英语 上册

（动力、化工类）

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ENGLISH
IN
POWER AND
CHEMICAL ENGINEERING

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内 容 提 要

本书可供高等学校动力、化工类学生用作专业阅读阶段的英语教材，也可供有关的工程技术人员进一步提高阅读能力之用。

全书共十八个单元，分上下册出版。每单元包括课文、生词、短语和词组、注释、练习、阅读材料等六个部分。课文内容主要介绍热力学、流体力学和传热学的基本知识。书末附有练习答案、参考译文和生词及词组的索引等。

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前　言

本书适用于高等学校动力类和化工类专业学生作为阅读阶段的英语教材。目的在于提高阅读与本专业有关的英语书刊的能力，学习科技英语中一些常用的表达方法和培养初步写作的能力。本书还可供工程技术人员进一步提高阅读能力之用。

全书分上下册共十八个单元。每个单元包括课文、生词、短语和词组、注释、练习、阅读材料等六个部分。教学共需80课内学时，每单元4学时。

上册有九个单元，生词688个，短语和词组212个。总阅读量约十万印刷符号。

课文和泛读材料主要介绍热力学、流体力学和传热学三门学科的绪论、基本概念、基本原理及其应用、解题和计算方法等。大部分材料选自七十和八十年代英、美出版的大学教科书、百科全书、手册和科学年鉴等书刊。为了便于教学，课文的安排，适当参照这三门基础技术课的教学进度；热力学在先（一至七单元），其次是流体力学（八至十二单元），最后是传热学（十三至十八单元）。选材力求语言规范，反映科技英语常用句型结构及词汇，同时适当考虑专业知识的系统性。

课文和阅读材料的注释较为详细，其中包括译文、语法难点说明和重点词语解释。分课生词、短语和词组等按字母顺序排列，并注明出处，以便查阅。

课文练习分“理解”、“词汇学习”、“语言实践”和“有指导的写作”等四个部分。“理解”主要用于检查读者对课文的理解程度。“词汇学习”密切结合课文中常用词和词组，以词的替换、构词法、词义匹配、词语搭配等方式，使读者掌握词的用法。“语言实践”主要是操练语法难点的用法和科技英语常用的表达方法。“有指导的写作”重点放在段落、实验报告和摘要等方面的写作。阅读材料也配有检查理解程度和词汇两种练习。本书练习中的具体内容，请参阅附录三。练习中有少量生词，要求读者运用词典，独立完成。

为了便于读者自学，书末附有课文和阅读材料的参考译文，以及全部练习的参考答案。

本书承西安交通大学顾逢时教授、陈钟颀和刘光宗副教授审稿，他们提出了许多宝贵意见，我们深表谢意。本书的编写始终得到该校动力机械工程系、能源与动力工程系、热工教研室、流体力学教研室和压缩机教研室等单位领导的大力支持和帮助，我们一并表示衷心的感谢。

由于编者水平有限，对于书中错误或不妥之处，请批评指正。

编　　者

一九八四年四月十日

CONTENTS

Unit 9

Appendix

UNIT 1

Text

WHAT IS THERMODYNAMICS?

Our modern technological society is based largely on the replacement of human and animal labor by inanimate, power-producing machinery. Examples of such machinery are steam power plants that generate electricity, locomotives that pull freight and passenger trains, and internal combustion engines that power automobiles. In each of these examples, working fluids such as steam and gases are generated by combustion of a fuel-air mixture and then are caused to act upon mechanical devices to produce power. *Predictions of how much energy can be obtained from the working fluid and how well the extraction of energy from the working fluid can be accomplished are the province of an area of engineering called thermodynamics[1].

Thermodynamics is based on two experimentally observed laws. The first is the law of conservation of

energy, familiar to the student from the study of classical mechanics. Whereas in mechanics only potential and kinetic energies are involved, in thermodynamics the law of conservation of energy is extended to include thermal and other forms of energy. When an energy transformation occurs, the same total energy must be present after the transformation as before; in other words, according to the first law, *all the different types of energy must be accounted for and balanced out when a transformation occurs[2]. For example, in an automobile engine, a specific quantity of thermal energy is released due to the combustion of gasoline in the engine cylinders. Some of this energy goes out the tailpipe as heated exhaust gases and is lost; some is converted to useful work in moving the car; and some is dissipated to the air via the cooling system. *Whereas the distribution of these various types of energy is clearly of importance to the engineer, who wants to obtain as much useful work as possible from a given quantity of fuel, the first law merely states that energy can be neither created nor destroyed; it does not provide information as to the ultimate distribution of the energy in its various forms.[3]

The second law provides further information about energy transformations. For example, it places a limitation on the amount of useful mechanical work

that can be obtained from combustion of the fuel in an automobile engine. The first law states that energy must be conserved. Thus, according to the first law, all the thermal energy available from combustion of the fuel could be converted to useful mechanical work with no losses. Intuitively, however, we know that thermal and other losses are present in the engine. The second law provides a quantitative prediction of the extent of these losses.

*An understanding of thermodynamics and the limitations it imposes on the conversion of energy from one form to another is very relevant to what is going on in the world today[4]. *With limited supplies of conventional energy resources of oil and gas, and with increased demands for an improved standard of living and an accompanying increased demand for energy, it is important that we obtain the maximum utilization of our oil, gas, and coal reserves[5]. Conversion of the chemical energy available in these fuels to usable form should be done as efficiently as possible. Further, we must examine the potential of new sources of energy, such as the sun and the oceans. Again, thermodynamics will be used to evaluate new energy sources and methods of converting the available energy to useful form.

——From (1) (see Appendix 5)

New Words

	line
balance ['bæləns] *v.* (使) 平衡；抵消	27
classical ['klæsikəl] *a.* 经典的；古典的	18
conservation [ˌkɔnsə(:)'veiʃən] *n.* 守恒，不灭	17
conserve [kən'sə:v] *vt.* 守恒，不灭	46
conventional [kən'venʃənl] *a.* 常规的；普遍的	57
cylinder ['silində] *n.* 汽缸，气缸；圆筒	30
dissipate ['disipeit] *vt.* 消散；散失	33
distribution [ˌdistri'bju:ʃən] *n.* 分布；分配	34
evaluate [i'væljueit] *vt.* 估计；评价；测定	67
exhaust [ig'zɔ:st] *n.* 排出；排气；排出的气；排气管	31
extraction [iks'trækʃən] *n.* 抽出；提取	13
familiar [fə'miljə] *a.* 熟悉的；通晓的	18
freight [freit] *n.* 货物；货运	5
further ['fə:ðə] *a.* 更远的；进一步的 *ad.* 更远地；进一步地；此外	41,64
impose [im'pəuz] *vt.* 把…强加于，施加	54
intuitively [in'tju:itivli] *ad.* 直觉地；直观地	49
kinetic [kai'netik] *a.* 动力（学）的	20
limitation [ˌlimi'teiʃən] *n.* 限制，约束	43
locomotive ['ləukəˌməutiv] *n.* 机车，火车头	5
maximum ['mæksiməm] *a.* 最大限度的；最多的	60
merely ['miəli] *ad.* 仅仅，只不过	38

potential [pə'tenʃəl] *a.* 位的，势的；潜在的 *n.* 潜力；潜能 64

prediction [pri'dikʃən] *n.* 预告；预测 11

province ['prɔvins] *n.* 范围，领域；省 14

quantitative ['kwɔntitətiv] *a.* 定量的 51

release [ri'li:s] *vt.* 释放；放出 29

relevant ['reləvənt] *a.* 有关的；相应的 55

replacement [ri'pleismənt] *n.* 替换（物）；取代 2

reserve [ri'zə:v] *n.* 储备，储藏量 61

resource [ri'sɔ:s] *n.* 资源 57

tailpipe ['teilpaip] *n.* 排气（尾）管，尾喷管 31

technological [ˌteknɔ'lɔdʒikəl] a. 技术的；工艺的 1

thermal ['θɔ:məl] a. 热的；热量的 22

thermodynamics ['θə:məudai'næmiks] *n.* 热力学 0

transformation [ˌtrænsfə'meiʃən] *n.* 转变，转换，转化 23

ultimate ['ʌltimit] *a.* 最终的；极限的 39

usable ['ju:zəbl] *a.* 可用的；运用的 63

utilization [ˌju:tilai'zeiʃən] *n.* 利用 61

via ['vaiə] *prep.* 经过；通过 33

whereas [hwɛər'æz] *conj.* 而，却；尽管…（但却） 19

Phrases and Expressions

line

account for 说明（原因，用途）；计及；（指数量等）占 26

as before 如前，同以前一样 24

as to 至于；关于；就…而论 39

balance out 平衡掉；抵消，补偿	27
be relevant to 与…有关的	55
energy resources 能源	57
energy sources 能源	67
exhaust gas 废气；排气	31
familiar to …所熟悉的	18
impose ... on 把…强加于	54
in other words 换句话说，也就是说	25
standard of living 生活水平	58
working fluid 工质	8

Notes

1/11 Predictions of *how much energy can be obtained from the working fluid and how well the extraction of energy from the working fluid can be accomplished* are the province of an area of engineering called thermodynamics.

要预测从工质中能够获得多少能量，要预知从工质中获得能量的过程能够完善到何种程度，这是称之为热力学这门工程学科研究的范围。

斜体部分是介词 of 的两个并列的宾语从句。

2/25 ... all the different types of energy must be accounted for and balanced out when a transformation occurs.

出现能量转换时，必须计及各种不同形式的能量，并对它们进行平衡。

3/34 *Whereas* the distribution of these various types of energy *is* clearly *of importance* to the engineer, who wants to obtain as much useful work as possible from a given quantity of fuel, the first law merely states that energy can be neither created nor destroyed; it does not provide information as to the ultimate distribution of the energy in its various forms.

尽管这些各种形式的能量的分配对工程技术人员显然是很重要的，因为他们想要从一定量的燃料获得尽量多的有效功；然而第一定律阐述的仅仅是：能量既不能创造，也不能消灭，它并没有提供关于各种能量最终分配的资料。

whereas 用来连接并列的两个对照的分句；它常引出第二分句，但为了强调对照，也可以引出第一分句。例如：

At high speeds the turbo-jet is more efficient, *whereas* at low speeds the propeller is more efficient. 高速飞行时，涡轮喷气发动机的效率较高；而低速飞行时，螺旋桨推进器的效率较高。

Whereas at high speeds the turbo-jet is more efficient, at low speeds the propeller is more efficient.

尽管喷气发动机的效率较高；然而低速飞行时，螺旋桨推进器的效率较高。

注意 "of＋抽象名词"的意义相当于与该名词同根的形容词。如：

be of importance = be important
be of value = be valuable
be of great use = be very useful

4/53 An understanding of thermodynamics and the limitations *it imposes on the conversion of energy from one form to another* is very relevant to what is going on in the world today.
懂得热力学及其对于从一种能量转换为另一种能量的限制，这同当前世界上发生的事情是密切相关的。
斜体部分是省略了关系代词 which 的定语从句。

5/56 With limited supplies of conventional energy resources of oil and gas, and with increased demands for an improved standard of living and an accompanying increased demand for energy, *it is important that we obtain the maximum utilization of our oil, gas, and coal reserves.*
由于对提高生活水平的要求日益增长，随之而来对能量的需求也越多，而石油和可燃气等常规能源的供应却受到限制，因此十分重要的是，我们应当最大限度地利用石油、可燃气和煤的储备。
由 it is important, it is essential, it is suggested 等引出的主语从句，其谓语常用虚拟语气。这个从句中的 obtain 也可写成 should obtain。

Exercises

A. *Comprehension*

1. Read these statements and decide if they are true (T), false (F), or not even mentioned in the text (O). When a statement is false, supply the correct information.

1) It is essential that we should fully utilize our energy resources.

2) All the heat energy obtained from combustion of the fuel is converted to useful mechanical work with no losses.

3) The logical structure of thermodynamics is the result of many great men of science.

4) Internal combustion engines, locomotives and power plants are some of the inanimate, power-producing machinery.

5) Thermodynamics can be used to predict how well energy can be obtained from a working fluid.

6) In a thermal power plant the steam is directly used to turn an electric generator.

7) The first and second laws of thermodynamics are based on experiments.

8) The first law of thermodynamics states both the conservation of energy and the ultimate distribution of various forms of energy.

9) The second law of thermodynamics imposes the limitations on the transformation of energy, and is applied to predict quantitatively the extent of