

Contents

1	Introduction	1
	References.	16
2	The Theory of a Local Ignition	19
1	On the Theory of a Local Thermal Explosion	19
2	Nonstationary Ignition of a Hot Spot	25
3	Initiation of a Hydrogen–Air Flame with a Hot Spot. Verification of the Theory	30
4	Conclusions	41
	Appendix	41
	References.	43
3	The Wave Theory of Ignition	45
1	Ignition of the Condensed Substances with Heat Losses from the Side Surface.	46
2	Ignition of a Condensed Substance with a Constant Heat Flux Released in Two Competing Exothermic Reactions	54
3	The Features of Ignition of the Condensed Systems Interacting Through a Layer of a Refractory Product with an Energy Flux ...	64
4	Regularities of Ignition of the Condensed Systems with a Heated Surface Under Parabolic Law of Chemical Interaction	72
5	Regularities of Ignition of Porous Bodies Under Conditions of a Counter Nonstationary Filtration of Gas	81
6	Ignition of Porous Substances with the Filterable Gas. Cocurrent Nonstationary Filtration	97
7	Conclusion	112
	References.	114

4	The Convective–Conductive Theory of Combustion of Condensed Substances	117
1	Convective Combustion of “Gasless” Systems	118
2	Convective Heat and Mass Transfer in the Processes of “Gasless” Combustion	132
3	The Features of Combustion of the Mixes $Ti + 0.5C$ and $Ti + C$ of Bulk Density in a Cocurrent Flow of Inert Gas	142
4	Influence of Humidity on the Features of Combustion of Powder and Granulated $Ti + 0.5C$ Mixes	151
5	Dependence of Combustion Velocity on the Sample Size in Nonactivated and Mechanically Activated $Ni + Al$ Systems	157
6	Combustion of Cylindrical $Ti + 0.5C$ Compacts: Influence of Mechanical Activation, Thermovacuum Processing, and Ambient Pressure	163
7	Conclusion	166
	References	167
5	Theory of Ignition of Gas Suspensions	171
1	Analytical Method of Calculation of Critical Conditions of a Local Ignition of Gas Suspensions of Solid Particles	172
2	Analysis of Critical Conditions of Ignition of Gas Suspension with a Heated Body at Pulse Energy Supply	180
3	Mathematical Modeling of the Process of Ignition of Gas Suspension of Solid Particles in a Mix Oxidizer—Combustible Gas (a Local Ignition)	194
4	Thermal Ignition of Hybrid Gas Suspensions in the Presence of Natural Gas and Chemically Active Additives	205
5	Conclusions	210
	References	212
6	Ignition, Combustion, and Passivation of Nanopowders	215
1	Ignition of Pyrophoric Powders: An Entry-Level Model	218
2	Temporal Characteristics of Ignition and Combustion of Iron Nanoparticles in the Air	226
3	Synthesis and Characterization of Passivated Iron Nanoparticles	233
4	Passivation of Iron Nanoparticles at Subzero Temperatures	238
5	Conclusions	244
	References	245
7	Conclusions	249

Ignition and Wave Processes in Combustion of Solids

Rubtsov, N.M.; Seplyarski, B.S.; Alymov, M.I.

2017, XIV, 253 p. 102 illus., 15 illus. in color., Hardcover

ISBN: 978-3-319-56507-1