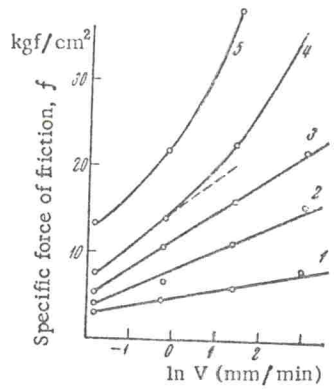

Fig. 3. Variation of the specific force of friction with logarithm of velocity of sliding for elastomer material of natural rubber with equilibrium modulus 3.4 kgf/cm² under various normal pressures; 1) 50; 2) 10^2; 3) $3 \cdot 10^2$; 4) $5 \cdot 10^2$; 5) 10^3 kgf/cm².

and to the increase of the activation energy U appearing in Eq. (3). Extension of range II and shift of range III towards high pressures, with increase of temperature (Fig. 2, curve 3), demonstrates that the increase of frictional force in range III is associated with the reduction of the free volume.

It should be noted further that under high normal pressures the mechanical-chemical processes on the contact surface [13] can contribute to the relation $f(p)$. However, more rigorous study of the influence of specific volume on the frictional properties within range III under higher pressures is hindered due to considerable wear of the polymer under normal pressures above $8 \cdot 10^2$-10^3 kgf/cm².

The study of the dependence of friction force on the logarithm of the sliding velocity (Fig. 3) shows a characteristic increase in the slope line of the graph with increase of normal pressure. Consideration of Eq. (3) reveals the cause of the increase in the value of the slope line of the $f(\ln V)$ graph with the increase of normal pressure. The slope line is determined by the coefficient of the term containing ln V, that is, $2n_k kT/\lambda$. Under the experimental conditions, the temperature was kept constant, therefore, with the increase of normal pressure the increase of the slope line in the f (ln V) graph is associated only with the change of the ratio n_k/λ. This ratio increases with the increase of normal pressure owing to the decrease of mean length of migration of the contacting chains λ and simultaneous increase of the number of contacting chains n_k with the reduction of the specific volume.

Moreover, the increase of the normal pressure leads to appreciable deviation of the relation f (ln V) from linearity (curves 4, 5, in Fig. 3), which was observed previously [14] with uniaxial loading of specimens. The observed deviation from linear dependence of the friction force with the increase of velocity of sliding under high normal pressures is associated partly with the reduction of the lifetime of a frictional junction and its approximation to the time necessary for the migration of the chain after the separation to the new point of contact [15], and partly with mechanical-chemical phenomena.

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