Combustion

Special Subjects
Elective 2 credit

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1. Course Description

The theory of combustion based on thermodynamics and fluid dynamics is presented using a text book written in English. Calculations of both heat and adiabatic flame temperature using JANNAF database will be demonstrated. The goal of this course is to get the quantitative understanding of the combustion phenomenon.

2. Course Objectives

Combustion plays an important role in various engines such as jet engines, gas turbine, rocket engines and so on. The physical chemistry of the combustion phenomenon will be demonstrated systematically and be able to applied in practical case. Furthermore recent topics on combustion research will be discussed.

3. Grading Policy

Mid-term reports (50%) and final report(50%)

4. Textbook and Reference

Textbook
W.C. Strahle AN INTRODUCTION TO COMBUSTION

Gordon & Breach Science Publisher (1986) ISBN:2-88124-608-7

5. Requirements(Assignments)

This course is related with Chemistry1, Chemistry2, Thermodynamics and Fluid mechanics in undergraduate course. Answer the questions in each chapter and solve them.

6. Note

group discussion

7. Schedule

[1] Introduction and review
[2] Chemical Thermodynamics 1; ideal gas
[3] Chemical Thermodynamics 2; heat of reaction
[4] Chemical Thermodynamics 3; heat of formation
[5] Chemical Thermodynamics 4; adiabtic flame temperature
[6] Chemical Thermodynamics 5; Gibb's free energy
[7] Chemical Thermodynamics 6; Equilibrium and equilibrium constant
[8] Discussion 1 :answer the problems in textbook
[9] Chemical Kinetics 1; reaction rate
[10] Chemical Kinetics 2; radical
[11] Chemical Kinetics 3; explosion
[12] Discussion 2 :answer the problems in textbook
[13] Pre-mixed flames 1; the Hugoniot
[14] Pre-mixed flames 2; detonation, deflagration
[15] Recent Topics and discussion 3