

Investigation of the Miscibility of Polycarbonate–Poly(Ethyleneterephthalate) Blends: Solid-State $^1\text{H-NMR}$ T_1 Relaxation Time Measurements, Transmission Electron Microscopy, and Structure–Properties Relationship

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SYNOPSIS

Solid-State $^1\text{H-NMR}$ measurements of T_1 relaxation times performed on polycarbonate–poly(ethyleneterephthalate) (PC–PET) blends point out the presence of two separate domains with apparent dimensions of about 80 nm. The variation of PET domain relaxation time with the increase of PC content is explained in terms of an interface in which parts of the PC molecules are finely dispersed into the PET matrix. Relaxation parameters and compositions match very well an equation that quantitatively describes a three-phase model formed by two domains separated by an interface of mixed components. Micrographs obtained by transmission electron microscopy (TEM) clearly reveal the presence of two separate domains with a phase inversion at 40/60 wt % composition. PET domains, although larger than expected from NMR analysis, are characterized by a dispersion of small PC particles that are considered responsible for the observed diffusion of magnetization from PET to PC domains. The partial miscibility seems to be physical in nature rather than due to transesterification processes between the components, as stem from $^1\text{H-NMR}$ spectra in solution of PET and PC–PET blends. T_1 relaxation times measured in the same way on totally immiscible PC–PA-6 blends, support, by contrast, the NMR interpretation of PC–PET results. The mechanical properties of PC–PET blends exhibit ductile behavior throughout the entire range of composition. This indicates that PC and PET are mechanically compatible. This is also in agreement with the isothermal crystallization data for PET at various compositions of PC–PET. These results are in agreement with the existence of a partial miscibility between PET and PC. © 1994 John Wiley & Sons, Inc.

INTRODUCTION

Polycarbonate–poly(ethyleneterephthalate) blends (PC–PET) are considered quite important from the commercial point of view as they feature in a single material properties that are characteristic of the individual polymer components.

In view of this interest, many studies have appeared in the scientific literature that aim to understand the intimate structure of the blend. Such

investigations rely on the results obtained by using spectroscopic techniques (IR and NMR), calorimetric methods [differential scanning calorimetry (DSC)], and dynamic mechanical analysis (DMA). The conclusions thus far reported are often conflicting.

Total miscibility of PC–PET blends was first reported in the patent literature.¹ Subsequently, Paul et al.² predicted for these blends a partial miscibility on the basis that mixtures made of dimethylterephthalate and diphenylcarbonate monomers yield a slightly negative enthalpy. Nasser et al.³ using DSC and dynamic mechanical thermal analysis (DMTA), have observed a single T_g for the melt-blended PC–

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PET compositions containing more than 70% PET and two glass transition temperatures for the compositions containing PET below 70%. On the basis of their results, they concluded that PC and PET are completely miscible in the amorphous phase for PET-rich compositions, whereas PC-rich blends separate into two amorphous phases that apparently contain both components but at varying levels. Similar conclusions were reached by Murff et al.⁴ on PC-PET blends obtained by continuous extrusion and injection molding into bars.

Both investigations excluded any involvement of transreactions affecting the miscibility. Henrichs et al.,⁵ reporting on ¹³C-NMR spin diffusion and ¹H-NMR T_1 measurements of a 75/25 wt % PET-PC blend, conclude that it is intimately mixed down to a level of 4.5–6 Å. The same author in a succeeding work demonstrated⁶ by means of solid-state ¹³C-NMR spectroscopy as well as by thermal analysis (DSC) that blends of PC-PET are physically immiscible. The miscibility reported in the previous study had, in their opinion, been chemically induced by exchange reactions occurring between the two polymers. Chen and Birley⁷ published results in agreement with the latter. On the basis of IR, DMA, and DSC, they found that PC-PET blends prepared with a die extruder are immiscible over the whole range of composition.⁷ The same conclusions were reached by means of DSC and dielectric loss spectra by Runt et al.⁸ Investigations dealing with the role of *trans*-reactions on the compatibility of these blends were then carried out. Li-Hui Wang⁹ reports on the effect of transesterification on the miscibility as studied by FTIR, DSC, and DMA. He points out that *trans*-reactions are initiated during the blending process by residual catalysts and that this fact further explains the divergence found thus far.

In this study, we have evaluated the compatibility aspects of the melt-blended PC-PET blends using techniques such as thermal analysis, physical properties, microscopy, and solid-state NMR. Our results indicate that the PC-PET blends exhibit two-phase morphology through the entire range of composition. Our results also show that there is good interfacial adhesion between the PC and PET phases as exemplified by the good mechanical properties of the blend.

EXPERIMENTAL

Materials

Polycarbonate was obtained from General Electric Company, designated as Lexan 141. The weight-av-

erage molecular weight of the PC was 26,000 as determined by gas phase chromatography (GPC). A fiber-grade PET from EniChem was used in the preparation of the PC-PET blends. The intrinsic viscosity (IV) of the PET used was 0.62 as determined in a 60/40 vol./vol. ratio blend of 1,1,2,2-tetrachloroethane and phenol at 25°C. About 0.5% of a phosphite stabilizer was used in the PC-PET blends to inhibit transesterification reaction.

Blend Preparation

The PC-PET blends were melt blended in a Leistritz LSM 30.34 twin-screw extruder. Blends of PC and PET were dried at 120°C for 4 h in a circulating air oven fitted with a drying agent bed prior to extrusion compounding. The screw configuration used for the melt blending is shown in Figure 1. The melt temperature during compounding of the PC-PET blends was about 285°C. The compounded pellets were dried at 120°C for 4 h prior to injection molding. Test specimens for the characterization of physical properties were molded in an 80-ton Nissei injection molding machine. The molding conditions for the PC-PET are shown in Table I. Following the above procedure several samples of PC-PET were prepared with compositions ranging from 10/90 to 90/10 wt %, in increments of 10%. These samples were labeled from A to I, respectively. Similarly, three blends of PC and Nylon-6 (PA-6) were prepared at PC-PA-6 ratios of 80/20, 60/40, and 40/60, which were labeled as A', B', and C', respectively.

Physical Testing

The tensile properties of the blends were tested according to the ASTM D 638 specifications and the experiments were carried out in an Instron Tensile Tester Model 4206. Notched Izod impact properties of the blends were tested according to the ASTM D 256 specifications using a Tinus Olsen Pendulum Impact Tester. Falling-dart impact strength values for the blends were tested using a Dynatup Impact Tester according to ASTM D 3763.

Thermal Properties

Glass transition temperatures (T_g) of the blends were characterized using a Polymer Laboratories DMTA. The samples were scanned from -150 to 200°C at 5°C/min and at a frequency of 1 Hz. Isothermal crystallization rates for the blends were performed using a Perkin-Elmer DSC. The test procedure was as follows: The sample was heated to

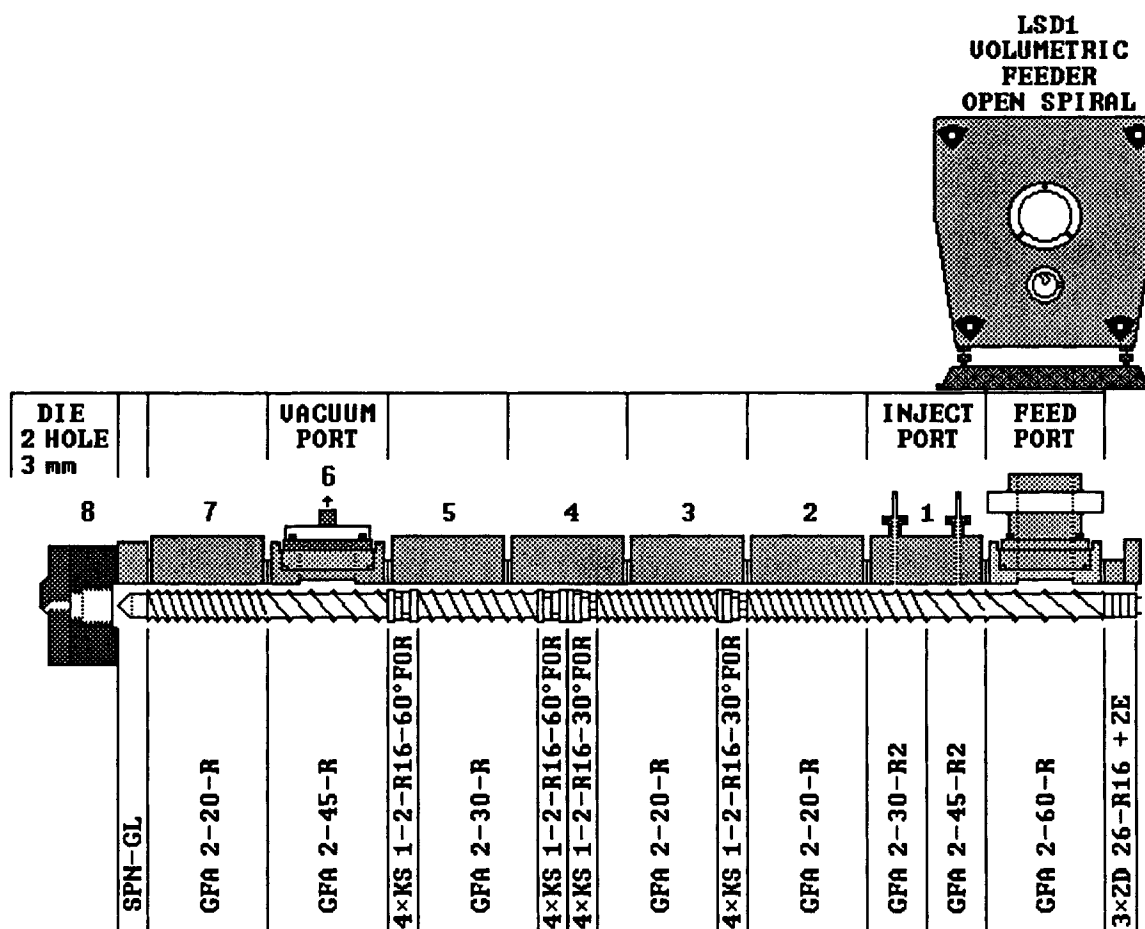


Figure 1 Extrusion screw design for PC-PET blends.

above the melting point of the PET in the PC-PET blend at 20°C/min and then quenched to desired crystallization temperature (200°C). The crystallization of the PET was monitored at that temper-

ature. The time for the sample to reach its maximum crystallization rate was then calculated.

Table I Injection Molding Conditions for PC-PET Blends^a

Injection velocity	40 mm/s
Screw velocity	50 rpm
Shot size	56.0 mm
Cushion	10.0 mm
Injection pressure	11,000 psi
Hold pressure	6,600 psi
Barrel temperature	270°C
Melt temperature	285°C
Mold temperature	80°C
Injection time	2.7 s
Cooling time	30 s
Cycle time	50.7 s

^a Nissei 80-ton 5-oz injection molding machine.

NMR Analysis

¹H-NMR spectra for spin-lattice relaxation time (T_1) measurements were acquired on solid samples by means of a MSL 200 Bruker spectrometer operating at 200.13 MHz and equipped with a 5-mm solenoid probe. To determine T_1 the well-known 180°- τ -90° pulse sequence was used, where τ was changed over a wide interval of 25 values ranging from 1 ms to $5 \times T_1$. Data were recorded at room temperature with the following acquisition parameters:

Time domain points: 1000; spectra width: 300×10^3 Hz; 90° pulse: 1.5 μ s; relaxation delay: $5 \times T_1$; dead time between measuring pulse and receiver switch-on: 5 μ s.

Relaxation times and the intensities of the relative components were calculated as regression best-

fit parameters, by means of a software package (Stelar Snc, Pavia, Italy) based on least-square method and running on a personal computer. Iterative fitting was performed by using Eq. (1), which describes the evolution of the NMR signal in the inversion recovery sequence:

$$I(\tau) = I(0)[1 - 2A \exp(-\tau/T_1)] \quad (1)$$

where $I(\tau)$ is the intensity of the NMR signal after the evolution time τ , $I(0)$ the intensity at $\tau = 0$, and A a constant whose value should be as close as possible to 1. Blend compositions were transformed from weight percentage into proton percentage to compare them with NMR results. The mean square relative deviation of experimental intensities with respect to the calculated $I(\tau)$ value was less than 0.5. The 95% confidence limits of component intensities and that of the long T_1 , calculated as best-fit parameters, were within 10% of their values, while those of the short T_1 were within 20% of their values. The probable errors were half the above values.

Transmission Electron Microscopy (TEM) Analysis

Ultra-thin sections of about 100 nm of the polymer blends were cut at low temperature with the aid of a LKB ultramicrotome equipped with a liquid nitrogen cryostat. Staining with Ruthenium tetroxide (RuO_4) was performed to enhance contrast between the phases. All bright-field micrographs have been gained by a 100-kV transmission electron microscope (Philips EM 300). Particular care was taken both in sample preparation and TEM observations to prevent unnecessary accumulation of radiation damage.

RESULTS AND DISCUSSION

$^1\text{H-NMR}$ T_1 Relaxation Measurements of PC-PET Blends

$^1\text{H-NMR}$ T_1 relaxation times of protons were measured by the well-known inversion recovery method on PC-PET blends A through G covering a range of compositions from about 90/10 to 10/90 wt % in increments of 10%, as well as on the individual PC and PET amorphous polymers. The difference between T_1 of the single polymers at room temperature was large enough (0.3 s for PC and 2.5 s for PET) to run the whole set of experiments at this temperature. As observed for polymethylmethacrylate (PMMA),¹⁰ the short value for PC arises from the presence of the highly mobile CH_3 groups. This

property should provide a very efficient path to the dispersion of PET magnetization through the PC lattice, in the event that substantial mixing occurs.

The experimental total relaxation curve for each blend was resolved into its components by means of an iterative software based on a least-squares analysis method. The best results were found by fitting the experimental decay to a biexponential function of the form (Table II, Fig. 2):

$$S(t) = p_1[1 - 2 \exp(-t/T_1^l)] + p_s[1 - 2 \exp(-t/T_1^s)] \quad (2)$$

where p_s and p_l are the percent numbers of protons in the short and long relaxing components, while T_1^l and T_1^s are the corresponding relaxation times. The presence of two components clearly stem from two distinct domains, whereas the long relaxing corresponds to PET and the short to PC. Furthermore, T_1^l and T_1^s values differ from those of the pure polymers. In particular, T_1^l decreases continuously by increasing the percentage of PC, while T_1^s changes slightly. This last trend implies a transfer, through spin diffusion, of magnetization between the two domains, thus suggesting the occurrence of intermolecular contacts at the interface. This is clearly a case where spin diffusion is controlling the relaxation of PET domains and T_1^l is comparable approximately to the time t_d needed for the magnetization to traverse the PET domain and diffuse into molecular contact boundaries.¹¹ In such a case, we can apply the following relationship:

$$\langle L^2 \rangle = \text{SQRT}(6 * t_d * D_{\text{PET}}) \quad (3)$$

Table II Parameters of PC-PET Blends Obtained by Resolving the Total T_1 Proton Relaxation Curve in Two Components^a

Sample	Wt_{PET}	p_{PET}	p_l	T_1^l	T_1^s
A	10	8	22	0.79	0.25
B	20	16	26	0.77	0.22
C	30	24	48	0.81	0.24
D	40	33	52	1.06	0.28
E	50	42	60	1.10	0.25
F	60	53	65	1.20	0.30
G	70	60	72	1.41	0.34
H	80	75	79	1.57	0.40
I	90	87	96	1.55	0.34

^a Wt_{PET} , weight percent of PET; p_{PET} , number percent of PET protons; p_l , number percent of protons in the long component of the blend; T_1^l , T_1^s , T_1 of the long and short component, respectively.

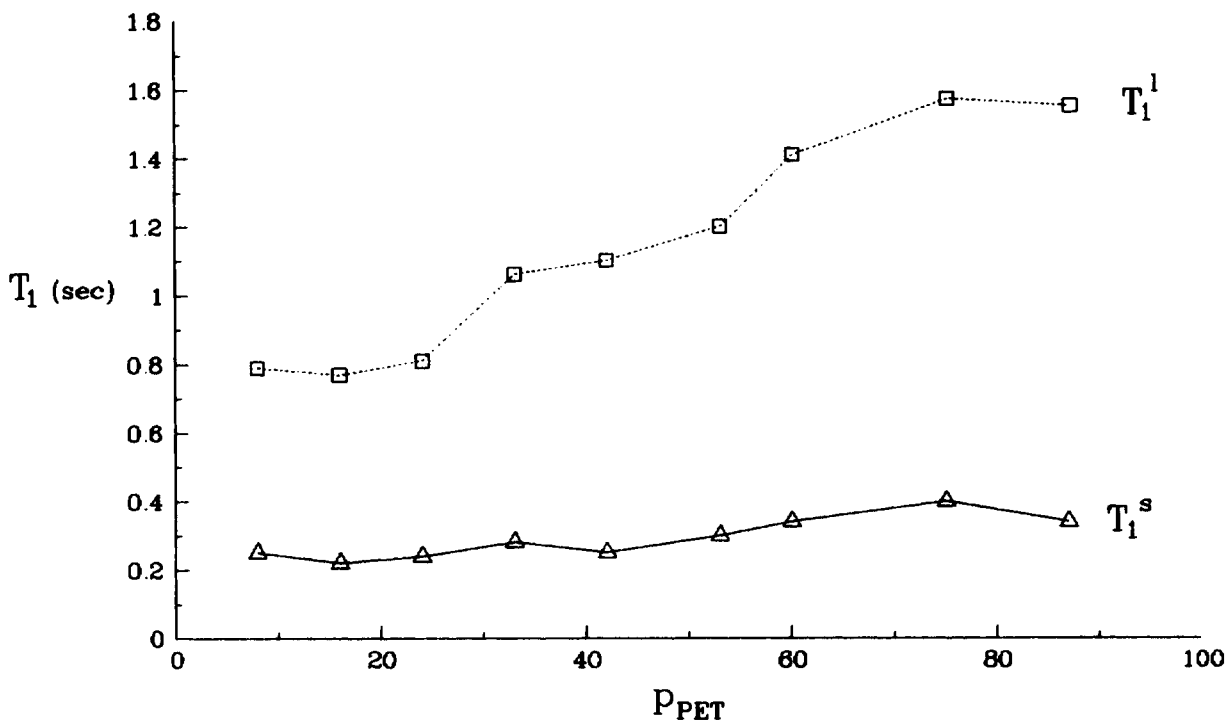


Figure 2 $^1\text{H-NMR } T_1^l$ and T_1^s relaxation times of PC-PET blends vs. the number percent of PET protons (p_{PET}).

$\langle L^2 \rangle$ being the mean square average diffusive path length and D_{PET} the diffusion coefficient for PET. Assuming $t_d = 2.5$ s (T_1 value found for amorphous PET) and $D_{\text{PET}} = 5 \times 10^{-12}$ $\text{cm}^2 \text{s}^{-1}$, we estimate the root mean square distance $\langle L^2 \rangle^{1/2}$ to be roughly 80 nm. Such a value represents an upper limit for PET domain size. In fact, for t_d larger than T_1 , two different relaxation times, not changing with composition, would be found, while for shorter ones a single average relaxation time is expected.

As the PC content in the blend rises, we expect an increase in the molecular contact number at the interface while a decrease of the PET domain size is likely to occur. The consequence is a shorter time for the PET magnetization to diffuse into the PC phase, which accounts for the parallel decrease of T_1^l and the slight increase of T_1^s , as is experimentally observed. The behavior of our system is very similar to the one proposed for PMMA-PVA blends.¹¹ Therefore, we suggest the same structural model based on two domains separated by an interface at which the two polymers are miscible.

By inspecting Table II, we observe that the experimental intensity p_1 of the long relaxing component is always larger than the PET content p_{PET} in the blend. This result supports the presence of an interface formed by PC molecular segments

highly dispersed into the PET matrix, the amount of dispersed PC being on the order of $p_{\text{PET}} - p_s$, that is, roughly, 10–20%. The parameters of the individual components forming the three phase models have been quantitatively encompassed by Schenk in a general relationship [Eq. (3) of Ref. 11].

Since, in our blends, the PET domain relaxation is masked completely by spin diffusion, only two apparent phases are detected. Therefore, Eq. (4) of Ref. 13 is used:

$$p_{\text{PC}} \times 10^{-2} (1/T_{1\text{PC}} - 1/T_{1\text{PET}}) = 1/T_1^l - 1/T_{1\text{PET}} + p_s \times 10^{-2} (T_{1\text{PC}} - 1/T_1^l). \quad (4)$$

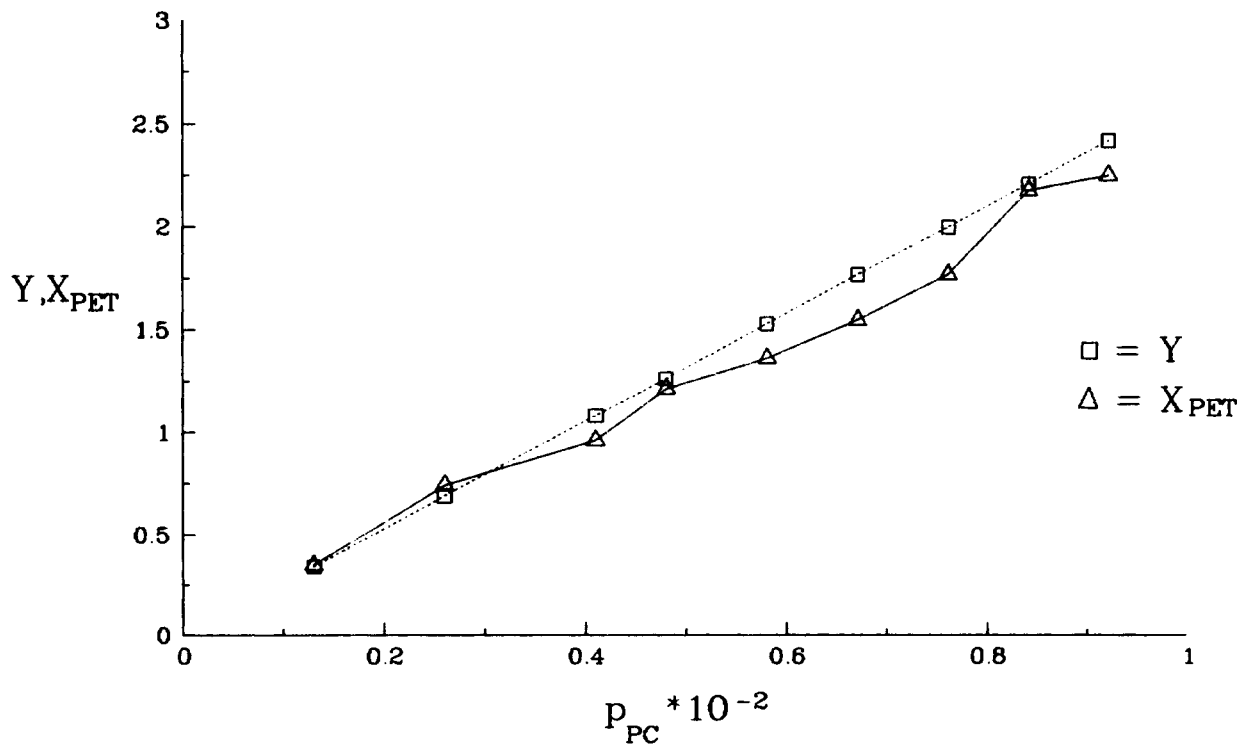
The left-hand part (Y) contains only relaxation T_1 values of the individual polymers and the blend composition as number percentage of protons, while the right hand (X) includes also the parameters obtained on the blends by resolving the T_1 relaxation curves. In particular, p_{PC} is the number percentage of PC protons in the blend; $T_{1\text{PC}} = 0.33$ s and $T_{1\text{PET}} = 2.5$ s are the relaxation times of the pure amorphous polymers. T_1^l and p_s have the usual meaning and their values are taken from Table II ($p_s = 100 - p_1$). X_{PET} is calculated by using T_1^l and p_s , while X_{PC} is calculated by using T_1^s and p_1 (Table III).

Table III Values of Y , X_{PET} , and X_{PC} Calculated from Eq. (4) for Each PC-PET Blend Composition^a

Sample	$p_{\text{PC}} \times 10^{-2}$	Y	X_{PET}	X_{PC}
A	0.92	2.42	2.25	2.81
B	0.84	2.21	2.18	3.07
C	0.76	2.00	1.77	1.96
D	0.67	1.77	1.55	1.52
E	0.58	1.53	1.36	1.44
F	0.48	1.26	1.21	1.03
G	0.41	1.08	0.96	0.71
H	0.26	0.69	0.74	0.44
I	0.13	0.34	0.35	0.10

^a p_{PC} , protons percent of PC in the blend; Y , left part of Eq. (4); X_{PET} , right part of Eq. (4) using T_1^l and $1 - p_1 \times 10^{-2}$ of Table II; X_{PC} , right part of Eq. (4) using T_1^s and $p_1 \times 10^{-2}$ of Table II.

A separate plot of both sides with respect to the composition of the blends is shown in Figure 3. A good agreement between Y and X_{PET} is found, which confirms the validity of the model. X_{PC} is not reported in the graph as it shows a departure from the ideal case, which is expected as PC relaxation is dominated by spin diffusion to the methyl groups.

**Figure 3** Plot of Y and X_{PET} [see Table III and Eq. (4)] vs. the fraction of PC protons in the blends ($p_{\text{PC}} \times 10^{-2}$).**Table IV** Parameters of PC-PA-6 Blends after Decomposition of the Total Proton Relaxation Curve in Two Components^a

Sample	W_{tPA}	p_{PA}	p_1	T_1^l	T_1^s
A ¹	20	31	30	0.79	0.29
B ¹	40	54	54	0.80	0.26
C ¹	70	73	76	0.79	0.28

^a W_{tPA} , weight percent of PA-6; p_{PA} , number percent of PA-6 protons; p_1 , number percent of protons in the long component; T_1^l , T_1^s , T_1 of the long and short component, respectively.

¹H-NMR T_1 Measurements on PC-PA-6 Blends

T_1 measurements were also performed on a series of blends of polycarbonate-polyamide-6 blends (PC/PA-6). These blends are reported to be physically incompatible over a wide range of compositions.¹² Therefore, an NMR behavior different from the PC-PET blends is expected. We have found that the total T_1 relaxation curve fits a biexponential decay, but we observe that T_1^l and T_1^s components are constant (Table IV) and very close to $T_{1\text{PA-6}}$ and $T_{1\text{PC}}$ of the pure polymers (0.86 s and 0.30 s, respectively). Moreover, the relative number per-

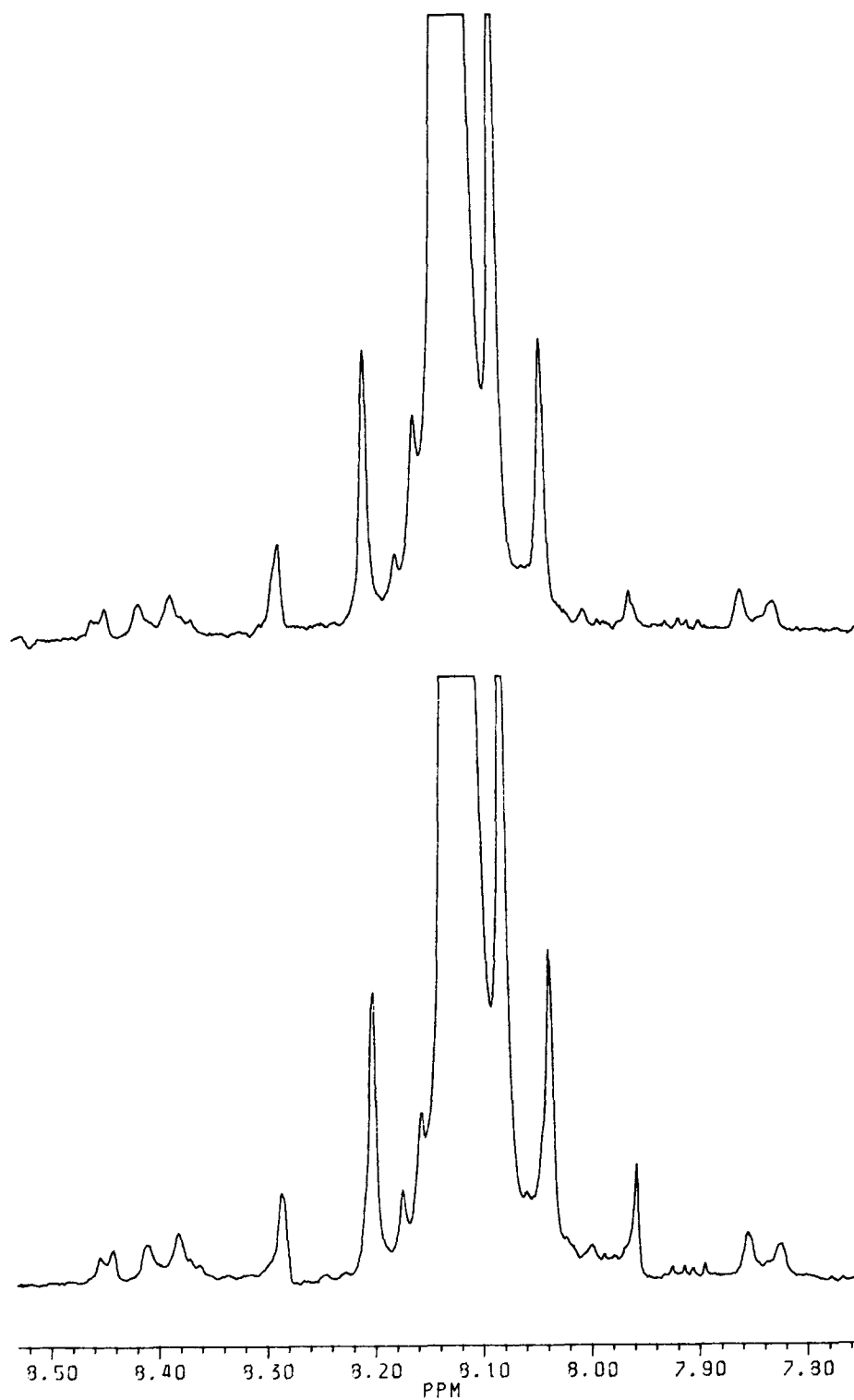


Figure 4 ^1H -NMR spectra of PET (lower) and of the blend of PET-PC 70/30 (upper) dissolved in a 4/1 by volume mixture of $\text{CDCl}_3/\text{CF}_3\text{COOH}$. Only the region of terephthalic ring proton signals is displayed.

centages of protons p_s and p_1 of the long and short component are close to the composition of the blends expressed in the same units. Such observations are coherent with the presence of two domains in which molecular contacts are absent. These results seem particularly interesting when compared to those concerning PC-PET blends, as they highlight the sensitivity of T_1 measurements in distinguishing totally immiscible from partially miscible polymeric domains and confirm the validity of the above NMR interpretation for PC-PET blends.

Trans-reactions in PC-PET Blends

As mentioned in the introduction, it has been pointed out in many papers that compatibility can be chemically favored in PC-PET blends by transesterification reactions activated by the presence of residual catalysts. In particular, such reactions would lead to the formation of (PET)COO(PC) sequences.¹³ To check this hypothesis in our blends, we have run solution $^1\text{H-NMR}$ spectra of PET and of the blend PC-PET 50/50. Substitution of an ali-

phatic residue as $\text{O}-\text{CH}_2\text{CH}_2-\text{O}$ with an aromatic one as bisphenol would certainly change the shift of terephthalic protons in the blend. In Figure 4, the proton spectra of the terephthalic residue region for PET pure and for the blend 50/50 are reported, but no difference can be observed. This finding rules out the presence of significant transesterification processes.

Transmission Electron Microscopy

TEM analyses were performed on PC-PET samples to determine their morphology and domain size (Figs. 5-11). In sample B (20/80, Fig. 5), a dispersed PC phase with a broad size distribution (diameter 20-300 nm) was observed in the PET matrix. For sample C (30/70, Fig. 6), a quasi-spherical PC phase is observed, uniformly distributed into the PET matrix, and with a very broad distribution of diameters (50-500 nm). We observe evidence of PET microinclusions with a diameter of 17-34 nm in the PC particles. Sample D (40/60, Fig. 7) shows a network of the two phases with irregular shapes

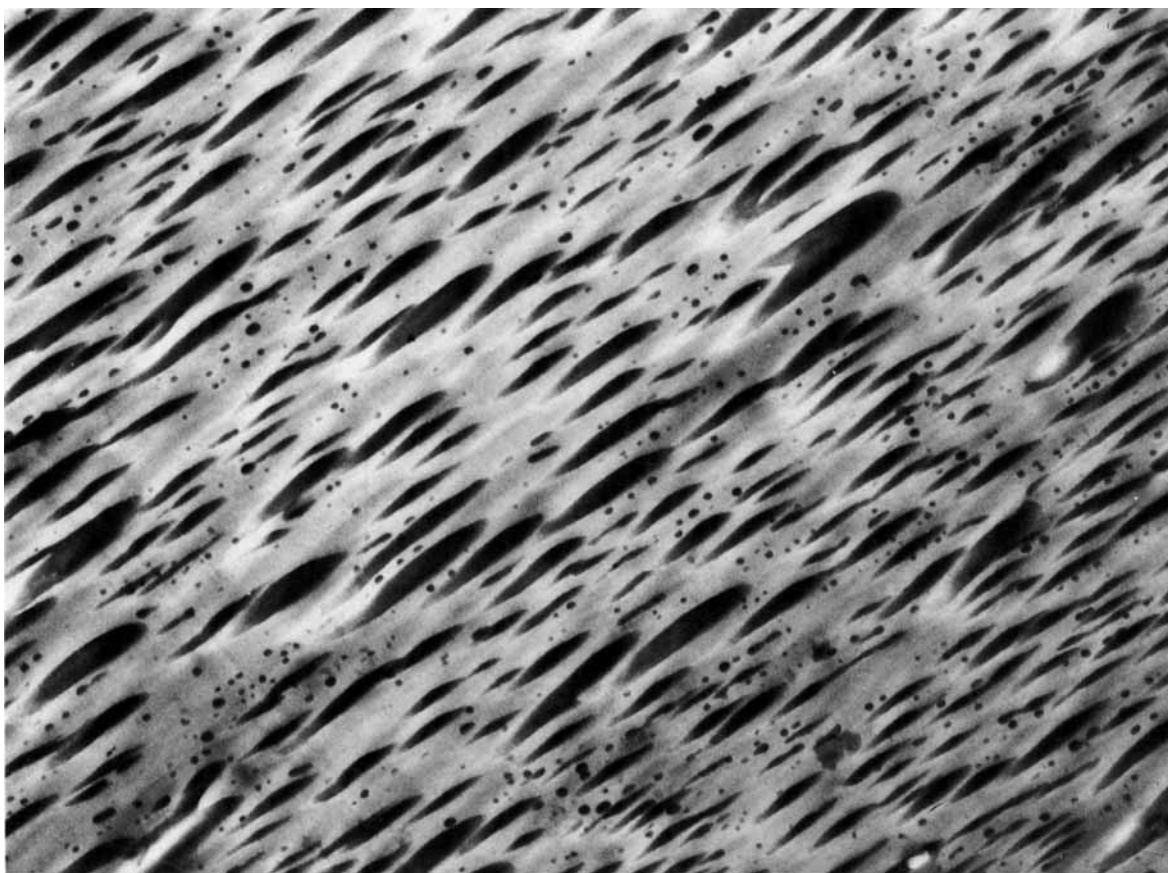


Figure 5 TEM micrograph of 20/80 PC-PET blends ($\times 20,880$).

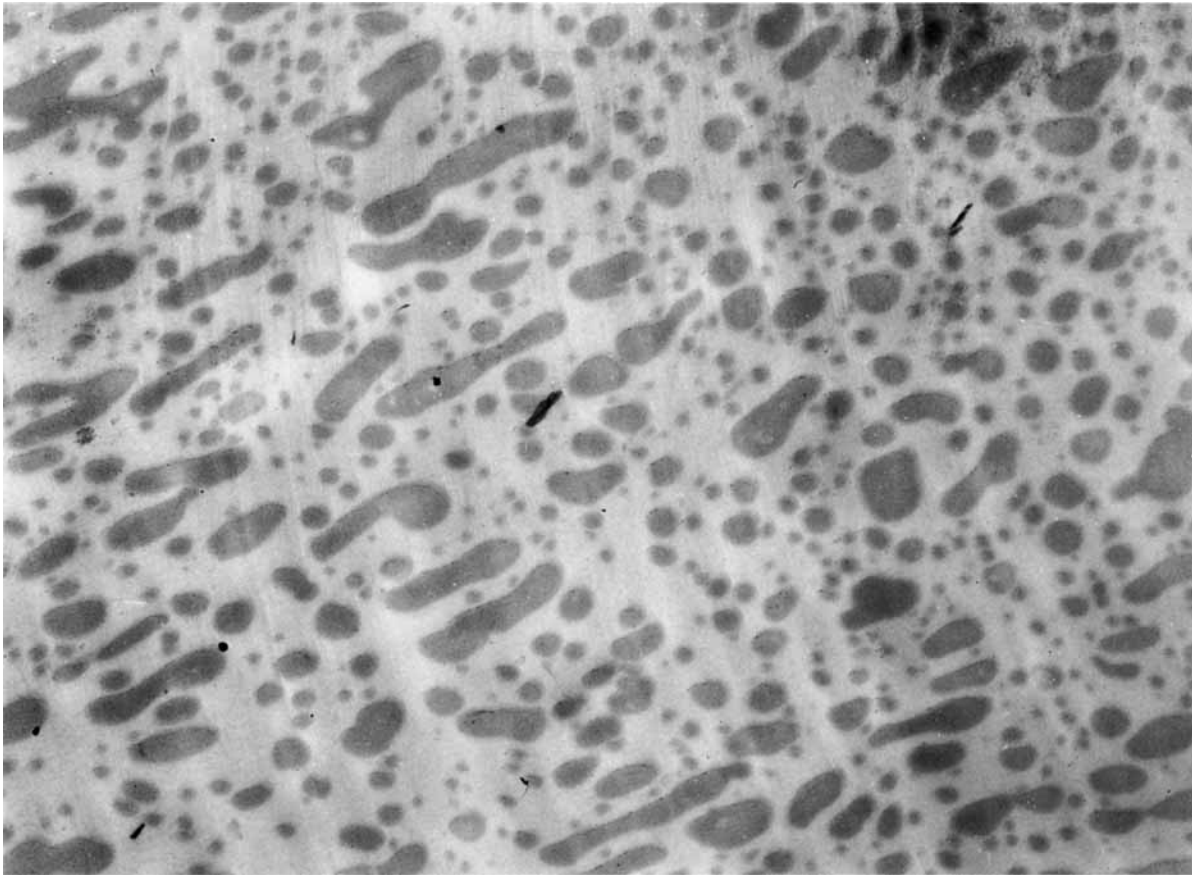


Figure 6 TEM micrograph of 30/70 PC-PET blend ($\times 37,230$).

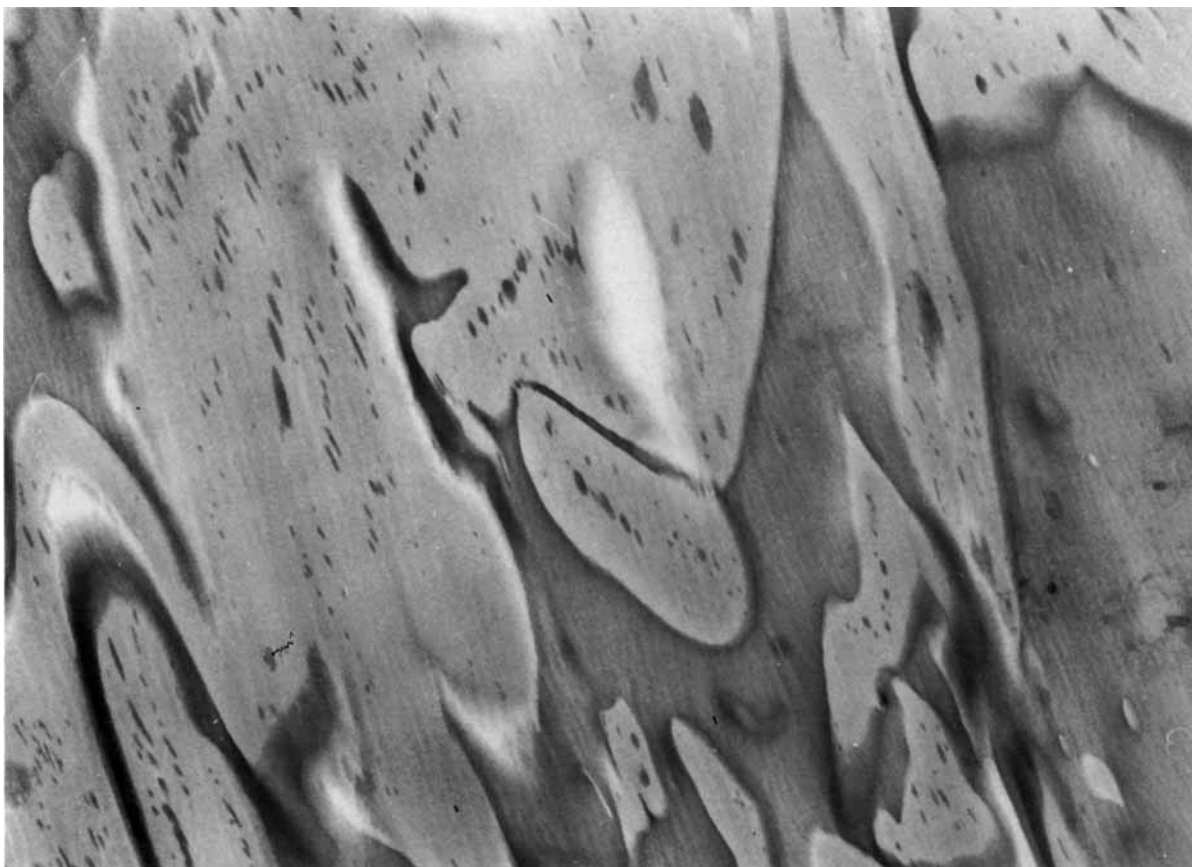


Figure 7 TEM micrograph of 40/60 PC-PET blend ($\times 20,880$).

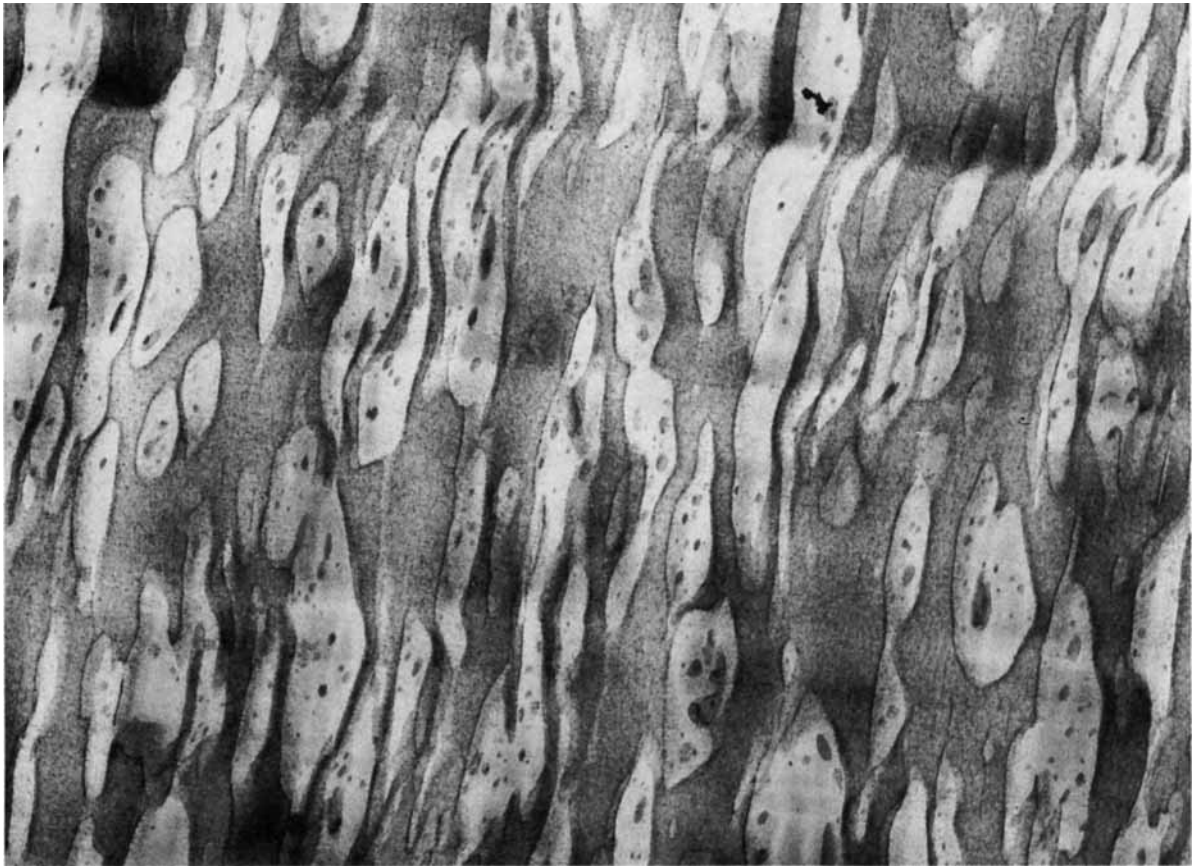


Figure 8 TEM micrograph of 50/50 PC-PET blend ($\times 30,120$).

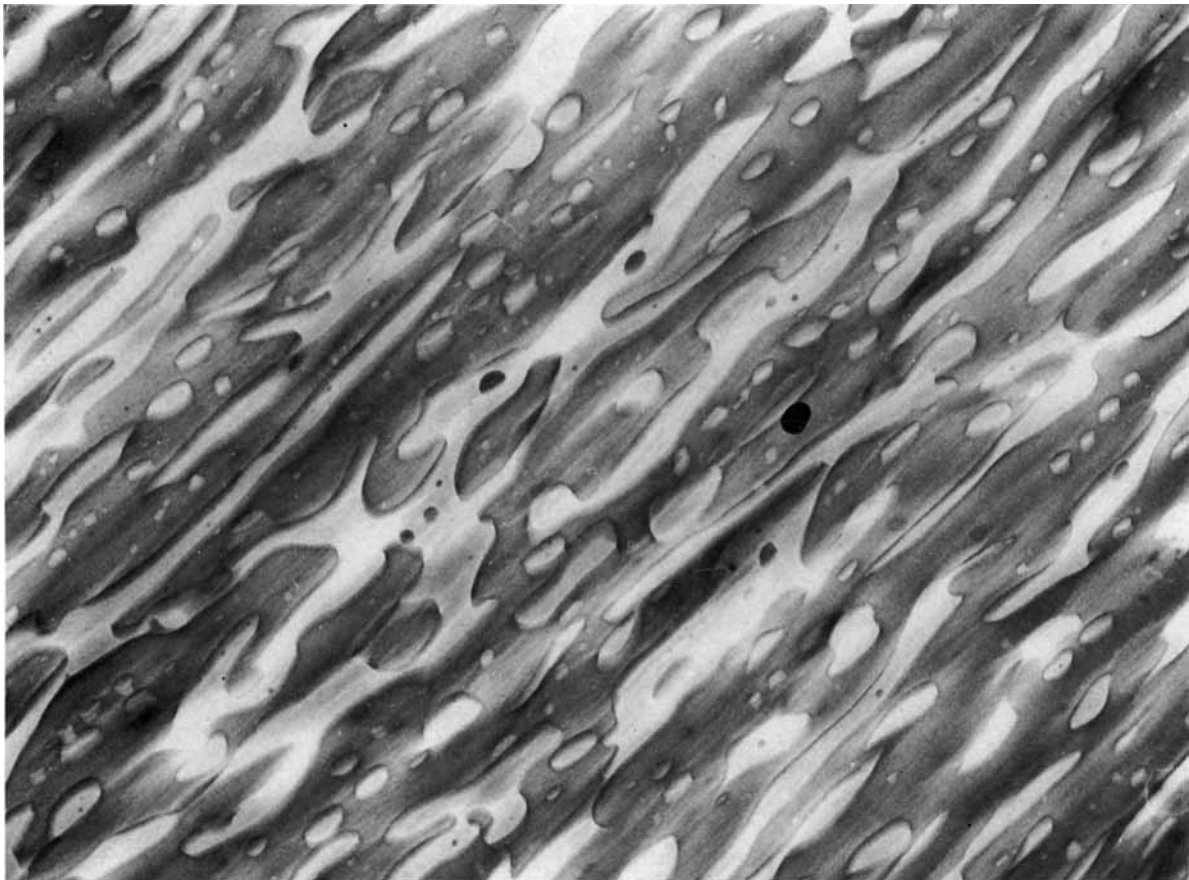


Figure 9 TEM micrograph of 60/40 PC-PET blend ($\times 20,880$).

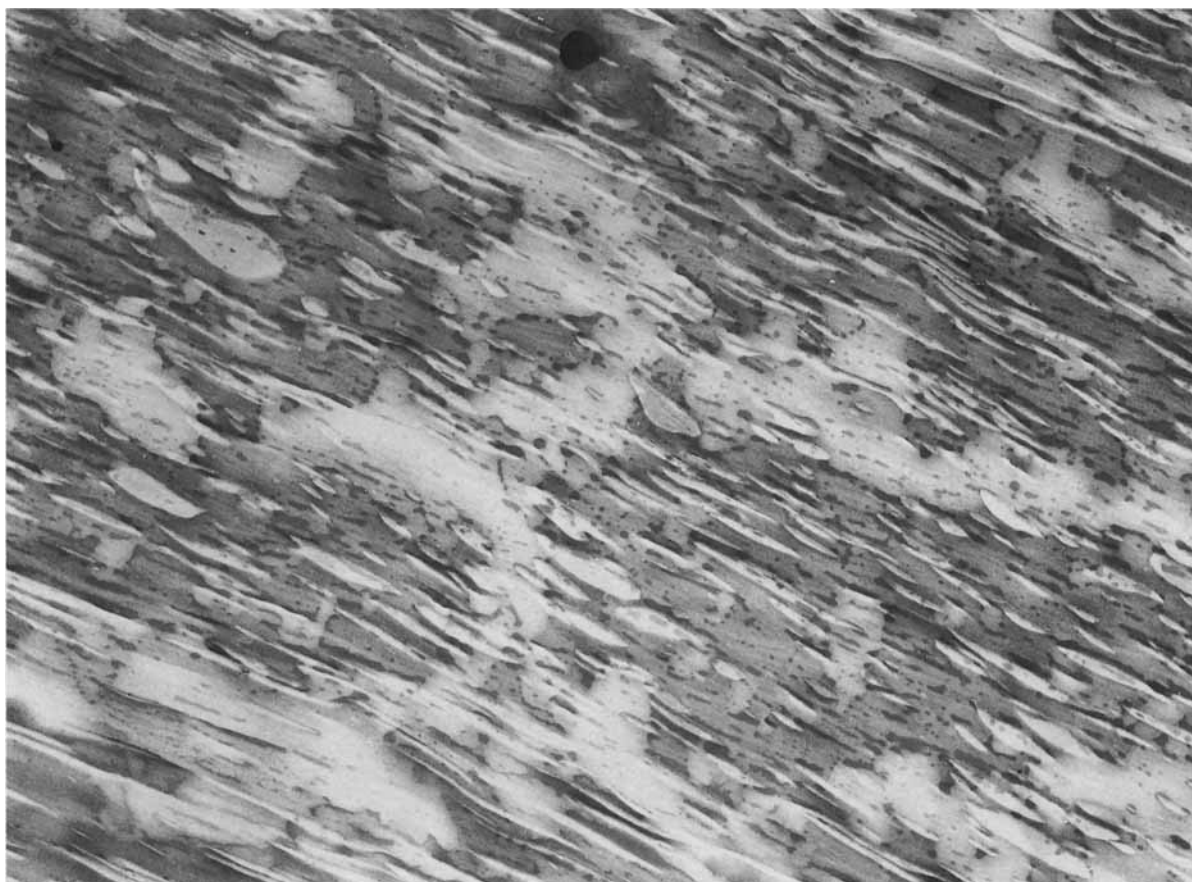


Figure 10 TEM micrograph of 70/30 PC-PET blend ($\times 20,880$).

and PC particles dispersed in the PET matrix. We think that phase inversion takes place at this composition with the final result shown in sample E (50/50, Fig. 8). Here, the dispersed phase is PET of broad dimension (400–1000 nm), containing small PC particles (15–35 nm). This phenomenon is also evident in sample F (60/40, Fig. 9), where the morphology is similar to sample C. In contrast, large morphological changes are evident in sample G (70/30, Fig. 10), where PET particles embedded in the PC matrix are of irregular shape and very large dimensions with PC inclusions of about 25 nm. Sample H (80/20, Fig. 11) shows a regular distribution of PET particles in the PC matrix. Their dimension reaches 500 nm in diameter.

Physical Properties

Tensile properties of the PC-PET blends were characterized according to the ASTM D 638 test method. Tensile strength for the blends is shown in Figure 12. The data indicate that the tensile strength of the polycarbonate is not altered by the addition

of PET to the blend throughout the entire range of composition. Tensile elongation of the blends (Fig. 13) shows that the blends exhibit ductile characteristics. The elongation of the blends, therefore, clearly indicates that the PC and PET are mechanically compatible.

The notched Izod impact strength of the PC-PET blends decreases as the level of the PET is increased in the blends (Fig. 14). This is expected because addition of a semicrystalline polymer such as PET to the polycarbonate would increase the notch sensitivity of the blend. However, the falling-dart impact strength of the blends is very good throughout the entire range of composition (Fig. 15). The falling-dart impact data seem to indicate excellent adhesion between the PC and PET phases.

Thermal Properties

Glass transition temperatures (T_g) of the blends can be used to determine the extent of miscibility between the components. The T_g 's of the PC and PET were determined for the entire range of composition.

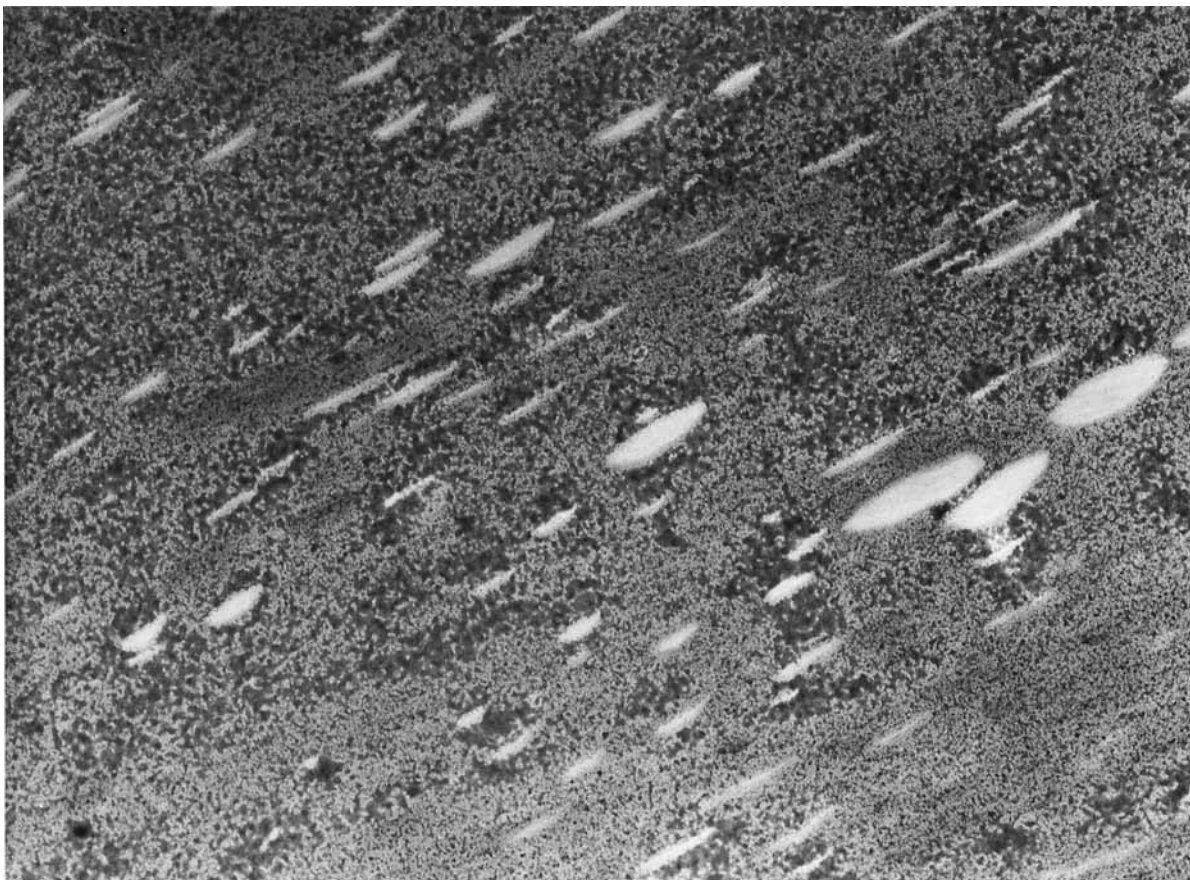


Figure 11 TEM micrograph of 80/20 PC-PET blend ($\times 20,880$).

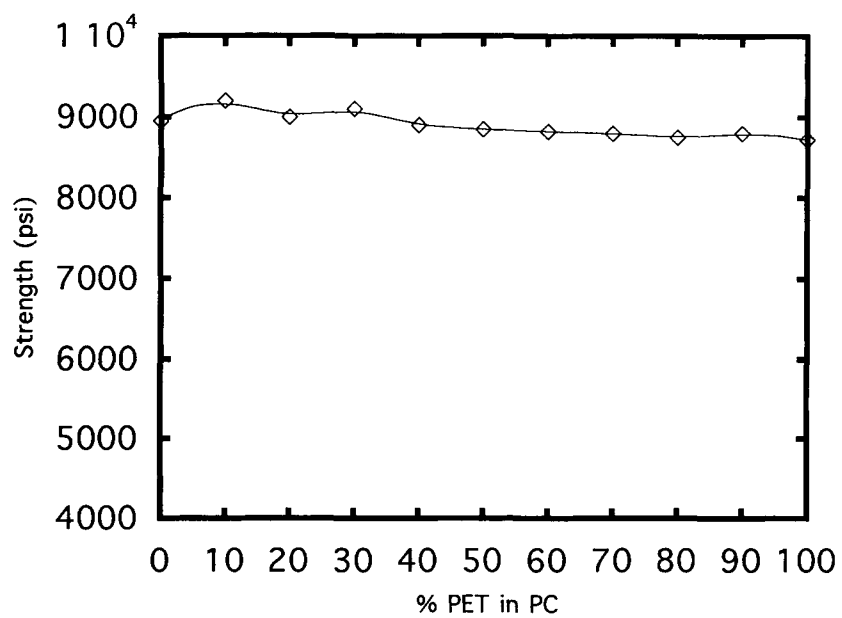


Figure 12 Tensile strength of PC-PET blends.

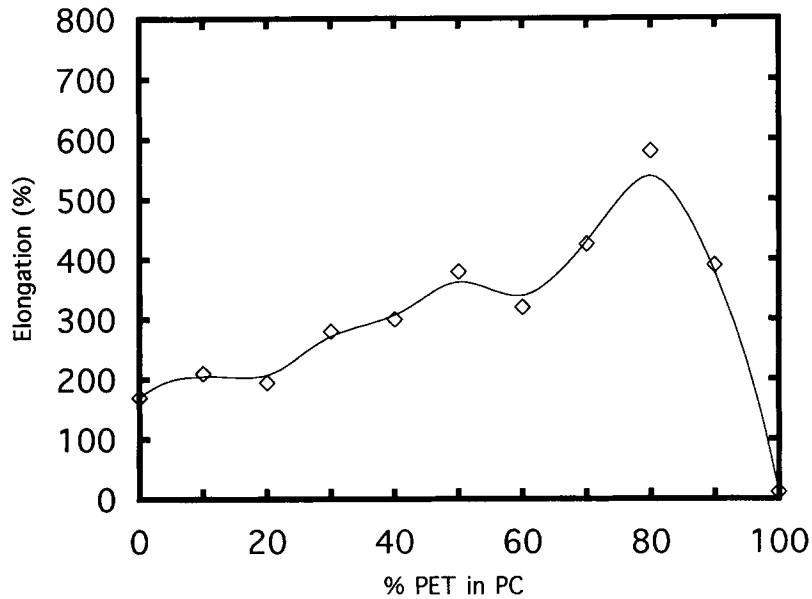


Figure 13 Tensile elongation of PC-PET blends.

The results are plotted in Figure 16. The T_g of the polycarbonate decreases significantly when the concentration of the PET is increased in the blends, whereas, the glass transition temperature of the PET is relatively unchanged. The change in the T_g of the polycarbonate is attributed to its degradation.

Isothermal crystallization times (ICT) for the PET in the PC-PET blends were characterized at 200°C crystallization temperature. The crystalli-

zation times for the PET are plotted against the percent PET in the blends in Figure 17. The results show that the crystallization rate of the PET is retarded when the concentration of the PC is increased in the blends. This implies some interaction between the PC and PET in the blends. It is also possible that the crystallization rate of the PET in the blend is reduced due to an increase in its melt viscosity. The melt viscosity of PC is higher than that of PET,

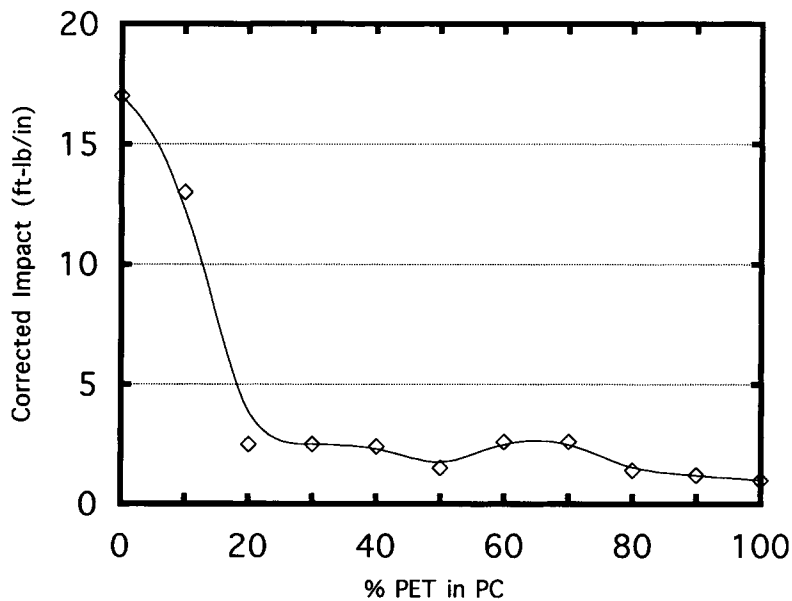


Figure 14 Notched Izod impact strength of $\frac{1}{8}$ in. PC-PET blends.

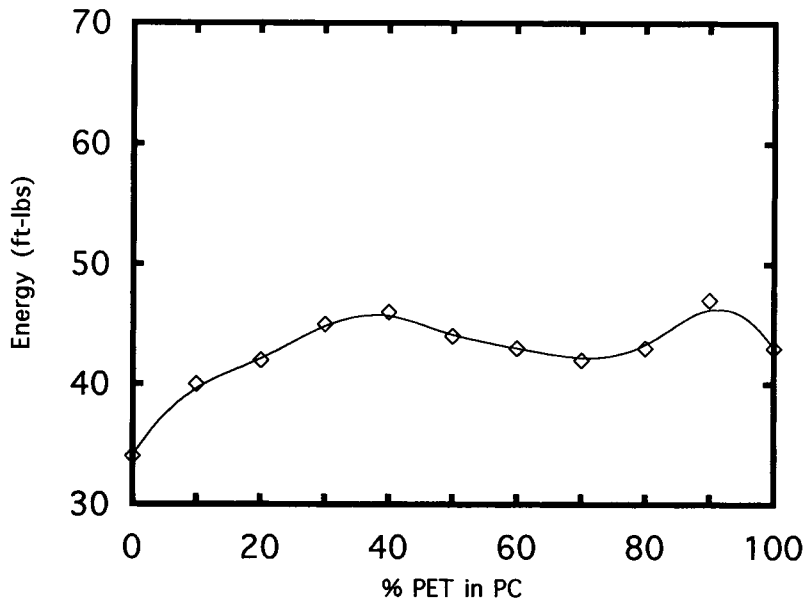


Figure 15 Dynatup impact strength of PC-PET blends.

therefore, the melt viscosity of PET in the blends would increase with increasing concentration of PC. Several authors¹⁴ have shown that the crystallization rate is reduced when partial miscibility between the two polymers in the melt occurs. Others¹⁵ suggest that the crystallization rate reduction for incompatible blends is due to the increase in the melt viscosity of the blend.

CONCLUSIONS

Nuclear magnetic resonance relaxation time measurements performed on PC-PET blends point out the presence of two separate domains with average dimensions not larger than 80 nm. The decreasing variation of PET relaxation time with increasing PC content is accounted for by the presence of an

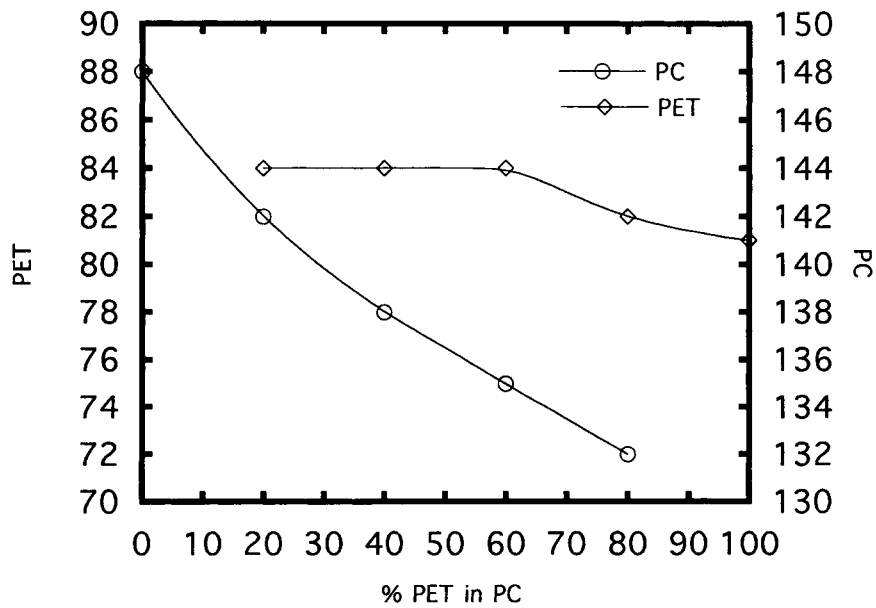


Figure 16 E'', Glass transition data for PC-PET blends.

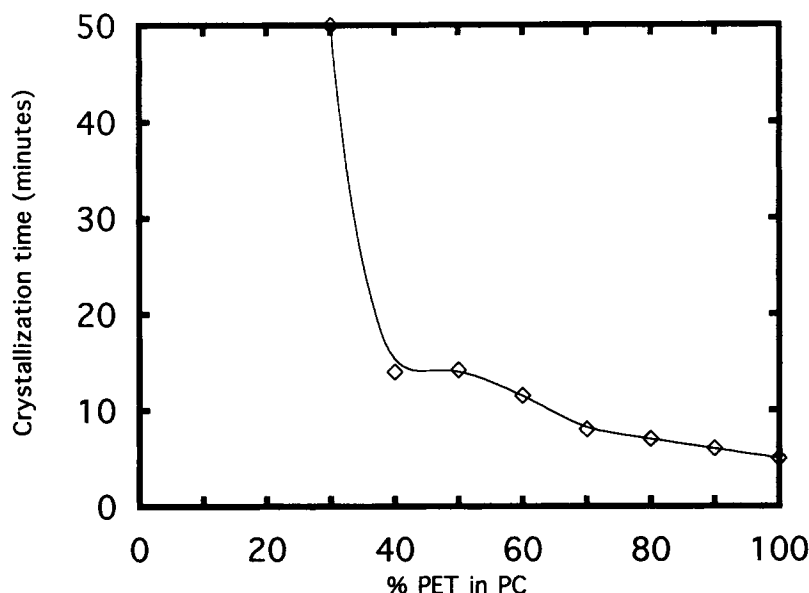


Figure 17 Isothermal crystallization rates (ICT) for PC-PET blends at 200°C.

interface in which part of the PC molecules are finely dispersed into the PET matrix. Relaxation parameters and compositions match very well the equation proposed by Schenk, which quantitatively describes a three-phase model formed by two domains separated by an interface of mixed composition.

Micrographs obtained by TEM clearly reveal the presence of two separate domains. Generally, PET domains appear to be larger than the limit of 80 nm stated on the basis of the NMR measurements. However, a careful inspection shows a dispersion of small PC particles into the PET domain over the whole range of composition, even when phase inversion occurs. It is likely that such a dispersion shortens the average path needed for magnetization to diffuse from PET into PC, thus affecting the PET relaxation times as experimentally observed. Moreover, the partial miscibility seems to be physical in nature rather than due to transesterification processes. This conclusion contrasts with the findings quoted in the introduction that exclude any miscibility over the whole range of composition in the absence of transesterification processes. Furthermore, the accuracy of NMR interpretation relative to PC-PET blends is confirmed by the behavior of the totally immiscible PC-PA-6 blends.

Finally, the tensile properties and Izod impact of the PC-PET blends indicate mechanical compatibility throughout the composition range, in agreement with the NMR interpretations.

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