



石油科技英语丛书
Petroleum Technical English Series

江淑娟 吴松林 编

石油勘探

英语

**Petroleum
Exploration English**

石油工业出版社
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前 言

随着石油工程国际合作项目的日益增多,越来越多的石油工程科技人员需要提高英语交流水平,从而了解国际石油经济的新进展,成功地从事国际合作业务,参与国际竞争。但目前市场尚缺乏适于自学,且石油专业覆盖面较广的英语阅读教材。为此,我们编写了一套《石油科技英语丛书》,分为石油勘探英语、石油钻井英语、油田开发英语、石油化工英语和石油经济与管理英语五个分册。这五个分册基本涵盖了石油工业各方面的词汇和术语,每一分册原文均选自英语国家原版刊物,语言地道、准确,疑难语法现象及语言点均配以注释,阅读理解练习的设计科学、合理,有利于阅读理解能力的快速提高。此外,所有原文均配有准确流畅的译文,读者可借此进一步提高阅读理解的准确性,也可以通过翻译练习提高翻译能力。

有了这套教程,石油工作者就可以随时随地进行英语自学,尽快掌握本专业常用术语、词汇及表达法等,更顺利地进行对外合作业务。本教程编写过程中,广泛参阅了国际最新石油科技杂志和专著,选材具有新颖性和实用性,语言技能训练根据学习者的专业需要而有所侧重,适用对象范围广,可供石油、石化科技工作者使用,也可供大专院校师生等做 ESP (English for Specific Purposes/专门用途英语) 教材或参考书使用,更值得作为资料情报馆藏。

本书在编写过程中,石油经济与信息研究所的王雪梅女士、娄承先生、高泳生先生在资料的收集、整理等方面给予了大力协助;美籍专家 John Carey 夫妇及 Barry Wallace 先生为本书做了终稿审校;江山、刘丽、常伟、田野等做了大量的文字录入和校对工作,在此一并衷心致谢。

由于作者水平有限，书中难免存在缺点和不足之处，诚望广大读者批评指正。

江淑娟 吴松林

2002年8月

Contents

1	Geology and Petroleum	(1)
1.1	Basic Geological Concepts(1)	(1)
1.2	Basic Geological Concepts(2)	(5)
1.3	Geologic Structure Sections	(8)
1.4	Database System for Managing Geological Map Units in Geographic Information System	(10)
1.5	Geology and Search for Petroleum	(13)
1.6	Finding Oil and Gas	(15)
1.7	Porosity	(19)
1.8	Permeability	(24)
1.9	Minerals	(26)
1.10	Folded and Tilted Strata	(29)
1.11	Petroleum Geology and Other Sciences	(33)
2	Description of Rocks	(37)
2.1	Fossil Succession (1)	(37)
2.2	Fossil Succession (2)	(39)
2.3	Description of Sedimentary Rocks (1)	(40)
2.4	Description of Sedimentary Rocks (2)	(43)
2.5	Description on Igneous Rocks (1)	(46)
2.6	Description on Igneous Rocks (2)	(50)
2.7	Dikes, Sills and Batholiths	(52)
2.8	Igneous Rocks and Metamorphic Rocks	(56)
2.9	Origin of Metamorphic Rocks(1)	(58)
2.10	Origin of Metamorphic Rocks(2)	(60)
2.11	Relationship of Some Ore Deposits to Magmas(1)	(63)
2.12	Relationship of Some Ore Deposits to Magmas(2)	(66)
2.13	Properties of Reservoir Rock	(68)

2.14	Pod of Active Source Rock	(70)
2.15	Ages of Effective Source Beds (1)	(72)
2.16	Ages of Effective Source Beds (2)	(76)
3	Accumulation of Petroleum	(79)
3.1	Traps and Geology	(79)
3.2	Traps	(81)
3.3	Types of Petroleum Traps	(83)
3.4	Origin and Generation of Oil and Gas	(85)
3.5	Fluid Content of Reservoir	(88)
3.6	Liquid Flow and Metering	(91)
3.7	Accumulation of Petroleum (1)	(94)
3.8	Accumulation of Petroleum (2)	(97)
3.9	Reserves	(101)
3.10	Reservoir Heterogeneity and Reserve Growth Opportunities	(104)
4	Petroleum System	(107)
4.1	Levels of Petroleum Investigations	(107)
4.2	Sedimentary Basin Investigations	(111)
4.3	Petroleum System Investigations	(115)
4.4	Play and Prospect Investigations	(117)
4.5	Origin of Petroleum System	(119)
4.6	Generative Basin	(122)
4.7	Independent Petroliferous System	(126)
4.8	Petroleum System Definitions and Characteristics	(129)
4.9	Evolution of Petroleum System	(131)
4.10	Level of Certainty and Preservation Time of Petroleum System	(133)
5	Geophysical Exploration	(136)
5.1	Principles of Geophysical Exploration Methods	(136)
5.2	Geophysical Exploration Methods (1)	(138)
5.3	Geophysical Exploration Methods (2)	(143)

5.4	Problem of Ambiguity in Geophysical Interpretation ...	(147)
5.5	Gravitational Prospecting	(150)
5.6	Applications of Gravity Surveying.....	(152)
6	Seismic Exploration	(156)
6.1	Seismic Exploration (1)	(156)
6.2	Seismic Exploration (2)	(158)
6.3	Outline of Seismic Reflection Method	(161)
6.4	Seismic Facies and Types of Reflection Characteristics	(165)
6.5	Configurations at Unit Boundaries	(168)
6.6	Complex Reflection Configuration.....	(171)
6.7	Mapping Reflecting Horizons.....	(173)
6.8	Drawing Conclusions From Reflection Data	(178)
6.9	Synthetic Seismograms	(181)
6.10	Application of Velocity, Tectonic Style and Amplitude Information	(185)
6.11	Seafloor Seismic Technology Reducing E&P Risk in Deep Water	(189)
7	Electrical and Magnetic Surveying	(193)
7.1	Electrical, Magnetic and Electromagnetic Surveying ...	(193)
7.2	Electrical Surveying	(198)
7.3	Magnetic Surveys	(201)
7.4	Applications of Magnetic Surveying	(204)
7.5	Surveying with Telluric Currents	(206)
7.6	Magnetotelluric Surveying	(209)
8	Field Methods for Land Surveys	(212)
8.1	Program	(212)
8.2	Laying Out the Line and Shothole Drilling	(214)
8.3	Recording	(217)
8.4	Spread	(222)
8.5	Arrays (1)	(224)

8.6	Arrays (2)	(226)
8.7	Design of Field Parameters (1)	(229)
8.8	Design of Field Parameters (2)	(233)
8.9	Design of Field Parameters (3)	(236)
8.10	Recording System	(239)
8.11	Data Basic Progressing	(242)
8.12	Spectral Analysis—Filter Parameters	(246)
8.13	Spectral Analysis—Deconvolution Parameters	(249)
	参考译文	(254)
	练习参考答案	(352)
	Bibliography(参考书目)	(355)

1 Geology and Petroleum

1.1 Basic Geological Concepts(1)

Petroleum is a result of the deposition of plant or animal matter in areas which are slowly subsiding. These areas are usually in the sea or along its margins in coastal lagoons or marshes, occasionally in lakes or inland swamps.⁽¹⁾ Sediments are deposited along with the organic matter and the rate of deposition of the sediments must be sufficiently rapid that at least part of the organic matter is preserved by burial before being destroyed by decay.⁽²⁾ As time goes on and the area continues to sink slowly (because of the weight of sediments deposited or because of regional tectonic forces), the organic material is buried deeper and hence is exposed to higher temperatures and pressures.⁽³⁾ Eventually chemical changes result in the generation of petroleum, a complex, highly variable mixture of hydrocarbons, including both liquids and gases (part of the gas being in solution because of the high pressure).⁽⁴⁾ Ultimately the subsidence will stop and may even reverse.⁽⁵⁾

Sedimentary rocks are porous, porosity being the fractional volume of the rock occupied by cavities or pores.⁽⁶⁾ Petroleum collects in these cavities, intermingled with the remaining water which was buried with the sediments.⁽⁷⁾ When a significant fraction of the pores is interconnected so that fluids can pass through the rock, the rock is permeable.⁽⁸⁾ Permeability permits the gas, oil and water to separate partially because of their different densities. The oil and gas tend to rise and will eventually reach the surface of the earth and be dissipated unless they encounter a barrier which stops the upward migration.⁽⁹⁾ Such a barrier produces a trap.

The anticline shown in vertical cross-section is a common type of trap and often the easiest to map.⁽¹⁰⁾ Cover bed is impermeable while the reservoir rock is permeable.⁽¹¹⁾ Oil and gas can collect in the reservoir rock of the anticline until the anticline is filled to the spill point. While an ordinary diagram is two-dimensional, similar conditions must hold for the third dimension, the structure forming an inverted bowl.⁽¹²⁾ If spill point is the highest point at which oil or gas can escape from the anticline, the contour through spill point is the closing contour and the vertical distance between spill point and the highest point on the anticline is the amount of closure.⁽¹³⁾ The quantity of oil which can be trapped in the structure depends upon the amount of closure, the area within the closing contour, and the thickness and porosity of the reservoir beds.⁽¹⁴⁾

Notes

(1) marsh 和 swamp 含义都是“沼泽”，但 marsh 为岸边常遭洪涝之低地，而 swamp 为一般杂草丛生偶尔有树林之洼地。

(2) sediments 沉积物，沉淀

at least 至少

before being destroyed by decay: being destroyed 是动名词被动态，作介词 before 的宾语。

(3) as time goes on 随着时间的流逝

be exposed to...: (遭) 受到...，暴露于...

(4) result in... 导致...

hydrocarbon 烃，碳氢化合物

a complex, highly variable mixture of hydrocarbons 是前面 petroleum 的同位语；including both liquids and gases 为现在分词短语作定语，修饰前面的 hydrocarbons；括号中的句子是由 being 构成的一个独立结构，对前面作补充说明。

(5) even reverse 这里指反过来上升。

(6) sedimentary rock 沉积岩

porosity 孔隙度, cavities or pores 洞穴或孔隙

the fractional volume of the rock occupied by cavities or pores:

岩石中洞穴或孔隙所占的体积比

(7) collect 聚集, intermingle with... 与...混合

which was buried with the sediments: 定于从句修饰其前面的
the remaining water, which 代 the remaining water.

(8) permeable 可渗透的, permeability 渗透性, 渗透率

a significant fraction of the pores: 大部分孔隙

When a significant fraction... so that fluids can pass through the
rock...the rock is permeable: 本句的主句是 the rock is permeable,
when 引导的从句又含有一个结果状语从句, 由 so that 连接。

(9) will eventually reach the surface of the earth and be
dissipated: be 前省略了 will。

unless they encounter a barrier which stops the upward
migration: unless (除非) 是连词, 引导条件状语从句, 后面又
带有一个由 which 引导的定语从句, 意为: 除非他们能遇到阻止
他们向上运移的障碍。

(10) anticline 背斜

shown in vertical cross-section: 过去分词短语作定语修饰
anticline。

often the easiest to map 前省略了 is。

(11) cover bed 盖层

(12) similar conditions must hold for the third dimension: 第三
维也必须具备类似条件

the structure forming an inverted bowl 为独立主格结构,
forming 的逻辑主语是 the structure。

(13) closing contour 闭合等值线

the amount of closure: 闭合度值

(14) depend upon... 取决于..., reservoir beds 储集层

which can be trapped in the structure: oil 的定语从句。

Exercise

Directions: For the passage there are some questions or unfinished statements. Each of them is provided with four choices marked (a), (b), (c) and (d). You should decide on the best choice and then mark your answer.

1. According to this passage, it is less possible to find petroleum in _____.

- a. coastal lagoons
- b. along the margins of the sea
- c. mountains
- d. inland swamps

2. The rate of deposition of sediments must be rapid enough for the organic matter to _____.

- a. sink slowly
- b. be preserved
- c. be exposed to higher temperatures
- d. be buried deeper

3. Petroleum _____.

- a. intermingles with hydrocarbons
- b. collects in sediments
- c. pass through the impermeable rock
- d. is a complex, highly variable mixture of hydrocarbons

4. A trap _____.

- a. permits the oil and gas to be dissipated
- b. stops the upward migration of oil
- c. is in the anticline
- d. is the closing contour

5. Which of the following statements is Not true?

- a. Anticline is a kind of trap.
- b. Cover bed is impermeable.
- c. The quantity of oil that can be trapped in the structure depends upon temperature.
- d. If spill point is the highest point at which oil or gas can escape from the anticline, the vertical distance between spill point and the highest point on the anticline is the amount of closure.

1.2 Basic Geological Concepts(2)

In a fault trap a permeable bed, overlain by an impermeable bed, is faulted against impermeable beds.⁽¹⁾ A trap exists if there is also closure in the direction parallel to the fault, for example because of folding.⁽²⁾

In a pinch-out reservoir bed gradually thins and eventually pinches out.⁽³⁾ A trap is formed when the upper and lower beds are impermeable and closure also exists in the direction to the both sides, perhaps because of folding or faulting.⁽⁴⁾ A permeability trap occurs when reservoir bed and impermeable beds are separate zones of the same bed differing in permeabilities, the reservoir bed being permeable the upper and lower beds impermeable; an example might be a permeable sandstone which becomes tight (impermeable) because of fine silt which closes the openings between the grains.⁽⁵⁾

In an unconformity trap the beds overlain by a covering bed became tilted and exposed to erosion.⁽⁶⁾ Later the surface sank below sea level and further deposition occurred. If the covering bed, left and right beds are impermeable, reservoir bed is permeable, and closure exists in the direction to the both sides, oil can be trapped under the unconformity.⁽⁷⁾

A salt dome formed when a mass of salt flows upwards under the pressure resulting from the weight of the overlying sediments⁽⁸⁾.

The salt dome bows up sedimentary beds and seals off disrupted beds and so provides traps over and around the sides of the dome.⁽⁹⁾

A limestone reef grew upwards on a slowly subsiding platform.⁽¹⁰⁾ The reef is composed of coral or other marine animals with calcareous shells which grow prolifically under the proper conditions of water temperature and depth.⁽¹¹⁾ As the reef subsides, sediments are deposited around it. Eventually the reef stops growing, perhaps because of a change in the water temperature or the rate of subsidence, and the reef may be buried. The reef material is usually highly porous and often is covered by impermeable sediments. Hence the reef may form a trap for petroleum generated in the reef itself or flowing into it from another bed.⁽¹²⁾

Notes

(1) fault trap 断层圈闭

overlain by an impermeable bed: 过去分词短语作定语, 修饰前面的 bed。

(2) if there is also closure in the direction parallel to the fault... 如果在平行于断层的方向上也有闭合...

parallel... 形容词短语, 修饰前面的 direction。

(3) pinch out 尖灭

(4) A trap is formed... 是主句, 从句由 when 引导, 从句中含有两个单句, 由 and 连接。

(5) the reservoir bed being permeable, the upper and lower beds impermeable 两个独立主格结构, 后一个 impermeable 前省略了 being。

an example might be a permeable sandstone which becomes... which closes... 是一个倒装句, an example 是表语; which 引导的两个定语从句修饰各自前面的名词。

(6) unconformity trap 不整合圈闭

overlain by a covering beds 过去分词短语作定语修饰 beds。

became tilted and exposed to erosion 变成倾斜的，出露而被
侵蚀

(7) in the direction to 在……方向

closure exists in the direction to the both sides 旁边两侧都有
闭合

(8) result from… 由…而产生

(9) bows up 向上拱成穹形

seals off 封闭

over and around the sides of the dome 在盐丘的上面和周围

(10) limestone reef 石灰岩礁

(11) be composed of… 由…构成

calcareous shells 石灰质壳

which grow prolifically… 定语从句，修饰前面的名词
animals。

(12) generated in the reef itself or flowing into it from another
bed 过去分词短语和现在分词短语都作 petroleum 的定语。

Exercise

Directions: Decide whether the following statements are true or false.

1. A trap is formed when the upper and lower beds are permeable and closure also exists in the direction to the both sides.

2. When reservoir bed and impermeable beds are separate zones of the same bed with different permeabilities, the upper and lower beds being permeable, there is a permeability trap.

3. A salt dome formed when a mass of salt flows upwards under the pressure resulting in the weight of the overlying sediments.

4. A limestone reef is made up of coral or other marine animals with calcareous shells under the proper conditions of water

temperature and depth.

5. Being highly porous and covered by impermeable sediments, the limestone reef may form a trap.

1.3 Geologic Structure Sections

A geologic map shows the distribution of rocks of different types and ages at the surface. If we assume that a vertical trench is cut along a line extending across such a surface, then a geologic structure section is a diagram of the rocks and structures that would occur along one of its walls (i. e., as rocks would be displayed along a straight, vertical cliff).⁽²⁾ The top of a structure section is a profile of surface topography along its trend, and its base occurs at whatever depth is needed for the features we want to show.⁽³⁾ Drill holes are one method of obtaining subsurface data for use in constructing a structure section.

Among the types of geologic features that can be shown on a structure section is the unconformity, which is a relationship between older and younger rocks that involves a break in the geologic record.⁽⁴⁾ Thus a surface of unconformity is commonly a buried surface of erosion. Unconformities may be local or widespread and may involve minor or major gaps in the geologic record. To illustrate, assume that a marine limestone—one containing fossils of organisms that lived only in the ocean—is overlain unconformably by a marine shale and that a buried subaerial erosion surface occurs between the two formations.⁽⁵⁾ The following sequence of events presumably occurred: (1) calcareous sediments accumulated on a sea floor and eventually were compacted and cemented to form limestone; (2) the sea became land, either because the land was uplifted or because sea level fell; (3) erosion then carved out gullies and small valleys and removed some of the limestone; (4) the sea again covered the area, and mud and clay