

Introduction à la Théorie des Explosifs. Par M. E. SARRAU, Ingénieur en Chef des Poudres et Salpêtres, Membre de l'Institut. Paris, Gauthier-Villars et Fils, 1893. 115 p.

To the student of applied and theoretical mathematics this work of the eminent M. E. Sarrau will be most welcome. Unfortunately our language can boast of but little on the mathematical theory of explosives, and that little mainly in isolated chapters, imperfect and confusing in their briefness. Whether this be due to lack of interest or of study, we do not care to discuss, but certain it is that for a clear exposition of mathematical thought we must turn to writers of other lands than ours. From France we have received many of our best works, and it is with pleasure that we now announce this new work from the hand of M. E. Sarrau. A prefatory note, four lines in all, states the author's intention to bring forward such mechanical, thermo-chemical, and thermodynamical problems as are necessary to a comprehensive theory of explosives. Throughout, the discussion, which is both analytical and general, is so clearly and concisely accomplished as to be quite within the understanding of any student versed in differential and integral calculus. The first chapter treats analytically of the mechanical principles, including work, kinetic energy, and potential energy. In the second chapter are established the general laws of gases, Mariotte's, Gay-Lussac's, the law of specific volume, the hypotheses of Avogadro and of Ampere, the molecular and atomic weights, the molecular volumes, and the chemical formulæ. In this same chapter are studied the laws governing the specific heat of gases and the laws of gaseous mixtures. Chapter III. treats of the thermo-dynamics of perfect gases, and Chapter IV. of the general principles of thermo-dynamics, including thermal phenomena, equivalence, and the principle of Carnot-Clausius. Chapter V. is devoted to liquids, the law of compression, and the equations of Van der Waals and Clausius. The preceding theories and principles are applied in Chapter VI. to the various transformations, first without change in physical state and then with change from one state (of pressure, tempera-

ture, and volume) into another. The nature of heat is discussed in Chapter VII., and the heat theory of chemical reactions in Chapter VIII. Chapter IX., the last in the book, contains a study of dissociation, theoretical and practical. It will be noticed that the author has confined himself strictly to his outline as planned, and the work is, as the title indicates, merely an introduction to the further and advanced study of explosives, but it is such an introduction as comes from a master hand, and is suggestive of latent power and of the ability to pursue the demonstration to its completion.

C. P.

THERE will be given at the gallery of the Boston Art Club, under the auspices of the Appalachian Mountain Club, from the 6th to the 24th of May, a remarkable exhibition of mountain photographs by Vittorio Sella of Biella, Italy. In addition to the exhibit (327 subjects) to which the "diploma of honor and large gold medal" has just been awarded at the competitive exhibition in Turin, it is expected that nearly two hundred other subjects will be represented, making it the most extensive exhibition of Sella's work ever given. The collection will fully represent the mountains of Dauphiny, Switzerland, the Tyrol, Sicily, and the Caucasus.

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