with P, but reached to a constant value at higher value of P (Table 1). Unfractionated polymer of $\bar{P}=800$ showed lower value than fractionated one, although this was uncertain at higher value of $\bar{P}$.

Table 1. Relation between the degree of polymerization and tensile strength (Kg/mm^2)

Degree of drawing (%) \ P	370	590	1040	1970	11600	16000	Unfractionated	
							800	8900
0	6.4	7.2	7.4	6.7	6.9	7.0	4 8	7.0
100	8.5	10.0	9.8	9.8	10.3	10.0	7.7	11.1
200	9.9	12.3	12.2	12.3	14.2	13.2	8.7	17.0
400	12.9	17.2	18.8	18.8	21.0	18.5	12.6	29.0

The degree of polymerization has more remarkable influence on the flex-life (folding strength) than on tensile strength (Table 2). The flex-life of unfractionated polymer was inferior to fractionated one.

Table 2. Relation between the degree of polymerization and flex-life (cycles).

Degree of drawing (%) \ P	370	590	1970	3880	Unfractionated	
					840	13000
0	28	24	27	22	20	22
100	89	426	680	712	115	97
200	238	1496	3105	2683	188	189
400	735	4010	18160	21780	669	2630

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23. The Elasto-viscous Behaviour of Plasticized Polyvinyl Chloride at the Elevated Temperature. (III)

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(Sakurada Laboratory)

The variation of the elongation of plasticized polyvinyl chloride films with time under constant load was estimated at various temperatures. Appling the four element mechanical model which consists of springs and dash-pots (W.M. Gearhart and W.D. Kennedy, Ind. Eng. Chem., **41**, 695 (1949)), the spring constants and viscosity of dash-pots were calculated. As plasticizers, di-n-octyl phthalate (DOP) and tricresyl phosphate (TCP) were used.

The relation between the concentration of DOP and the logarithm of the principal viscosity η_3 (the viscosity of the series connected dash-pot) was linear at every temperature except 150°C. Linear relation between ln η_3 and 1/T (T;

absolute temperature) was observed and the activation energy of viscous flow E_3 was calculated. The values of E_3 for TCP, DOP and DBP (dibutyl phthalate) were 7.5, 7.0 and 5.8 Kcal., respectively (weight ratio, resin 100 : plasticizer 100). TCP gave higher values of η_3 than DOP at lower temperatures, but at an elevated temperature this order was reversed (Table).

Values of η_3 of plasticized polyvinyl chloride at various temperatures (Weight ratio, resin 100 : plasticizer 100). (unit of η_3: poise).

Plasticizer \ Temp. (°C)	16-28	65	100	150
DBP	1.53×10^{10}	4.34×10^{9}	2.08×10^{9}	3.61×10^{8}
DOP	2.28×10^{10}	5.28×10^{9}	1.66×10^{9}	6.92×10^{8}
TCP	3.55×10^{10}	5.92×10^{9}	1.82×10^{9}	1.00×10^{8}

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24. Elastic and Thermal Properties of Vinylon AN and Vinylon C

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Various mechanical and thermal properties of an ordinary Vinylon, Vinylon C and Vinylon AN, which were synthesized using the same heattreated polyvinyl alcohol fiber as the raw material, were measured.

Vinylon AN and Vinylon C have higher dry and wet tanacity and wet Young's modulus (Table 1).

Table 1. Mechanical properties (room temp., RH 60-70%).

Materials	Denier	Dry			Wet			Wet and Dry Tenacity Ratio (%)
		Tenacity (g)	Elong. (%)	Young's Modulus (Kg/mm²)	Tenacity (g)	Elong. (%)	Young's Modulus (Kg/mm²)	
Ordinary Vinylon	1.90	6.04	25.7	496	3.89	29.5	94	64.4
Vinylon C	2.24	7.56	38.4	—	5.59	44.0	—	73.9
Vinylon AN	2.26	6.52	31.2	524	5.12	36.9	264	78.5

Vinylon AN showed higher degree of elasticity than ordinary Vinylon, and more excellent properties at the elevated temperature (Table 2).