

CONTENTS

	Page
PREFACE	vii
INTRODUCTION	xi
I. THEORETICAL PRINCIPLES OF HEATING AND DRYING USING INFRA- RED RADIATION	1
1. Basic data on physics of thermo-radiation processes	1
2. Radiant heat exchange between solid bodies	1
3. Analysis of the initial drying (heating) of transparent bodies by infra-red radiation	7
4. Thermo-radiation (optical) characteristics of the irradiated materials	12
5. Peculiarities of the mechanism of internal heat-and mass-transfer resulting from infra-red irradiation	55
6. Mathematical analysis the radiant-convective heating of materials	71
7. Brief outline of the modelling of radiant heat exchange	74
II. THE TECHNOLOGY OF HEATING AND DRYING BY INFRARED RADIATION	77
1. Generators and intensity of radiation	77
2. Relative positions of radiation generators and the objects of irradiation	130
3. The effect of working chamber parameters on thermo-radiant treatment	137
4. Fundamentals of the engineering heat computation of the thermo-radiant installation	146
III. DRYING AND THERMAL TREATMENT OF FOOD PRODUCTS BY INFRA- RED RAYS	174
1. The mechanism of infra-red drying and thermal treatment, and general principles of obtaining optimal conditions of the process	174
2. Drying and thermal treatment of grain	178
3. Drying and thermal treatment of flour	218
4. Drying malt	227
5. Thermal treatment –roasting cocoa beans and fat-containing nut kernels	231
6. Drying fruit and vegetables	242
7. Drying tea	255
8. Drying of pasta products	260
9. Drying of bread-rusk biscuits	268
10. Drying pastille-marmalade gels	277

11. Drying of tartaric acid (raw material)	287
12. Thermal treatment and drying of meat and meat products	292
13. Thermal treatment and drying of fish	297
14. Applying infra-red to sublimation drying	305
IV. INFRA-RED BAKING	310
1. Mechanism of radiant-convective process of baking	310
2. Heat-and mass-transfer in radiant-convective baking	312
3. The analysis of dough-bread temperature fields and methods of determining the density of the radiant energy from experimental data	319
4. A comparative analysis of baking and drying	333
5. Experimental study of the infra-red baking of bread	334
6. Mechanism and basic principles of infra-red baking of bread	356
7. Generalized variables for the process of infra-red baking	361
8. Baking of pastry and biscuits by infra-red	370
9. Construction of installations for infra-red baking	373
10. Combined baking in a high-frequency electric field, and by infra-red	377
CONCLUSIONS	389
REFERENCES	390
INDEX	407