

acteristics of its effectiveness are thus fundamentally different from those of direct and reflected sunlight. The temperature 311°K is the highest mean to be expected for satellites at the particular 400-mile mean height assumed by Ross. For heights above this, the terrestrial contribution falls off rapidly, as his treatment makes clear.

Another possible variation which should be borne in mind is that a satellite temperature decrease of 20°C would result from assuming the 400° lower effective solar temperature 5760°K which is implied by direct measurements of the solar "constant." Also, it is quite certain that the 2-percent eccentricity of the earth's orbit would cause annual variations up to 1 percent, or 3° above and below the mean. An approximate general formula, incorporating all these considerations, would be:

$$T = T_s (D_s/4)^{1/4} \times [1 + (1 + 2\epsilon/\alpha F)/48(1 + h/3960)^2] \times (\alpha F/\epsilon)^{1/4}$$

In this,  $T_s$  and  $D_s$  are, respectively, the effective absolute temperature and radian diameter of the sun,  $\alpha/\epsilon$  is the absorptivity/emissivity ratio of the satellite,  $F$  its sunlit time fraction, and  $h$  the mean height of its orbit in miles.

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#### Absorption Spectra of Hill Reaction Oxidants

In considering the correlation of absorption spectra with oxidant potential and with antioxidant ability, as in the report of R. J. Marcus, J. L. Hatchett, and K. M. Sancier [*Science* 127, 647 (1958)], it is of interest to note that F. J. Stubbs and C. N. Hinshelwood [*J. Chem. Soc. Suppl. Issue* 1, 571 (1949)] showed that with arylamines the activation energy of acylation was partially contributed by the ring substituents. These contributions were additive. Stubbs and Hinshelwood also showed that other properties, such as basicity and absorption spectra, correlated similarly with these contributions.

It is reasonable to assume that, for the phenols and phenoxy radicals related to the quinones of the report of Marcus, Hatchett, and Sancier, the ring substituents control the energy of dissociation of the weakest hydrogen. Perhaps both the redox potential and the absorption spectra of these quinones and their reaction intermediates can then be considered as functions of this dissociation energy.

G. R. WARD

Los Angeles Soap Company,  
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