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Nota di contenuto	Contents; Figures; Tables; Preface; Historical background; 1 Introduction; 1.1 Practical background; 1.2 A 'microstructural' discussion of the phenomena of drying moist, porous materials; 1.3 The REA to modelling drying; 1.3.1 The relevant classical knowledge of physical chemistry; 1.3.2 General modelling approaches; 1.3.3 Outline of REA; 1.4 Summary; References; 2 Reaction engineering approach I; 2.1 The REA formulation; 2.2 Determination of REA model parameters; 2.3 Coupling the momentum, heat and mass balances; 2.4 Mass or heat transfer limiting; 2.4.1 Biot number analysis 2.4.2 Lewis number analysis2.4.3 Combination of Biot and Lewis

numbers; 2.5 Convective drying of particulates or thin layer products modelled using the L-REA; 2.5.1 Mathematical modelling of convective drying of droplets of whey protein concentrate (WPC) using the L-REA; 2.5.2 Mathematical modelling of convective drying of a mixture of polymer solutions using the L-REA; 2.5.3 Results of modelling convective drying of droplets of WPC using the L-REA; 2.5.4 Results of modelling convective drying of a thin layer of a mixture of polymer solutions using the L-REA
2.6 Convective drying of thick samples modelled using the L-REA2.6.1 Formulation of the L-REA for convective drying of thick samples; 2.6.2 Prediction of surface sample temperature; 2.6.3 Modelling convective drying thick samples of mango tissues using the L-REA; 2.6.4 Results of convective drying thick samples of mango tissues using the L-REA; 2.7 The intermittent drying of food materials modelled using the L-REA; 2.7.1 Mathematical modelling of intermittent drying of food materials using the L-REA; 2.7.2 The results of modelling of intermittent drying of food materials using the L-REA
2.7.3 Analysis of surface temperature, surface relative humidity, saturated and surface vapour concentration during intermittent drying2.8 The intermittent drying of non-food materials under time-varying temperature and humidity modelled using the L-REA; 2.8.1 Mathematical modelling using the L-REA; 2.8.2 Results of intermittent drying under time-varying temperature and humidity modelled using the L-REA; 2.9 The heating of wood under linearly increased gas temperature modelled using the L-REA; 2.9.1 Mathematical modelling using the L-REA
2.9.2 Results of modelling wood heating under linearly increased gas temperatures using the L-REA2.10 The baking of cake modelled using the L-REA; 2.10.1 Mathematical modelling of the baking of cake using the L-REA; 2.10.2 Results of modelling of the baking of cake using the L-REA; 2.11 The infrared-heat drying of a mixture of polymer solutions modelled using the L-REA; 2.11.1 Mathematical modelling of the infrared-heat drying of a mixture of polymer solutions using the L-REA
2.11.2 The results of mathematical modelling of infrared-heat drying of a mixture of polymer solutions using the L-REA

Sommario/riassunto

This comprehensive summary of the state of the art and the ideas behind the reaction engineering approach (REA) to drying processes is an ideal resource for researchers, academics and industry practitioners. Starting with the formulation, modelling and applications of the lumped-REA, it goes on to detail the use of the REA to describe local evaporation and condensation, and its coupling with equations of conservation of heat and mass transfer, called the spatial-REA, to model non-equilibrium multiphase drying. Finally, it summarises other established drying models, discussing their features, limitations and comparisons with the REA. Application examples featured throughout help fine-tune the models and implement them for process design and the evaluation of existing drying processes and product quality during drying. Further uses of the principles of REA are demonstrated, including computational fluid dynamics-based modelling, and further expanded to model other simultaneous heat and mass transfer processes.