科目ナンバリング	U-LAS13 10004 LE60				
授業科目名<英訳>	Basic Physical Chemistry (thermodynamics)-E2 Basic Physical Chemistry (thermodynamics)-E2	担当者所属職名・氏名	エネルギー理工学研究所 講師	ARIVAZHAGAN RAJENDRAN	
群	自然科学科目群	分野(分類)	化学(基礎)	使用言語	英語
旧群	B群	単位数	2単位	週コマ数	1コマ	授業形態	講義（対面授業科目）
開講年度・開講期	2026・前期	曜時限	火3	配当学年	全回生	対象学生	理系向

[授業の概要・目的]

We learn about the thermodynamics in the state-change of matter, also in the chemical reactions. Contents of the lecture covers the following fields of change of state, thermodynamic laws, definition of the quantities (enthalpy, entropy, free energy, chemical potential), chemical equilibrium, and reaction kinetics. Aim of this course is the understanding of these concepts.

[到達目標]

The aim of this class is to understand the basic principles of thermodynamics.

[授業計画と内容]

1. Change of the system and quantity of state
2. Thermal energy and work
3. 1st law of thermodynamics: Change of internal energy and enthalpy
4. Chemical reaction and thermal energy
5. Interpretation of internal energy in molecular level
6. Change of state of the ideal gas
7. 2nd law of thermodynamics: Entropy
8. Entropy change in the change of state
9. 3rd law of thermodynamics: Conversion from heat to work
10. Gibbs energy
11. Change of the Gibbs energy when temperature and pressure change
12. Chemical potential
13. Change of state and chemical potential change of matter
14. Chemical equilibrium and rate of chemical reaction
15. Assignment which is considered as a term examination
16. Feedback

[履修要件]

特になし

[成績評価の方法・観点]

Results will be evaluated by the submission of homework written in English (30%), attendance and discipline (20%), and assignment which is considered as a term examination (50%).

Basic Physical Chemistry (thermodynamics)-E2(2)へ続く↓↓↓

Basic Physical Chemistry (thermodynamics)-E2(2)

[教科書]

Yunus A. Cengel and Michael A. Boles 『Thermodynamics: An Engineering Approach, 8th Edition in SI Units』（McGraw-Hill Education）ISBN:978-981-4595-29-2
Peter Atkins and Julio de Paula 『Atkins' Physical Chemistry, 10th Edition』（Oxford University Press）ISBN:978-0-19-969740-3

[参考書等]

（参考書）
授業中に紹介する

[授業外学修（予習・復習）等]

I recommend that the students should review the points to be learned.

[その他（オフィスアワー等）]

Office hours are set at 15:00-17:00 in every Friday.

[主要授業科目（学部・学科名）]

理学部