tion will fall between 132 km/sec and 55 km/sec, respectively. The majority of silicate micrometeorites should escape sputtering entirely, as should satellites with metallic or silicate surfaces in the regime of free molecular flow.

In evaluating the drag coefficient for a body travelling in the regime of free molecular flow (m.f.p. greater than diameter of body) in the upper atmosphere, the following model is proposed: of the number of atmospheric particles which the body encounters, a fraction p will penetrate the surface, to be later isotropically re-emitted; while a fraction r ($=1-p$) will rebound elastically from the surface. The drag effect of the former group follows from simple momentum considerations, while the drag component parallel to the line of flight for the average particle in the latter fraction may be derived from a center-of-mass collision diagram. In so doing, the particle should be considered to collide with a single atom at the surface of the body, if the bond energies retaining the surface atom are small compared to the energy of the impinging particle. This yields a different average drag component per rebounding particle than the simpler, and less realistic model in which collisions occur against the total mass of the body. The fraction p may also be derived from the center-of-mass collision diagram.

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Wyller, Arne A. Theoretical vibrational transition probabilities for 81 bands in the red CN system.

Relative vibrational transition probabilities have been computed for 81 bands which belong to the red system of CN. The bands correspond to all possible transitions between the upper and lower vibrational levels, with respectively $v' = 0, 1 \dots 7, 8$ and $v'' = 0, 1 \dots 7, 8$. The vibrational wave functions were constructed and normalized according to the phase integral method as applied by Ta-You Wu (1952) to the case of diatomic molecules. A modification of the Morse potential function proposed by Hulburt and Hirschfelder (1941) was used throughout the investigation. The overlap integrals were evaluated by mechanical quadratures performed with the aid of an IBM electronic computer. The vibrational sum rules were fulfilled to within one or two per cent in all cases where enough bands were available, thus serving as a check on the accuracy of the integration procedures.

The calculated transition probabilities agree well with the published theoretical values of Fraser *et al.* (1954) which are based upon approximations to the Morse potential functions. However only 21 values could be compared and these were all pertaining to transitions between mainly lower vibrational levels. Only two values differed by more than 10 per cent, the remaining values, unless too close to zero, agreed to within 5 per cent. This rather good agreement is partly explained by the fact that the potential functions of Morse and Hulburt and Hirschfelder do not differ much in shape for these lower vibrational levels. It is to be expected that more pronounced discrepancies would arise for values pertaining to relatively high vibrational transitions.

The agreement with the theoretical values by Bouigue (1954) is not so satisfactory. Only four values out of twenty-one differed by less than 5 per cent, the remaining values showing differences mostly in the range of 20 per cent or more. This probably indicates that the method used by Fraser, Jarman and Nicholls for the approximation to the exact Morse potentials is more satisfactory than that used by Bouigue in the case of the red CN system. The phase integral method on the other hand does not introduce any approximations to the original form of the potential functions.

The greater labour of constructing the wavefunctions appears justified in view of the importance the transition probabilities carry in the determination of the vibrational temperatures from stellar spectra. It is highly desirable to extend the present studies to take into account higher-order terms in the expansion of the electronic transition moment as a function of the internuclear distance (Shuler 1950, Fraser 1954). To this end the already constructed wavefunctions should be of value. Naturally it is also highly desirable in the future to obtain a complete set of transition probabilities from laboratory data based on rotational line intensities where blends are fully taken into account.

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