$|\psi| < 30°$ and $|\Delta\delta| < 30°$, a much smaller scattering of the results is found. In our earlier paper (ref. 1, Fig. 3), some points did not fit the general curve. It was found that all of them represent density values for which $|\Delta\delta| > 30°$.

Using atmospheric densities as derived in our earlier communication[1] for altitudes of 210, 350 and 660 km. we obtain a density model with solar and diurnal fluctuations as shown in Fig. 3. The scale-heights of the atmosphere according to Kallmann and Juncosa[3] on which the computations were originally based are eliminated from the final result by means of an iteration process (see ref. 1).

In Fig. 3 the three upper curves (solid lines) are valid for $\Delta\alpha' = \Delta\alpha - 25° = 0°$ (13h. 40m. local time); the three lower (dotted) curves are valid for $\Delta\alpha' = 180°$ (extrapolated values). In each group the lowest of the three curves corresponds to a value of $S = 120$, the middle curve to $S = 170$ and the upper curve to $S = 220 \times 10^{-22}$ W./m.^{2} c./s. of the solar 20-cm. radiation. The large density fluctuation between day and night suggests a daily up and down movement of the atmosphere[6].

A layer of constant atmospheric density, for example, would rise from 520 to 660 km. within 6h. according to Fig. 2. The resulting velocities in the vertical direction are about 25 km./hr. The air movements decrease with decreasing altitude and at 200 km. become insignificant compared with the fluctuation caused by solar radiation. The latter must originate in a layer below 200 km. This suggests that the absorption of solar X-ray radiation in the E-layer of the ionosphere is responsible for them. The scale height $H = \frac{RT}{gM}$ (where R is the gas constant, T is temperature, g is acceleration of gravity, M is mean molecular weight) of the atmosphere and thus the ratio T/M changes strongly with the time of the day but very little with the flux of 20-cm. radiation.

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PHYSICS

Natural Radioactivity of Samarium and Neodymium

There seems to exist a discrepancy between the measured value of the alpha-decay half-life of natural samarium (samarium-147) and the theoretical half-life calculated from its measured alpha energy[1]. This may be due to the fact that in most ion-chamber measurements of samarium-147, heavy natural alpha-emitters with much higher energies have been used as standards, which leads to great difficulties because of the non-linearity of the ionization process.

In this investigation thin samples containing about 50 μgm./cm.^{2} of natural samarium, 0·3 μgm./cm.^{2} of natural uranium and 0·5 μgm./cm.^{2} of elemental boron were analysed in a grid-type ionization chamber in the presence of a thermal neutron flux of $1·5 \times 10^3$ n/cm.^{2} obtained from a polonium–beryllium source.

The neutrons absorbed by boron gave rise to alpha-particles with energies of 1·797 and 1·474 MeV.[2], respectively, which were recorded photographically together with the samarium and uranium alpha-particles for the purposes of calibration[3].

By the use of exposures several days long, spectra containing 10^4–10^5 pulses were obtained and analysed with a spectrophotometer. The result for the alpha energy of samarium-147 is:

$$E = 2·20 \pm 0·03 \text{ MeV.}$$

which is somewhat higher than the value quoted by W. Jesse and J. Sadauskis[4].

The specific activity of samarium-147 was measured by counting the alpha-particles from 28·9 mgm. of samarium which were vacuum-evaporated on a source plate of diameter 200 mm. Taking into account self-absorption and back-scattering, a value of $7·00 \pm 0·3$ counts/min./mgm. of natural samarium is obtained, which corresponds to a half-life of $(1·14 \pm 0·05) \times 10^{11}$ yr. for the isotope 147.

An attempt to detect the natural alpha activity of neodymium was made using a 200-mm. source-plate on which 36 mgm. of neodymium were evaporated. In spite of appreciable thorium contamination a weak line was observed at $(2·0 \pm 0·1)$ MeV., in agreement with investigations made by the emulsion method[5].

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Evaporation Figures on the Surface of Sodium Chloride Crystals

Figures which appear during evaporation on the surface of sodium chloride have already been reported by E. Kern and H. Pick[1], S. Amelinckx and E. Votava[2], and others. Here we report on figures obtained during evaporation experiments which recall similar figures obtained on the surface, for example, of silicon carbide by A. R. Verma[3] and on sodium chloride by Z. Morlin[4].

The annealing of the sodium chloride plates (15 mm. × 5 mm. × 2 mm.) was carried out near the melting point for 4–5 days in a crucible made from sodium chloride single-crystal and covered with a single-crystal plate. Besides the simple-concentric circles seen in Fig. 1 (the small spots on the figure are etch-pits revealed by glacial acid), figures of sharp characteristic contours were obtained (Fig. 2). These may represent Frank–Read sources, which appear at the edges of the sodium chloride plates,