medium with inverted population.

The action of such a mechanism of shortening the scattered light pulse is clear from an analysis of backward scattering ($\theta = 180°$). In the case of large gain, the leading front of the scattered-light pulse produced, for example, in the focal region and propagating in a direction opposite to that of the exciting light will draw from the latter an appreciable fraction of the energy, and with this the slope of the leading front will increase while the trailing edge will practically not be amplified. As a result, the scattered-light pulse can have a duration t_s much shorter than the total duration t_0 of the exciting light. Within a time t_0 we can expect several such short pulses of scattered light, and their limiting duration is set by the anisotropy relaxation time, $(t_s)_{lim} \sim \tau$, and consequently it can reach a value $\sim 10^{-12}$ sec. This estimate of the limiting duration of the pulse in SRW agrees with the experimentally observed broadening of the spectrum of the Stokes SRW ($\Delta\Omega \sim 1/\tau$). The considered mechanism of formation of ultrashort pulses is most effective at scattering angles $\theta = 180°$, but can occur at any $\theta \neq 0$.

The existence of ultrashort SRW pulses with duration shorter than the lifetime of the acoustic phonons makes it possible to explain the competition observed in these and earlier [2] experiments and leading to a total or partial suppression of the SMBS components upon occurrence of SRW. Apparently, the SMBS phenomenon does not have time to become established while the ultrashort SRW pulses occur.

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SHAPE OF COEXISTENCE CURVE OF THE LIQUID AND GASEOUS PHASES OF ARGON

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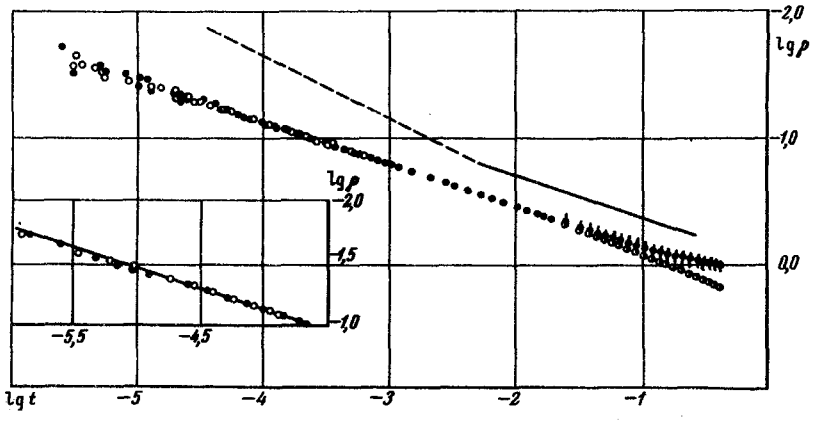
It is known that there is no meeting of minds concerning the shape of the coexistence curve of pure liquids near the critical point. In the first approximation, this curve can be expressed by the formula

$$|\rho - \rho_c|/\rho_c = A[(T_c - T)/T_c]^{\beta},$$

where ρ is the density of the liquid or saturated vapor at temperature T, and A and β are universal contacts.



Plot of log ρ vs. log t, where ρ and t are the density and temperature of the coexisting phases of Ar: o - $\rho < \rho_c$, ● - $\rho > \rho_c$, ϕ and ◑ - the same as given in [13]; ——— curve corresponding to $\beta = 1/3$, - - - - - $\beta = 1/2$. Insert - the same plot for a series with rates $\leq 10^{-15}$ deg/min.

The authors of [1 - 3] stated, on the basis of experimental data, that the constant β is close to 1/3 for all substances.

To the contrary, it was shown in [4, 5] that the same experimental material offers evidence in favor of $\beta \approx 1/2$ in the immediate vicinity of the critical point. Some recent papers [6 - 8] cite $\beta \approx 1/3$. Since the value of this parameter is important for the question of applicability of the lattice-gas mechanism to the critical point of a liquid, we undertook a special investigation aimed at estimating β.

The coexistence curve was measured by the method of quasistatic thermograms [11], which reduces to a slow heating (or cooling) of the substance at constant density, with stirring under almost adiabatic conditions. At the point where the state of the system changes, the time dependence of the temperature (run) exhibits a kink due to the presence of the jump of the specific heat, which is readily detected on the plot, accurate to $\sim (1 - 2) \times 10^{-4}$ degrees. The rate of change of the temperature should be such that the state of the substance can be assumed to be in equilibrium at each given instant of time. Our earlier determinations of the time of establishment of equilibrium [12] have enabled us to estimate the equilibrium rates of the runs at different distances from the critical point.

The experiments (see the figure), which include several measurements series on different samples of argon, yielded a coexistence curve that is approximately symmetrical with respect to $\rho_c = 0.531$ g/cm^3, with $T_c = 150.663_3$°K. The points on the plot are the results of averaging of values obtained from 2 - 5 runs. For the purest argon sample (spectrally pure, 99.995% according to the manufacturer's certificate), we chose the value $T_c = 150.663 \pm 0.01$°K in our scale (table SST-64, based on the NPL thermodynamic scale) and $\rho_c = 0.531 \pm 0.001$ g/cm^3.

In our experiment, importance attaches not to the absolute temperature error, but to the relative error, which in our case is smaller by almost two orders of magnitude. Our method makes it possible to come closer to the critical point by one order of magnitude compared with all existing methods, and is just as accurate. Further approach leads to an increase in the scatter of the points (see the figure), due to the fact that so close to the critical point the rate $\sim (2 - 3) \times 10^{-5}$ deg/min used by us in most series no longer is sufficiently small, and the obtained results are not fully in equilibrium. Since this rate is still smaller by

one order of magnitude than the rates usually employed by experiments to approach the lamination point of the system (regardless of the method used to detect the existence of two phases - the appearance of a meniscus [6, 7] measurement of the dielectric constant [9], or measurement of the refractive index [10]), we consider the results obtained by others in the region $|(T_c - T)/T_c| < 10^{-4}$ to be unreliable, no matter what their opinion concerning the value of β.

In the figure, our data are presented in a logarithmic scale. We see that the formula

$$|\rho - \rho_c|/\rho_c = 1{,}55\,[(T_c - T)/T_c]^{0{,}33}$$

approximates satisfactorily the data in the relative-temperature interval $10^{-2} - 5 \times 10^{-6}$ and in the density interval $0.5 - 2 \times 10^{-2}$. The points ◆● on the plot were taken by us from the handbook [13] to complete the picture. In the left corner of the figure are shown the results of measurements of the last series at rates $\sim 5 \times 10^{-6}$ deg/min. We see that the reproducibility is improved compared with the remaining series; this is due to the increase in the degree of equilibrium in the runs. In the figure, the points ○ correspond to $\rho < \rho_c$ and ● to $\rho > \rho_c$. A change of 0.001° in the choice of T_c violates the applicability of formula (2) (changes the value of β) in the region $|(T_c - T)/T_c| < 10^{-5}$. Since the choice of the authors of [6, 7] is larger by one order of magnitude, the deviation of β in the direction of higher values, starting approximately with $|(T_c - T)/T_c| < 10^{-4}$, seems to be connected with the choice of too high values of T_c. The same considerations apparently apply also to our estimates [4, 5].

Thus, we must state that the value $\beta = 0.33 \pm 0.02$ is close to that expected in accordance with the model of the lattice gas, and our skepticism with respect to this value [14] is not justified. The result forces us to return again to a study of the temperature dependence of C_v with an accuracy comparable with the present experiment.

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