TABLE

T°K	η, g/cm^{-1} sec^{-1}	φ, g^{-1}/cm/sec
84.25	0.00282*	355*
86.25	0.00262*	382*
86.90	0.00256*	391*
87.30	0.00252*	397*
90.0	0.00232	432
99.5	0.00162	618
111.0	0.00137	750
120	0.00116	862
127	0.00100	1000
133.5	0.00077	1300
138.7	0.00070	1430
143	0.00063	1590
147	0.00056	1790
149	0.00050	2000

* Values cited from work of N. S. Rudenko[4].

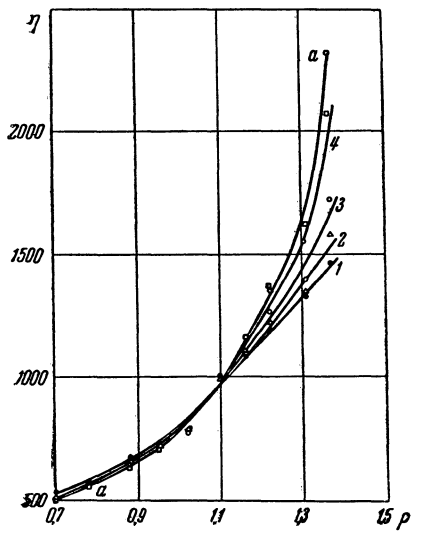

FIG. 2. Isothermal plots of argon viscosity vs. density. 1 – 260° K; 2 – 230° K; 3 – 200° K; 4 – 125° K.

our investigation, the viscosity coefficient of argon was measured at temperatures below + 18° C, and the results can therefore be compared only for a narrow temperature interval. Our results are nevertheless in good agreement with those of Ref. 3; the maximum discrepancy does not exceed 10%.

The temperature dependence of the viscosity of liquid argon at constant density in excess of $2\rho_k$ can be quite satisfactorily represented by an equation of the type $\eta = Ae^{U/T}$, where A and U are constants. A similar temperature dependence of viscosity was formerly obtained for nitrogen[2].

In conclusion, I must thank B. I. Berkin and N. S. Rudenko for supervising this work.

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The HDSe Microwave Spectrum

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THE HDSe microwave spectrum was investigated with a radio spectroscope with electric molecular modulation.

Preliminary calculations called for two transitions to exist in the 9000 mc region: $2_{20}-2_{21}$ and $4_{31}-4_{32}$. An investigation of the spectrum in the 8400-9300 mc range disclosed two groups of six lines each, one for each of the selenium isotopes.

Study of the Stark effect of the observed lines disclosed that one group of lines corresponds to the $2_{20}-2_{21}$ transition, the other to the $4_{31}-4_{32}$ transition. The frequencies of the observed lines are given in the Table.

The frequencies were measured with the aid of a quartz multiplier. The measurement accuracy was ±0.1 mc. The frequencies of the Se^{74} lines were not measured, for this isotope occurs infrequently and its lines are of low intensity. In addition to observing the HDSe lines, we also observed two previously known[1] HDO lines, at 8577.7 and 8836.95 mc.

The intensity of the HDSe line reaches values of the order of 10^{-6} cm^{-1}. The HDO line at 8836.95 mc[2] was used to calibrate the spectroscope sensitivity.

The observed lines were used to calculate the frequencies of other possible transitions. Calculations called for a $9_{54}-9_{55}$ transition to exist in the vicinity of 14,000 mc. The lines corresponding to this transition were found, but a discrepancy on the order of 60 mc was found between

TABLE

Transition	Selenium Isotope	Frequency, mc
4_{31}—4_{32}	82	8756.7
	80	8771.05
	78	8786.05
	77	8793.95
	76	8801.85
2_{20}—2_{21}	82	9127.75
	80	9138.55
	78	9149.65
	77	9155.85
	76	9161,50
9_{54}—9_{55}	82	13827.7
	80	13862.65
	78	13899.3
	77	13918.3
	76	13937.8

the calculated and the experimental data. This is attributed to the failure to allow in the calculations for the centrifugal perturbation, which is large for this molecule. To find the constants of the centrifugal perturbation, it is necessary to measure the frequencies of a few more transitions; this will be done in the future.

In conclusion, the authors thank G. Ia. Vzenkova for preparing the HDSe compound.

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"Seniority" Quantum Number Selection Rules in Nuclear Reactions

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A "SENIORITY" quantum number appears in the theory of atomic and nuclear shells[1-4]. Let us denote this by v. At the present time, the degree of accuracy of this quantum number has not been established. The question of the correctness of v is closely related to the question of the accuracy of jj coupling, although it does not entirely coincide with the latter. For the purpose of obtaining the required experimental information, it is necessary to investigate the satisfying of the selection rules for v in nuclear reactions. These rules can be derived in a very simple way on the basis of the results given in the articles referred to above.

1. In a reaction involving the capture or emission of a j nucleon (initial configuration j^n, final configuration j^{n+1}, or vice versa) $\Delta v = \pm 1$.

In particular, stripping in even-even nculei, for example, with an $f_{7/2}$ shell, should not lead to the formation of a resultant nucleus in the excited state $J = 7/2-$, $T = T_{gr}$ with $v = 3$ (the ground state of the initial nucleus has $v = 0$ and $J = 0$; the ground state of the final nucleus, with the exception of Ti_{22}^{49} and V_{23}^{49}, has $v = 1$ and $J = 7/2-$). However, such excited states of nuclei with $f_{7/2}$ shells have not yet been observed experimentally.

2. For $M1$ or $M3$ transitions in nuclei where there are only neutrons outside of the filled shells (for example, Ca_{20}^{43}), or only protons (for example, V_{23}^{51}), which are characterized by the configuration j^n, $\Delta v = 0$.

Thus the selection rules in Ca^{43} and V^{51} for v forbid an $M1$ transition from any level of the $(f_{7/2})^n$ configuration to the ground level of this configuration with $v = 1$, $J = j = 7/2-$, which is ground level for these nuclei.

3. For $M1$ or $M3$ γ-transitions in the case of a j^n configuration formed by neutrons and protons ($|M_T| < n/2$): $\Delta v = 0, \pm 2$, $\Delta T = \pm 1.0$; when the isobaric spin T of the initial and final states is zero, $\Delta v = 0$.

For $E2$ radiation the selection rules for v will be $\Delta v = 0, \pm 2$. These have no practical value.

Selection rules 1 are intuitively clear and require no explanation. Selection rules 2 and 3 can also be derived by a very clear method. We shall now discuss selection rules 2.

The wave function of a state of configuration j^n with seniority v can be written as:

$$\Psi_M^J(n, v) = \sum_P (-1)^P P\Psi_0^0(1, 2) \ldots \Psi_0^0(n - v - 1, n - v)\, \Psi_M^J(v, v);$$

where the P are permutation operators of n numbers: $(-1)^P = +1$ when P is even and -1 when P is odd. It is important to note that even in other cases where such a wave function of the j^n configuration is broken up into factors, none of the