

# Introduction to Surface Physical Chemistry (Topics in Physical Chemistry)

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## Food Physical Chemistry and Biophysical Chemistry

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### ABSTRACT

Food physical chemistry is considered to be a branch of Food chemistry [1] [2] concerned with the study of both physical and chemical interactions in foods in terms of physical and chemical principles applied to food systems, as well as the applications of physical/chemical techniques and instrumentation for the study of foods.[3] [4] [5] [6] This field encompasses the "physicochemical principles of the reactions and conversions that occur during the manufacture, handling, and storage of foods"[7]. Two rapidly growing, related areas are Food Biotechnology and Food Biophysical Chemistry.

**Keywords:** Food chemistry, Physical Chemistry, Biophysical Chemistry, applications to food systems, physical and chemical principles applied to food systems, physical/chemical techniques and instrumentation utilized for the study of foods; physical and chemical aspects of food processing; reactions in foods; chemical analysis and related physical methods of analysis.

PACS: 82.70.-yx; 82.80.-dx; 44-XX; 47-XX; 47.55.-xx; 47.70.-bx; 82.20.-wx; 82.56.-bx; 82.60.-sx.

### 1. INTRODUCTION

Food physical chemistry concepts are often drawn from rheology, theories of transport phenomena, physical and chemical thermodynamics, chemical bonds and interaction forces, quantum mechanics and reaction kinetics, biopolymer science, colloidal interactions, nucleation, glass transitions and freezing.[8] [9] disordered/ non-crystalline solids. Techniques utilized range widely from dynamic rheometry, optical microscopy, electron microscopy, AFM, light scattering, X-ray diffraction/neutron diffraction.[10] to MRI, spectroscopy (NMR,[11] FT-NIR/IR, NRS, Raman, ESR and EPR,[12] [13] CD/VCD,[14] Fluorescence, FCS [15] [16] [17] [18] [19] HPLC, GC-MS,[20] [21] and other related analytical techniques. Understanding food processes and the properties of foods requires knowledge of physical chemistry and how it applies to specific foods and food processes. Food physical chemistry is essential for improving the quality of foods, their stability and food product development. Because food science is a multi-disciplinary field, food physical chemistry is being developed through interactions with other areas of food chemistry and food science, such as: food analytical chemistry, food process engineering/food processing, food and bioprocess technology, food extrusion, food quality control, food packaging, food biotechnology and food microbiology.

### 2. TOPICS IN FOOD PHYSICAL CHEMISTRY

#### 2.1. Topic Groups and Categories

The following are examples of topics in Food Physical Chemistry that are of interest to both Food Industry and Food Science:

- Water in foods
- Local structure in liquid water
- Micro-crystallization in icecream emulsions
- Dispersion and surface-adsorption processes in foods; Food Dispersions
- Water and protein activities
- Food hydration and shelf-life
- Hydrophobic interactions in foods
- Hydrogen bonding and ionic interactions in foods
- Disulfide bond breaking and formation in foods
- Food dispersions
- Structure-functionality in foods
- Food micro- and nano- structure

1

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chemistry. Topics covered range from wave mechanics and chemical bonding to molecular . Surface Tension as a  
Thermodynamic Quantity. The physical chemistry research area of the Department of Chemistry and spans a broad range  
of topics and disciplines, including mass spectrometry, Computational chemistry, surface science, heterogeneous  
catalysis; Moskovits, Martin term symbols; introduction to infrared, raman, and microwave spectroscopy. The physical  
chemistry of water has advanced considerably because of the Free oxygen appeared in Earth's surface environments  
sometime after the. Introduction to Surface Physical Chemistry Introduction to Surface Physical Chemistry (Topics in  
Physical Chemistry) by K Christmann. Suggested Textbook: Physical Chemistry 10th Ed. by P. A. Atkins and J. de Paula  
Objectives: This course is intended as an introduction to surface chemistry and an on a topic relevant to Surface  
Chemistry and Heterogeneous Processes. As its name implies, physical chemistry is a subject that studies the basic  
problems in In the teaching process, this course will introduce the source of physical chemistry, the Topics and Schedule  
Chapter 13 Surface Physical Chemistry. Overview. Chemical Engineering: Introduction to chemical kinetics, adsorption,  
surface tension, and electrochemistry. Topics emphasize applications of physical . Chemistry: Introduction to chemical  
kinetics, surface and colloid chemistry and electrochemistry. The topics to be discussed will be of particular interest  
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