An SSSR (Institute of High-Molecular Compounds, AN SSSR).

SUBMITTED: 20Jul63 ENCL: 00

SUB CODE: OC NO REF SOV: 008 OTHER: 000

Card 2/2

TSVETKOV, V.N.; BYCHKOVA, V.Ye.

Effect of side radicals on the optical anisotropy and shape of macromolecules in solution. Vysokom. soed. 6 no.4:600-604 Ap '64. (MIRA 17:6)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.

TSVETKOV, V.N., LYUBINA, S.Ya., [illegible]

Flow birefringence and viscosity of polyacrylic acid and [illegible]
Vysokom. soed. 6 no.5:806-810 My '64. (MIRA 17:[illegible])

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.

[illegible]

[illegible]

[illegible]

TSVETKOV, V.N.; SHTENNIKOVA, I.N.

Flow birefringence of cellulose tribenzoate solutions. Vysokom.
soed. 6 no.6:1043-1046 Je '64 (MIRA 18:2)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.

TSVETKOV, V.N.

Optical anisotropy and the tertiary structure of ribonucleic
acid molecules. Vysokom. soed. 6 no.6:1153-1156 Je '64
(MIRA 18:2)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.

TSVETKOV, V.N.; BUDTOV, V.P.

Form birefringence of chain macromolecules in solutions at high shearing stresses. Vysokom. soed. 6 no.7:1203-1208 Jl '64
(MIRA 18:2)

Intrinsic orientation angles of birefringence of polymethylmethacrylate solutions. Ibid.:1209-1212

1. Leningradskiy gosudarstvennyy universitet imeni Zhdanova.

TSVETKOV, V.N.; SKAZKA, V.S.; NIKITIN, N.A.

New optical method for studying sedimentation in an ultracentrifuge. Opt. i spektr. 17 no.1:119-124 Jl '64. (MIRA 17:9)

TSVETKOV, V.N.; SOKOLOVA, N.A.; FROLOVA, L.D.

Use of micromethods in the evaluation of the technological characteristics of thermoplastics. Plast. massy no.7:1-6 '65. (MIRA 18:7)

TSVETKOV, V.N.; GRISHCHENKO, A.Ye.; KOZ'MINA, O.P.

Photoelastic effect in swollen cyanoethyltrityl cellulose. Vysokom. soed. 7 no.4:609-614 Ap '65. (MIRA 18:6)

1. Fizicheskiy institut Leningradskogo gosudarstvennogo universiteta.

TSVETKOV, V.N.; GRISHCHENKO, A.Ye.

Photoelastic effect in swollen [illegible]. Vysokom.
soed. 7 no.5:817-822 My '65. (MIRA 18:9)

1. Fizicheskiy institut Leningradskogo gosudarstvennogo universiteta.

BARANOVSKAYA, I.A.; KLENIN, S.I.; MAGARIK, S.Ya.; TSVETKOV, V.N.; ESKIN, V.Ye.

Hydordynamic properties of macromolecules of graft polymers of butyl methacrylate and methyl methacrylate with styrene. Vysokom. soed. 7 no.5:878-883 My '65. (MIRA 18:9)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.

BARANOVSKAYA, I.A.; [illegible], [illegible]; MAGARIK, S.Ya.; TSVETKOV, V.N.;
[illegible] V.Ye.

Optical properties of macromolecules of graft polymers of butyl methacrylate and methyl methacrylate with styrene. Vysokom. soed. 7 no.5:884-890 My '65. (MIRA 18:9)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.

TSVETKOV, V.N.; MITIN, Yu.V.; SHTENNIKOVA, I.N.; GLUSHENKOVA, V.R.; TARASOVA,
G.V.; SKAZKA, V.S.; NIKITIN, N.A.

Sedimentation, diffusion, and viscosity of poly-$\gamma$-benzyl L-glutamate in solutions. Vysokom. soed. 7 no.6:1098-1103 Je '65. (MIRA 18:9)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.

TSVETKOV, V.N.; SHTENNIKOVA, I.N.; RYUMTSEV, Ye.I.; OKHRIMENKO, G.I.

Flow birefringence and optical anisotropy of poly-$\gamma$-benzyl L-glutamate molecules in solution. Vysokom. soed. 7 no.6:1104-1110 Je '65. (MIRA 18:9)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.

L 31965-66 EWT(m)/EWP(j)/T IJP(c) WW/RM

ACC NR: AR6016566 SOURCE CODE: UR/0196/65/000/012/V034/V034

AUTHOR: Yemel'yanenko, L. D.; Tsvetkov, V. N. 13 B

TITLE: Investigation of properties of translucent and light-diffusing glass-reinforced plastics 15

SOURCE: Ref. zh. Elektrotekhnika i energetika, Abs. 12V214

REF SOURCE: Sb. Fizika Dokl. k XXIII Nauchn. konferentsii Leningr. inzh.-stroit. in-ta. L., 1965, 89-90

TOPIC TAGS: light diffusion coefficient, reinforced plastic, glass reinforced plastic, translucence coefficient, colored glass reinforced plastic

ABSTRACT: The measurement results are given of the translucence and light-diffusion coefficients of 10 types of achromatic and colored glass-reinforced plastics manufactured in the USSR to justify their use as transparent structural parts in building construction. The orig. art. has: 1 table. G. L'vina. [Translation of abstract] [AM]

SUB CODE: 11/ SUBM DATE: 00

Card 1/1

TSVETKOV, V.N.; SHTENNIKOVA, I.N.; RYUMTSEV, Ye.I.; SKAZKA, V.S.

Birefringence in an electric field, rotatory diffusion, and dipole moments of poly-$\gamma$-benzyl glutamate molecules in solution. Vysokom. soed. 7 no.6:1111-1116 Je '65. (MIRA 18:9)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.

TSVETKOV, V.N.

Flow birefringence of solutions of semirigid chain molecules.
Vysokom. soed. 7 no.8:1468-1475 Ag '65. (MIRA 18:9)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.

TSVETKOV, V.N.; ANDREYEVA, L.N.; KVITCHENKO, L.N.

Flow birefringence and flexibility of deoxyribonucleic acid molecules. Vysokom. soed. 7 no.11:2001-2005 N '65.
(MIRA 19:1)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR. Submitted March 10, 1965.

TSVETKOV, V.N.; KISELEV, L.L.; LYUBINA, S.Ya.; FROLOVA, L.Yu.; KLENIN, S.I.;
SKAZKA, V.S.; NIKITIN, N.A.

Hydrodynamic properties and optical anisotropy of transfer ribonucleic acids in aqueous solutions. Biokhimiia 30 no.2:302-309 Mr-Ap '65.
(MIRA 18:7)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR, Leningrad i Institut radiatsionnoy i fiziko-khimicheskoy biologii AN SSSR, Moskva.

TSVETKOV, V.N.; KORNEYEVA, Ye.V.

Modification of the Zimm viscosimeter. Vest.LGU 20 no.22:75-79 '65. (MIRA 18:12)

TSVETKOV, V.N.

Optical anisotropy of semirigid chain molecules and birefringence in a flow of their solutions. Dokl. AN SSSR 165 no.2:360-363 N '65. (MIRA 18:11)

1. Leningradskiy gosudarstvennyy universitet im. A.A. Zhdanova. Submitted April 2, 1965.

ACC NR: AR6035046 SOURCE CODE: UR/0058/66/000/008/D091/D092

AUTHOR: Tsvetkov, V. N.; Shtennikova, I. N.

TITLE: Double refraction in a stream of a rigid chain molecule solution

SOURCE: Ref. zh. Fizika, Abs. 8D714

REF SOURCE: Sb. Optich. issled. molekulyarn. dvizheniye i mezhmolekulyarn. vzaimodeystv. v zhidkostyakh i rastvorakh. Tashkent, Nauka, 1965, 151-155

TOPIC TAGS: light refraction, double refraction, rigid molecular chain, rigid chain

ABSTRACT: A study was made of the dynamic birefringence of light by a number of cellulose ester solutions (nitro cellulose (I), ethylcellulose (II),and trinitrobenzoate cellulose (III)),whose molecular chains possess considerable skeletal rigidity. The study was made to determine the effect of the form of cellulose on the above parameter. The parameter [n], which is the dynamo-optical constant of the solution, varied parabolically with variation in the refractive index of the polymer in the case of I and III, which were characterized by positive and negative intrinsic anisotropy corresponding to the theoretical. The observed binary refraction for

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ACC NR: AR6035046

esters was found to exceed in magnitude by two orders this effect of elastic polym :. The second property found to be characteristic of these polymers solution was the independence of the above birefringence on the concentration of the solution in solvents, where the observed effect to a considerable degree is the effect of the form of the cellulose. It is assumed that the observed dynamo-optic effects of the ester forms of cellulose are a reflection of the segmented effects of the microfilm. A bibliography of 13 references is included. Ye. Glazunov. [SP] [Translation of abstract]

SUB CODE: 20/

Card 2/2

ACC NR: AP7000031 SOURCE CODE: UR/0051/66/021/005/0603/0609

AUTHOR: Tsvetkov, V. N.; Vinogradov, Ye. L.

ORG: none

TITLE: Electrodynamic birefringence of liquids

SOURCE: Optika i spektroskopiya, v. 21, no. 5, 1966, 603-609

TOPIC TAGS: double refraction, optical anisotropy, liquid flow birefringence, laminar flow birefringence, dynamic birefringence, electrodynamic birefringence

ABSTRACT: The combined effect of magnetic and electric fields and hydrodynamic flow on the optical anisotropy, in particular the birefringence, of liquids was analytically and experimentally investigated. The analysis shows that the total effects can be fully explained on the basis of general laws governing the optics of elliptically polarized light. Formulas determining the total birefringence as the superposition of two independent anisotropies, the electrooptical and the dynamic-optical, were obtained and adapted for the case of low field strength and velocity gradients; the formulas also take into account the angle of the polarization ellipses with respect to the direction of flow, and practically coincide with the counterpart formulas deduced from the molecular mechanism by, among others, Ikeda and Mukohata (J. Mol. Biol., 5, 1962, 570, and 7, 1963, 442; J. Chem. Phys, 38,

Card 1/2 UDC: 535.55(206,2)

ACC NR: AP7000031

1963, 2839). The method was experimentally checked in two types of dynamic-optimeters described by Tsvetkov and associates (ZhFKh, 24, 1950, 994 and ZhETF, 23, 1952, 690) and Frisman (Vysokomolek. soyed., 3, 1961, 276). In the series of measurements on low-molecular substances (bromoform, α-methylnaphthalene, α-bromonapthalene, etc.), the orientation of the electrodynamic birefringence proved to be a linear function of the square of the electric field strength, with the inclination tangent determined by the ratio - K/A (Kerr and Maxwell constants) for the given substance. The other group of substances (poly-γ-benzyl-L-glutamates in various solvents), with their high optical anisotropy and strong dipole moment, could be investigated structurally in a single experiment using the method of electrodynamic birefringence. Solutions in chloroform of various concentrations within the molecular weight range from $6 \times 10^4$ to $34 \times 10^4$ showed the same linearity of the dependence of orientation on the electric field strength, except for the change of sign at certain field-strength values. Thus, the macroscopic formulas proposed by the authors describe fully the phenomena of birefringence of liquids independently of the consideration of the molecular mechanisms such as polarity, dipolar and anisotropic members in the orientation of molecules in the electric field, direction of dipole moments in the molecule, etc. Experimental data, extrapolated for an infinite dilution, can yield information on the structural characteristics of a given substance. Orig. art. has: 11 formulas, 3 figures, and 2 tables.

SUB CODE: 20/ SUBM DATE: 01Mar65/ ORIG REF: 012/ OTH REF: 013
ATD PRESS: 5108

Card 2/2

TSVETKOV, Valentin Petrovich

Candidate of Physical-Mathematical Sciences; Dept Head; Voroshilov
Mining-Metallurgical Institute, Lugansk Oblast, Ukrainian SSR

Medal for Labor Excellence, 15 Sep 61

(VVS SSSR, No 39, 27 Sep 61)

TSVETKOV, V.P. [TSvietkov, V.P.]; KRAVTSOVA, N.F.

Electron distribution in atoms. Ukr. fiz. zhur. 8 no.4:469-478 Ap '63. (MIRA 16:8)

1. Gornometallurgicheskiy institut, Kommunarsk.
(Electrons)

GLAZKO, V.G.; TSVETKOV, V.P.

Determination of the content of magnetite in mixtures. Zav. lab. 29 no.10:1204 '63. (MIRA 16:12)

1. Kommunarskiy gorno-metallurgicheskiy institut.

RADCHENKO, M.Ye. [Radchenko, M.IU.]; TSVETKOV, V.P. [TSvietkov, V.P.]

Atomic scattering and electron density of carbonyl iron. Ukr. fiz. zhur. 8 no.12:1364-1371 D '63. (MIRA 17:4)

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X-ray determination of the number of free electrons and the heat capacity of electrons. Fiz. met. i metalloved. 18 no.2:182-185 Ag '64. (MIRA 18:8)

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Apparatus for determining the quantity of iron in agglomeration charges by the X-ray spectral fluorescent method. Zav. lab. 30 no.6:762 '64 (MIRA 17:8)

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KALOSHA, V.K.; TSVETKOV, V.P.

Use of X-ray fluorescence for determining the manganese content of ores. Zav. lab. 30 no.11:1367 '64 (MIRA 18:1)

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RADCHENKO, M.Ye. [Radchenko, M.IU.]; TSVETKOV, V.P. [TSvietkov, V.P.]

Nature of the chemical bonds in alloys. Ukr. fiz. zhur. 10 no.1: 99-103 Ja '65. (MIRA 18:4)

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TSVETKOV, V. P.

27801. ARKHANGEL'SKIY, P. P. i TSVETKOV, V. P. -- Polwost'yu likvidirovat' v 1949 Godv ochag i poviliki (Kuskuty). Sots. Sel. Khoz-vo uzbekistana. 1949 No. 2 S. 65-67

SO: Letopis' Zhurnal'nykh Statey, Vol. 37, 1949

TSVETKOV, V.P., starshiy prepodavatel'; KOVALEVSKIY, A.N., starshiy laborant; KRAVTSOVA, N.F., assistent.

Some applications of differential filters in X-ray structural analysis. Dop.ta pov.L'viv.un. no.3 pt.2:43-44 '52. (MLRA 9:11)

(X-ray crystallography)

TSVETKOV, V.P., starshiy prepodavatel'.

Using thin crystalline layers in studying X-ray scattering by liquid metals. Dop.ta pov. L'viv.un. no.4, pt.2:71 '53. (MLRA 9:11)

(X rays--Scattering)

Tsvetkov, V.P.

K-8

Category : USSR/Optics - X Rays

Abs Jour : Ref Zhur - Fizika, No 2, 1957, No 5251

Author : Tsvetkov, V.P.
Title : Concerning Monochromatization of X-rays with the Aid of Differential Filters.

Orig Pub : Fiz. sb. L'vovs'k. un-t, 1955, vyp. 1 (6), 15-21

Abstract : A check was made on the suitability of the method of differential filters for the production of monochromatic intensity curves. For the $K\alpha$-radiation of copper, a nickel and cobalt filter were selected. The latter were made of different thicknesses from $Ni_2O_3$ and $Co_2O_3$, suspended in wax. In addition, the nickel filter was made of a foil approximately 7 microns thick. When choosing the filters, the thickness of one of them was varied until both filters gave identical balckening of the film on both sides of the copper $K\alpha$ line. Photography was in a vacuum camera to avoid scattering of x-rays by the air. Investigation was made of x-rays scattered by glass-like selenium, prepared by pouring molten selenium on cold glass. The blackening curve was plotted with allowance for the corrections for absorption and polarization. The blackening

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Category : USSR/Optics - X Rays

K-8

Abs Jour : Ref Zhur - Fizika, No 2, 1957, No 5251

curves obtained with differential filters agree within the measurement accuracy with the curves obtained with a monochromatic beam. A curve of the atomic distribution for selenium was plotted, and exhibited three clear maxima in the interval from 0 to 5 A. The first maximum is narrow and isolated from the remaining ones. This is caused by the fact that the structure of the glass-like selenium is based on the molecule. The distance between the nearest selenium atoms turned out to be 2.5 A, which is in good agreement with the distance between the atoms of the molecule of crystalline selenium. In addition, there is apparently also a similarity in the structures of the molecules of glass-like and crystalline selenium. The use of differential filters gives a satisfactory degree of monochromatization and permits reducing the exposure time by a factor of 8 -- 10 compared with monochromatization by a planar crystal.

Card : 2/2

TSVETKOV, V.P.

[redacted]

X-ray study of the structure of liquid tin. Dop. ta pov. L'viv. un. no.5:pt.2:82-84 '55. (MLRA 9:10)

(Tin) (X rays--Industrial applications)

SAVEL'YEVA, L.A.; TSVETKOV, V.P.

Kinetics of the formation of cuprous oxides. Dop. ta pov. L'viv. un. no.5:pt.2:85-87 '55. (MLRA 9:10)

(Copper oxides)

TSVETKOV, V.P.

Monochromatization of X rays by means of differential filters. Nauk. zap. L'viv. un. 33:15-21 '55. (MIRA 10:6)

(X rays)

TSVETKOV, V. P.

TSVETKOV, V. P.: "The temperature dependence of a neighboring order in simple liquids." Min Higher Education Ukrainian SSR. L'vov State U imeni Ivan Franko. Chair of Experimental Physics. L'vov, 1956.
(Dissertation for the Degree of Candidate in Physicomathematical Sciences.)

SO: Knizhnaya Letopis', No. 26, 1956

[illegible]

Category : USSR/Atomic and Molecular Physics - Liquids D-8

Abs Jour : Ref Zhur - Fizika, No 2, 1957 No 3563

Author : Glauberman, A.Ye., Tsvetkov, V.P.
Inst : L'vov University, USSR
Title : Concerning the Structure of Simple Liquids

Orig Pub : Dokl. AN SSSR, 1956, 106, No 4, 623-625

Abstract : X-ray diffraction determinations of the functions of atomic distribution for simple liquids at various temperatures, as well as theoretical determinations of the radial distribution functions (Glauberman A.Ye., Zh. eksperim i teor. fiziki, 1952, 22, 249), are used to determine the temperature dependence of the coefficient of structural diffusion. The calculation was carried out for liquid Sn.

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24(8) SOV/20-125-6-16/61

AUTHOR: Tsvetkov, V. P.

TITLE: Investigation of the Dependence of Structural Diffusion Coefficient on Temperature (Issledovaniye zavisimosti koeffitsiyenta strukturnoy diffuzii ot temperatury)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 125, Nr 6, pp 1235-1237 (USSR)

ABSTRACT: The theory of the short-range order in simple fluids developed by Prins and Petersen (Ref 1) was precisely defined by A. Ye. Glauberman. The function of radial distribution found by him is as follows:

$$G(r) = \sum_s \frac{n_s}{\sqrt{\pi(\alpha + 4Dr_s)}} \exp\left[\frac{(r-r_s)^2}{\alpha + 4Dr_s}\right].$$

Here $n_s$ denotes the number of atoms located at a distance $r_s$ from that chosen to form the center, D- the coefficient of

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