1. Record Nr. UNINA9910969002703321

Titolo	Cross sections and rate constants for physical and chemical processes / / edited by G.G. Chernyl ... [et al.]
Pubbl/distr/stampa	Reston, Va., : American Institute of Aeronautics and Astronautics, 2002
ISBN	1-60086-666-2 1-60086-447-3
Edizione	[English ed.]
Descrizione fisica	1 online resource (316 p.)
Collana	Progress in astronautics and aeronautics ; ; v. 196 Physical and chemical processes in gas dynamics ; ; v. 1
Altri autori (Persone)	ChernyiG. G
Disciplina	629.1 s 620.1/074
Soggetti	Gas dynamics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Originally published in Russian in 1995 by Moscow University Press, Moscow, Russia.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	""Cover""; ""Title""; ""Copyright ""; ""Contents""; ""Preface""; ""Chapter 1 General Notions and Essential Quantities""; ""I. Particles and Processes Under Consideration""; ""II. Physical Quantities, Notations, and Units of Measurement""; ""A. Physical Quantities""; ""B. Physical Constants and Units of Measure""; ""III. Description and Characteristics of Interacting Particles""; ""A. General Notation of Particles""; ""B. Extended Notation of Particle States (Subscripts/Superscripts)""; ""C. Electronic, Vibrational, and Rotational States"" ""D. Statistical Weight (Multiplicity) of Electronic States""""E. Statistical Weight (Multiplicity), Vibrational Frequency, Vibrational Energy, and Characteristic Vibrational Temperature of Molecules and Molecular Ions""; ""F. Statistical Weight (Multiplicity), Rotational Energy, and Characteristic Rotational Temperature of Molecules and Molecular Ions""; ""IV. Classical Pattern of Binary Collisions of Particles""; ""V. Characteristic Dynamic Parameters""; ""A. Scales of Length and Time""; ""B. Characteristic Criteria"" ""VI. Particle Distribution over Velocities and Energy: Temperatures of Different Degrees of Freedom""""VII. Mean Relative Velocity of Particles in a Gas""; ""VIII. Partition Functions and the Mean Energy of Particles in a Gas""; ""A. Partition Functions""; ""B. Mean Energy of Particles (Per Particle)""; ""C. Assumptions""; ""IX. Heat of Reaction""; ""X. Relation

Between Particle Number and Gas Pressure""; ""XI. Formulas for the Rate Constants of Specific Processes""; ""A. Rate Constant for Arbitrary Energy Dependence of the Process Cross Section""
""B. Formulas for Cross Sections and Rate Constants""""""References""; ""Chapter 2 Elastic Collisions in Gases and Plasmas (T Models)""; ""I. Elastic Collisions of Neutral Particles (X + Y-+X + Y)""; ""A. Hard-Sphere Model (T.1)""; ""B. Repulsive Power-Law Potential Model (T.2)""; ""C. Hard-Sphere Model with Variable Diameter (T.3)""; ""D. Model Based on Lennarda€?Jones Potential (T.4)""; ""E. Model Based on Borna€?Mayer Potential (T.5)""; ""F. Model of Attracting Particles (T.6)""; ""II. Elastic Collisions Involving Charged Particles""
""A. Effective Radius Approximation for Electrona€?Atom and Electrona €?Molecule Collisions (T.7)""""""B. Classical Approximation for Electrona€? Molecule Collisions (T.8)""; ""C. Born Approximation for Electrona€? Molecule Collisions (T.9)""; ""D. Model of Electron Scattering by Molecule with High Dipole Moment (T.10)""; ""E. Classical Approximation for Iona€?Atom and Iona€?Molecule Collisions (T.11)""; ""F. Model Based on the Borna€?Mayer Repulsive Potential for Ion Collisions with Neutral Particles (T.12)""; ""G. Model Based on the Shielded Coulomb Potential (T.13)""; ""References""
""Chapter 3 Rotational Energy Exchange (R Models)""

Sommario/riassunto

This unique book and accompanying software provides concise, exhaustive, and clear descriptions of terms, notations, concepts, methods, laws, and techniques that are necessary for engineers and researchers dealing with physical and chemical processes in gas and plasma dynamics. It reflects the state of the art of physico-chemical gas dynamics and is designed to serve the modern needs of the related areas of science and technology. This first volume of a two-volume set treats the dynamics of elementary processes (cross section and rate coefficients of chemical reactions, ionisation and recombination processes, and inter- and intramolecular energy transfer). Volume II will discuss complex physical and chemical kinetics in gases and plasmas.