Title	A cycle study of the gas turbine for the gas conversion process
Sub Title	
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Publisher	慶応義塾大学藤原記念工学部
Publication year	1967
Jtitle	Proceedings of the Fujihara Memorial Faculty of Engineering Keio University (慶応義塾大学藤原記念工学部研究報告). Vol.20, No.81 (1967.) ,p.187(11)- 187(11)
JaLC DOI	
Abstract	
Notes	Summaries of Doctor and Master Theses
Genre	Departmental Bulletin Paper
URL	https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=KO50001004-00200081-0011

A Cycle Study of the Gas Turbine for the Gas Conversion Process

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This thesis deals with the analysis of a gas turbine cycle for the chemical industries. In these days, the total energy systems, which satisfy the own power-source and the usage as the reactor, have been wanted in the chemical processes.

The conversion gas as the material for synthetic chemistries is recently provided from the natural gas, which mainly contains methane.

These tasks may be solved with the internal combustion engines. Of these, it is well-known that the gas turbine disposes of a plenty of the gas and they have no substantial restriction for the fuel treatment. It can be supposed that the gas turbine is also one of the best.

This paper has two parts of these estimations. The former chapter refers to the gas conversion in the thermochemical meanings. Methane-conversion process is explained by the following reaction;

$$CH_4+\chi O_2+70/21\chi N=\alpha H_2+\beta CO+\delta H_2O+\delta CO_2+\varepsilon N_2+\zeta O_2+\mu CH_4+\theta OH+\iota NO$$

On the basis of this form, the composition of the converted-gas is decided from the equilibrium relations, the thermal and the mass balance.

In the latter, the cycle study of the suitable gas turbine for this use, will be shown theoretically.

The conversion processes are usually in high temperature chamber. But the turbine inlet temperature must be lower than some what 1100 °K. The cycle calculations are done by mean of this opposed temperature relation.

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