

that active, diverse, and important inorganic substances usually contain oxygen or hydrogen, and that it is the union of other elements with these two which renders them available and useful to the organism.

III

THERMOCHEMISTRY

Every chemical change consists in simultaneous rearrangements of matter and energy. The true nature of the chemical process is to be sought neither in the one nor in the other of these two phenomena, but in both together; and properly energy is as much the chemist's concern as matter itself.

Thus far in the present investigation, considerations regarding energy have been avoided except in the case of hydrolytic cleavages, and these constitute a unique class of reactions. No other large and important class is characterized by inappreciable heat of reaction, for it is as heat that chemical energy commonly manifests itself when liberated. It is evident, however, in accordance with the fundamental postulates, that the organism must have energy to actuate as well as matter to form its mechanism. Therefore the nature of the energy transformations, which make up one