

石油化工中等专业学校统编教材

专业英语

(石油加工)

王子康 雪文 杨晋 编



中国石化出版社

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内 容 提 要

本书为石油化工中等专业学校石油加工专业英语教材。全书共26课。内容包括石油加工基础、石油炼制工艺、石油化工工艺、以及天然气加工、油品、分析、能量管理、环境保护、安全等方面。课文选自国外专业技术书籍，与本专业工业技术密切相关。课文写作风格多样，体现了技术英语的基本特点，并附有参考译文。

本书可作为石油化工中等专业学校石油加工专业教学用书。同时，还可作为具有一定英语基础的工程技术人员和干部学习、培训用书。

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前 言

《专业英语》（石油加工）是石油化工中等专业学校统编教材，可供初步学完英语基础语法，具有2000个左右基本词汇量的石油化工中等专业学校石油加工专业学生使用。

本书授课约需60学时。总阅读量约为13万个印刷符号，新词1700个左右。通过学习，可以了解技术英语的一般结构和特点；掌握本专业的英语基本词汇；培养阅读科技文献的能力。全书共26课、5个附录。从专业内容上可划分为4个单元：

第一单元为石油加工基础部分（1~6课）。内容包括传热、流体流动、原油基本知识等。

第二单元为石油炼制部分（7~13课）。内容包括炼制反应、蒸馏、重整、热裂化、催化裂化、加氢精制、油品调和等。

第三单元为综合技术部分（14~19课）。内容包括油品、分析、能量管理、环境保护、安全以及天然气加工等。

第四单元为石油化工部分（20~26课），内容包括石油化工原料、塑料、合成纤维、合成橡胶和精细化工等。

附录部分包括石油加工文摘选读、课文参考译文、总词汇表、总词组表，以及石油加工专业英语单词中常用的前缀。

每一课的基本结构包括课文、单词、词组、注释、阅读材料五个部分。课文均直接选自英、美原版专业书籍。少数

地方因教学需要略有删改。文章形式以技术阐述为主。文中单词尽可能列得多一些。课文注释不仅对文章的难点做了解释，而且在更深的层次上，对一些比较灵活的词汇、新的语法现象做了说明。阅读材料是对课文的补充，既可作为课外作业，也可作为课堂精读内容。

本书由王子康主编，其中课文注释由雪文、杨晋编写。完稿后，请陆庆邦译审对参考译文进行了校订，并请石油大学张怀祖教授审读全书。在编写过程中，得到了广东石油学校朱耘青副教授、杨德祥副教授的大力支持，还有许多同志对本书提出了宝贵意见，在此一并表示诚挚的感谢。

由于经验和水平的缘故，书中难免留有谬误之处，敬请同志们不吝赐教，以便改进。

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Lesson 1

HEAT

Text

Heat is a form of energy. A basic law of physics is that energy may be transformed from one kind to another, but it cannot be created or destroyed¹. Heat is only one form of energy, though it is certainly the most common² and hence most important. The units in which heat is measured³, therefore, are actually units of energy. They can be used to express quantities of energy which may or may not actually be observed as heat.

Heat may be transformed into different kinds of mechanical work as in a steam power plant or an internal combustion engine. Also, heat may be developed from chemical energy, from atomic energy, or from mechanical work such as friction.

One gallon (3.79dm^3) of heating oil will give off about $1.37 \times 10^8\text{J}$ when it burns in a furnace. A 100W light bulb gives off the energy equivalent to about $3.61 \times 10^5\text{J}$ per hour⁴. A $1\text{ hp}(746\text{W})$ motor will supply the energy equivalent to $2.69 \times 10^6\text{J}$ in 1 hour.

Effects of Heat

The effects of heat upon a substance are:

1. Rise in temperature. When heat is added to a material the temperature rises. To raise⁵ the temperature in a room, heating to accomplish this is usually done by supplying fuel to the furnace.

2. Change of size. Heating usually increases the size of a material. When a pipe is heated the pipe expands. Bends or loops are installed to allow for expansion⁶. In areas where bends or loops are impractical, the use of expansion couplings are sometimes used. Different solids will expand in different amounts. When a gas or liquid is heated in a confined space, pressure buildup will result. This thermal expansion, particularly in liquids, can create very large and dangerous pressures in equipment.

Heat almost always causes materials to expand, because it causes the small molecules, which make up all matter⁷, to move around faster. This faster movement causes them⁸ to separate from one another, therefore causing expansion.

3. Change of state. Heating some solids will changes them to liquids and finally to gases⁹. Cooling gases changes them to liquids and finally to solids. For example, when water is heated and cooled, it changes from liquid to steam(gas)then eventually to

ice(solid). This changing of form, for substances, between gas, liquid, and solid is known as¹⁰ a change of state. Gases, liquids, and solids are different states of matter.

4. Chemical change. The striking of a match shows how the mechanical friction of rubbing the match head is changed into heat energy which in turn starts a chemical reaction which gives off flame and more heat. Thermal cracking is a refinery example of a reaction caused by high temperature¹¹.

5. Electrical effect. Two different metals welded together can transform heat energy into electrical energy. This principle is used in the refinery to measure temperature by use of thermocouples.

New Words

heat [hi:t] *n.;* *v.* 热量, 热, 加热

energy ['enədʒi] *n.* 能, 能量

law [lɔ:] *n.* 定律, 规律

physics ['fɪzɪks] *n.* 物理(学)

transform [træns'fɔ:m] *v.;* *n.* 变换, 转变

create [kri'eɪt] *vt.* 创造, 产生

destroy [dis'trɔɪ] *vt.* 消灭, 消失

measure ['meʒə] *n.;* *v.* 测量, 度量

express [ɪks'pres] *vt.* 表示, 表明

quantity ['kwɒntəti] *n.* 数量, 数目

mechanical [mi'kænikəl] *a.* 机械的, 力学的

steam [sti:m] *n.* 蒸汽
 power ['paʊə] *n.* 动力, 电力
 plant [plɑ:nt] *n.* 设备, 装置, 工厂
 internal [in'tə:nl] *a.* 内部的, 内在的
 combustion [kəm'bastʃən] *n.* 燃烧
 engine ['endʒin] *n.* 发动机
 chemical ['kemikl] *a.* 化学(上)的
 atomic [ə'tɒmɪk] *a.* 原子的, 原子能的
 friction ['frikʃən] *n.* 摩擦(力)
 gallon ['gælən] *n.* 加仑
 furnace ['fə:nɪs] *n.* 加热炉
 bulb [bʌlb] *n.* 灯泡
 equivalent [i'kwɪvələnt] *a.* 相等的, 等同的
 motor ['məʊtə] *n.* 发动机, 马达
 substance ['sʌbstəns] *n.* 物体, 物质
 temperature ['temprɪtʃə] *n.* 温度
 material [mə'tɪəriəl] *n.* 物料, 物质
 raise [reɪz] *vt.; n.* 提高, 提升
 accomplish [ə'kɒmplɪʃ] *vt.* 完成, 达到
 fuel ['fjuəl] *n.* 燃料
 pipe [paɪp] *n.* 管子
 expand [ɪks'pænd] *v.* 扩张, 膨胀
 bend [bend] *n.* 弯管, 弯道
 loop [lu:p] *n.* 环路, 回路
 install [ɪn'stɔ:l] *vt.* 安装, 装配
 expansion [ɪks'pænfən] *n.* 扩张, 膨胀
 impractical [ɪm'præktɪkəl] *a.* 不实用的, 不能实行的

coupling [ˈkʌplɪŋ] *n.* 连接, 偶联
 confine [kənˈfaɪn] *vt.* 限制, 封闭
 pressure [ˈpreʃə] *n.* 压力, 压强
 buildup [ˈbɪlˈdʌp] *n.* 累积, 叠加
 thermal [ˈθəːməl] *a.* 热(量)的
 equipment [iˈkwɪpmənt] *n.* 设备, 装备
 molecule [ˈmɒlɪkjʊːl] *n.* 分子
 matter [ˈmætə] *n.* 物体, 物质
 separate [ˈsepəreɪt] *v.* 使分离, 区别
 state [steɪt] *n.* 状态, 情形
 cool [kuːl] *a.; v.* 冷的, 冷却
 ice [aɪs] *n.* 冰
 strike [straɪk] *v.* 碰, 撞, 触发
 match [mætʃ] *n.* 火柴
 rub [rʌb] *v.* 摩擦
 reaction [riˈækʃən] *n.* 反应, 反作用
 flame [fleɪm] *n.* 火焰, 火舌
 crack [kræk] *v.; n.* 裂化, 裂解
 refinery [riˈfaɪnəri] *n.* 炼油厂
 electrical [iˈlektrɪkəl] *a.* 电的, 带电的
 metal [ˈmetəl] *n.* 金属
 weld [weld] *v.* 焊接
 principle [ˈprɪnsəpl] *n.* 原理, 定律
 thermocouple [ˈθəːmoukʌpl] *n.* 热(温差)电偶

Phrases and Expressions

such as 例如, 象

give off 发出, 释放出
 equivalent to 等于, 相当于
 allow for 考虑, 估计到
 make up 决定, 组成
 move around 四处移动, 动来动去
 separate from one another 互相分开, 彼此分离
 for example 例如
 be known as 被称为, 被认为是
 in turn 依次, (同样) 也
 by use of 利用, 借助于
 power plant 发电厂, 发电装置
 internal combustion engine 内燃机
 heating oil 取暖用油
 light bulb 电灯泡
 per hour 每小时
 expansion coupling 膨胀节
 match head 火柴头
 thermal cracking 热裂化

Notes

1. A basic law of energy is that..., but it cannot be created or destroyed. that连接表语从句。该句 中有两个被动语态谓语: be transformed, be created or destroyed. 被动语态在科技英语中使用很广。凡是不需要或不可能指出动作的主动者时, 就使用被动语态。如:

Theory must be combined with practice.

Heat and light are given off during the chemical

change.

2. ...though it is certainly the most common....
though作连词用, 作“可是”、“然而”解, 位于全句后部,
though前一般有逗号。如:

Air has weight, though it is very light.

试比较though(或although)作“虽然”解时, 引出让步从句:

Though it was late, she went on working.

3. in which heat is measured作units的定语, 介词in在这里表示用……作单位。如in meters, 以米为单位; in kilograms, 以千克为单位。上句话的意思是度量热的单位……”。

4. equivalent to about $3.61 \times 10^5 \text{ J per hour}$ 为形容词短语, 修饰the energy。形容词短语作定语时应后置。

5. 注意raise和rise的区别:

rise是不及物动词, “升起”、“起来”。

raise是及物动词, “举起”、“升高”。

The temperature rises as summer comes.

We raise the temperature by lighting a fire. 两词不仅意思和用法容易混淆, 形态也极易混淆。

6. ...to allow for expansion: 动词不定式短语作目的状语。

7. which make up all matter修饰molecules。which后的谓语动词根据which所实指的名词的数来确定单复数。

8. them代替molecules。

9. Heating some solids...finally to gases. finally to gases和to liquids并列, 都作change them的状语, 表示转变的结果。

10. ...be known (as)....: “被认为是...”。这个短语常

用来引出某种普通常识，或大家都知道的事情。如：

Heat is known as a kind of energy.

It is known that the sun rises from the east.

11. caused by high temperature 为过去分词短语，作 reaction 的定语。同样，下面的 welded together 作 metal 的定语。过去分词作定语有被动意义（如该定语的意思是“被焊接在一起的金属”）。

Reading Material

TEMPERATURE

Temperature is a measure of the hotness or coldness of a substance. The thermometer is an instrument used for determining the temperature of a body or space. There are several types of thermometers used for this purpose. Some of the common thermometers consist essentially of some confined substance, such as mercury, the volume of which changes with a change in temperature. One example is the clinical thermometer that is a self-registering thermometer for determining body temperature; the common weather thermometer uses another liquid in the bulb for measuring atmospheric temperature. Other thermometers, include the thermocouple, electrical-resistance thermometers, optical pyrometers and radiation pyrometers.

Lesson 2

HEAT TRANSFER

Text

Heat, as a form of energy, cannot be created or destroyed. Heat can be transferred from one substance to another.

Heat always tends to pass from warmer objects to cooler ones¹. When a warm substance comes in contact with a cold substance the molecules of the warm substance collide with the molecules of the cold substance, giving some of its energy to the cold molecules². This is only one way to transfer heat.

In a refinery, transfer of heat is very important. The successful operation of most processes is dependent on correct application of the principles of heat transfer. Where we are handling a hot material we may insulate the system to hold the heat in³, where the material is cold we may insulate to keep the heat out. Efficient equipment, designed to take full advantage of processing heat, is in use in all refining operations.

Three methods of heat transfer are conduction, convection, and radiation. Conduction is the transfer of heat that occurs⁴ by direct contact between two