

Surface chemistry

Composante
Sciences Fondamentales et Appliquées

En bref

- # **Langue(s) d'enseignement:** Anglais
- # **Forme d'enseignement :** Cours magistral
- # **Ouvert aux étudiants en échange:** Non

Présentation

Description

The course will be delivered in English

This course will deal with interfacial phenomena occurring at solid-gas, solid-liquid and electrified solid- liquid interfaces. Students must have a good knowledge of thermodynamics and a basic knowledge of electrochemistry.

Program overview:

- Solid-gas interfaces (systematic knowledge and understanding of adsorption phenomena).
- Definitions of general solid-gas adsorption isotherms (Langmuir, BET).
- Thermodynamic of solid-gas adsorption (Isosteric adsorption enthalpy, adsorption entropy).
- Applications to determination of physicochemical properties of porous solids.
- Solid-liquid interfaces (contact angle, surface tension, wettability).
- Electrified interfaces (electrical double layer models, zeta potential).
- Applications to the modification of surfaces for biological, chemical, medical applications.

Objectifs

Outcomes

- Provide with knowledge to interfacial phenomena (solid/gas and solid/liquid).
- Be familiar with a variety of technological applications in surface chemistry.

Heures d'enseignement

CM CM 8h

Pré-requis obligatoires

Bachelor of science with a good knowledge of thermodynamics and a basic knowledge of electrochemistry.

Programme détaillé

The first part of the course will be focused on the definitions of adsorption phenomena at the solid-gas interface. The relative strength of physisorption and chemisorption will be highlighted. Next, the adsorption from the kinetic point of view will be described as well as the macroscopic (thermodynamic) approach. Some of useful adsorption isotherms will be derived. Finally, this part of the course will end with the description of the determination of the thermodynamic parameters of adsorption and their applications.

The second part of the course will be dedicated to the study of interfacial phenomena occurring at liquid/solid and electrified liquid/solid interfaces. The focus will be first on interfacial tension phenomenon. Techniques used to measure interfacial tension will be presented and phenomena related to surface tension such as capillarity and wettability of solid surfaces will be investigated. Direct technological applications (Langmuir and Langmuir Blodgett films) of these phenomena will be detailed. Finally, the structure of electrical double layer formed at solid/liquid interfaces will be described and the concept of zeta potential will be explained. This latter will be used to describe the behavior of colloidal solutions.

Informations complémentaires

Assessment methods

- Written examination

Compétences visées

Targeted skills

- Knowledge of characteristic thermodynamic quantities of adsorption.

- Knowledge of Henry, Langmuir and BET isotherms equations and their derivations.
- Knowledge of determination of porous volumes and surface area of solids.
- Knowledge of surface tension and its application to study capillarity as well as wettability of surfaces.
- Knowledge of technological processes used to modify solid surfaces (Langmuir technique, Langmuir Blodgett films, self-assembling systems).
- Knowledge of structure of electrical double layer (application to study the stability of colloidal systems).