A Possible Method for the Estimation of the Mixing Length in Turbulent Convection. CHARLES R. COWLEY, *Yerkes Observatory*.—An order of magnitude expression for the mixing length may be obtained when it is possible to estimate the Rayleigh number Ra from physical considerations. The expression for the mixing length depends on the square root of the Rayleigh number so that uncertainties in the estimated value of Ra are minimized. We suggest a generalization of this result to the case of a variable density atmosphere.

Nonuniformity of the Interstellar Polarization Law. GEORGE V. COYNE, S.J., *Woodstock College*, AND THOMAS GEHRELS, *University of Arizona*.—The polarization of a total of 37 stars brighter than $M_V=7.5$ has been observed at seven wavelengths ranging from $1/\lambda=1.05$ to $1/\lambda=3.04$. There is no uniform law for the dependence of the percentage of polarization upon wavelength. In fact, several stars show two discrete maxima in their $P(\lambda)$ curves; others show a rise to a second maximum at one or other of the extreme wavelengths observed. In addition, for some of the stars there is a dependence of the orientation of the plane of polarization on wavelength. This is notably true for the stars at low galactic latitudes in two discrete longitude ranges, $121^\circ < \text{long.} < 145^\circ$ (Cassiopeia) and $144^\circ < \text{long.} < 191^\circ$ (from Perseus to Orion). An interpretation of these data is proposed in terms of the traverse of several discrete clouds having different particle sizes and different particle orientations. If the refractive index is 1.3, for example, particle diameters of about $0.2\text{--}0.4\ \mu$ occur commonly. In a few regions particle diameters near $1\ \mu$ are found. From the comparison of the observations of several observers over a period of 15 yr, there are indications of a time-dependent variation of polarization for some of the stars. The variability of μ Cephei is confirmed.

Eclipse Determination of Chemical Abundances in the Solar Corona. G. W. CURTIS, J. T. JEFFERIES, AND F. Q. ORRALL, *Sacramento Peak Observatory, University of Hawaii*.—Chemical abundance determinations from observations of the coronal emission spectrum (particularly for iron) have consistently exceeded those determined from curve of growth analyses of photospheric absorption lines. Although the coronal abundances are somewhat uncertain because they depend on uncertain coronal models and uncertain theories of coronal ionization and excitation, Jefferies and Orrall (*Astrophys. J.* 1966, to be published) have shown that it is possible to set rigorous lower limits to the abundances that

are insensitive to these uncertainties. Applying this method to coronagraph observations of the red, yellow, and green coronal lines they found lower limits to the calcium and iron abundances in excess of the photospheric values by factors of 2 or 3.

We have applied this method to the very complete observations of the coronal spectrum between $\lambda 3000$ and $\lambda 9000$ obtained by the University of Hawaii–Sacramento Peak Observatory expedition to observe the eclipse of 30 May 1965. Emission lines arising from 15 different ions were studied. The resulting lower limits to the coronal abundances are given below, along with the photospheric abundances taken from the careful curve of growth studies by C. R. Cowley (*Astrophys. J.* 143, 352, 1966) for Ni, and E. A. Müller and J. P. Mutschlecner (*Astrophys. J. Suppl.* 9, No. 85, 1964) for the remainder of the elements.

Element	Abundance per 10^6 protons					
	V	Cr	Mn	Fe	Co	Ni
Corona (lower limit)	0.22	1.0	0.042	5.0	1.1	1.1
Photosphere	0.013	0.12	0.065	5.0	0.026	0.49

The coronal abundances shown are strict lower limits. The actual values can be that low only if there is a specially favorable temperature distribution to make ionization a maximum and only if the local electron density is high enough that the excitation is governed completely by collisions. But within the ions Fe XI and Ni XIII, which give rise to two observable emission lines, it is clear that both radiation and collision processes enter to determine the degree of excitation. We conclude that the coronal abundances are higher than the lower limits shown and that they therefore exceed the photospheric values.

Role of Collision-Induced Transitions in the Venus Greenhouse Effect. R. E. DANIELSON AND P. M. SOLOMON, *Princeton University Observatory*.—The infrared opacity of collision-induced transitions in N_2 and CO_2 has been estimated for $T=600^\circ\text{K}$ from laboratory tracings obtained at room temperature. Assuming a 10% CO_2 , 90% N_2 atmosphere on Venus having a surface pressure of 100 atm and a surface temperature of 600°K , the optical depth of the Venus atmosphere is in excess of 500 in the centers of the following collision induced bands: (1) N_2 , rot.-trans. ($\sim 200\text{ cm}^{-1}$), (2) CO_2 , $2\nu_2^0$ (1286 cm^{-1}), (3) CO_2 , ν_1 (1388 cm^{-1}), (4) N_2 (1-0) (2331 cm^{-1}). Optical depths of the order of 50 occur at the centers of the following weaker bands resulting from collision induced simultaneous transitions: (5) N_2 (1-0)– CO_2 , ν_2 (1664 cm^{-1}), (6) N_2 (1-0)– CO_2 , ν_2 (2998 cm^{-1}), (7) N_2 (1-0)– CO_2 , ν_3 (4680 cm^{-1}). In addition to the induced