It will be seen, therefore, that the dualistic view of valence introduces complications in the theoretical treatment of chemical reactions which may be avoided to a great extent if the unitary polar valence view be adopted throughout. The positive results which have been obtained with the unitary view must also be emphasized. The work of Stieglitz[1] must be mentioned especially in this connection. Not the least important feature of this view is the possibility of grouping together all chemical phenomena. The IV Paper of this series dealt especially with this point of view and the Classification of Chemical Reactions developed there shows how the principles may be applied to organic as well as to inorganic reactions.

Finally, therefore, the relations pointed out in this paper and a number of other facts, some of which have been mentioned in the previous papers, have convinced the writers that the polar view of valence (or the valence view which considers chemical bonds to be formed by the transfer of corpuscles between atoms) is sufficiently broad to enable a satisfactory classification of valence phenomena to be developed at present, and it is this fact which it is desired to emphasize in this paper in contradistinction to the classification of Bray and Branch which involves both polar and non-polar valences. Especially in oxidation and reduction reactions with organic as well as with inorganic compounds does the unitary view, in which the changes are assumed to depend upon the electrical charges of the atoms, show a simpler and more satisfactory classification than does the dualistic view which leads to contradictions or to an arbitrary separation of phenomena fundamentally similar.

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The Nature of the Forces Holding Atoms in Combination.—The magnitude of electrical forces in comparison with that of gravitation, which seems to be the other force most worthy of consideration, makes it seem quite improbable that the atoms of such compounds as hydrochloric acid, hydriodic acid and water are held together by electrical forces while those of methane and ethane are held by gravitation or some other non-electrical force. From the experiments of E. C. Franklin, especially, it seems quite clear that we have positive hydrogen and negative amide, NH_2, in ammonia, just as we have positive hydrogen and negative hydroxyl in water. There is considerable evidence that acetylene, H—C≡C—H, contains positive hydrogen but, if this is true, it is hard to believe that ethane, $H_3C—CH_3$, from which it can be obtained by simple reactions, does not also contain positive hydrogen. W. A. NOYES.

[1] Stieglitz and Curme, *Ber.*, **46**, 911 (1913). Curme, THIS JOURNAL, **35**, 1143 (1913). Cf. also W. A. Noyes, THIS JOURNAL, **35**, 767 (1913) and the references to the work of others along similar lines given there.