TRƯỜNG ĐẠI HỌC BÁCH KHOA HÀ NỘI
50 NĂM XÂY DỰNG VÀ PHÁT TRIỂN
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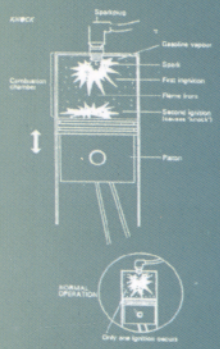
KHOA CÔNG NGHỆ HÓA HỌC
PHẠM THANH HUYỀN



TIẾNG ANH DÀNH CHO SINH VIÊN NGÀNH HÓA DẦU

ENGLISH FOR STUDENTS OF PETROCHEMICAL TECHNOLOGY

NHÀ XUẤT BẢN KHOA HỌC VÀ KỸ THUẬT

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(Bài giảng cho sinh viên)

NHÀ XUẤT BẢN KHOA HỌC VÀ KỸ THUẬT

HÀ NỘI

HANOI UNIVERSITY OF TECHNOLOGY

FACULTY OF CHEMICAL TECHNOLOGY

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SCIENCE AND TECHNICS PUBLISHING HOUSE

HANOI

LỜI NÓI ĐẦU

Bài giảng "Tiếng Anh dành cho sinh viên ngành Hoá dầu" được biên soạn dựa trên các tài liệu tiếng Anh chuyên ngành của các tác giả người Mỹ và Anh. Hy vọng bài giảng này sẽ cung cấp cho bạn đọc, đặc biệt là sinh viên chuyên ngành Hóa dầu, một số vốn từ và thành ngữ tiếng Anh thường được sử dụng trong chuyên ngành Công nghệ Lọc - Hoá dầu.

Tác giả xin chân thành cảm ơn các đồng nghiệp, bạn bè, người thân, đặc biệt là các cựu sinh viên ngành Công nghệ Hoá dầu đã động viên, giúp đỡ và cung cấp nguồn tài liệu vô cùng phong phú và đa dạng trong quá trình hoàn thành tập bài giảng này.

Chắc chắn trong quá trình biên soạn, bài giảng không thể tránh khỏi các thiếu sót, rất mong nhận được các ý kiến đóng góp của độc giả để bài giảng được hoàn thiện hơn.

PREFACE

The textbook "English for students of Petrochemical Technology" was written based on the specialist books of American and English authors. I hope that this textbook will provide readers, especially students of petrochemical technology, some special words and phrases commonly used in the Refining and Petrochemical Technology.

I wish to acknowledge the cooperation and assistance I received from my colleagues, my friends, my family and my former students for their encouragement and their document support in completing this work.

I also hope to receive the suggestion and the criticism of readers to make this textbook better.

Pham Thanh Huyen, Ph.D

CONTENT

UNIT 1. CRUDE OIL

Section A. READING COMPREHENSION

Crude oil (petroleum) is a naturally occurring brown to black flammable liquid. Crude oils are principally found in oil reservoirs associated with sedimentary rocks beneath the earth's surface. Although exactly how crude oils originated is not established, it is generally agreed that crude oils derived from marine animal and plant debris subjected to high temperatures and pressures. It is also suspected that the transformation may have been catalyzed by rock constituents. Regardless of their origins, all crude oils are mainly constituted of hydrocarbons mixed with variable amounts of sulfur, nitrogen, and oxygen compounds.

Metals in the forms of inorganic salts or organometallic compound are present in the crude mixture in trace amounts. The ratio of the different constituents in crude oils, however, varies appreciably from one reservoir to another.

Normally, crude oils are not used directly as fuels or as feedstocks for the production of chemicals. This is due to the complex nature of the crude oil mixture and the presence of some impurities that are corrosive or poisonous to processing catalysts.

Crude oils are refined to separate the mixture into simpler fraction that can be used as fuels, lubricants or as intermediate feedstock to the petrochemical industries. A general knowledge of this composite mixture is essential for establishing a processing strategy.

PROPERTIES OF CRUDE OILS

Crude oils differ appreciably in their properties according to origin and the ratio of the different components in the mixture. Lighter crudes generally yield more valuable light and middle distillates and are sold at higher prices. Crudes containing a high percent of impurities, such as sulfur compounds, are less desirable than low-sulfur crudes because of their corrosivity and the extra treating cost. Corrosivity of crude oils is a

function of many parameters among which are the type of sulfur compounds and their decomposition temperatures, the total acid number, the type of carboxylic and naphthenic acids in the crude and their decomposition temperatures. It was found that naphthenic acids begin to decompose at 600°F. Refinery experience has shown that above 750°F there is no naphthenic acid corrosion. For a refiner, it is necessary to establish certain criteria to relate one crude to another to be able to assess crude quality and choose the best processing scheme. The following are some of the important tests used to determine the properties of crude oils.

Density, Specific Gravity and API Gravity

Density is defined as the mass of unit volume of a material at a specific temperature. A more useful unit used by the petroleum industry is specific gravity, which is the ratio of the weight of a given volume of a material to the weight of the same volume of water measured at the same temperature.

Specific gravity is used to calculate the mass of crude oils and its products. Usually, crude oils and their liquid products are first measured on a volume basis, then changed to the corresponding masses using the specific gravity.

The API (American Petroleum Institute) gravity is another way to express the relative masses of crude oils. A low API gravity indicates a heavier crude oil or a petroleum product, while a higher API gravity means a lighter crude or product. Specific gravities of crude oils roughly range from 0.82 for lighter crudes to over 1.0 for heavier crudes.

Salt Content

The salt content expressed in milligrams of sodium chloride per liter oil (or in pounds/barrel) indicates the amount of salt dissolved in water. Water in crudes is mainly present in an emulsified form. A high salt content in a crude oil presents serious corrosion problems during the refining process. In addition, high salt content is a major cause of plugging heat exchangers and heater pipes. A salt content higher than 10 lb/1,000 barrels (expressed as NaCl) requires desalting.

Sulfur Content

Determining the sulfur content in crudes is important because the amount of sulfur indicates the type of treatment required for the distillates. To determine sulfur content, a weighed crude sample (or fraction) is burned in an air stream. All sulfur compounds are oxidized to sulfur dioxide, which is further oxidized to sulfur trioxide and finally titrated with a standard alkali.

Identifying sulfur compounds in crude oils and their products is of little use to a refiner because all sulfur compounds can easily be hydrodesulfurized to hydrogen sulfide and the corresponding hydrocarbon. The sulfur content of crudes, however, is important and is usually considered when determining commercial values.

Pour Point

The pour point of a crude oil or product is the lowest temperature at which an oil is observed to flow under the conditions of the test. Pour point data indicates the amount of long-chain paraffins (petroleum wax) found in a crude oil. Paraffinic crudes usually have higher wax content than other crude types. Handling and transporting crude oils and heavy fuels is difficult at temperatures below their pour points. Often, chemical additives known as pour point depressants are used to improve the flow properties of the fuel. Long-chain n-paraffins ranging from 16-60 carbon atoms in particular, are responsible for near-ambient temperature precipitation. In middle distillates, less than 1% wax can be sufficient to cause solidification of the fuel.

Ash Content

This test indicates the amount of metallic constituents in a crude oil. The ash left after completely burning an oil sample usually consists of stable metallic salts, metal oxides, and silicon oxide. The ash could be further analyzed for individual elements using spectroscopic techniques.

CRUDE OIL CLASSIFICATION

Appreciable property differences appear between crude oils as a result variable ratios of the crude oil components. For a refiner dealing with crudes of different origins, a simple criterion may be established to group

crudes with similar characteristics. Crude oils can be arbitrarily classified into three or four groups depending on the relative ratio of the hydrocarbon classes that predominates in the mixture. The following describes three types of crudes:

1. Paraffinic-the ratio of paraffinic hydrocarbons is high compared to aromatics and naphthenes.

2. Naphthenic-the ratios of naphthenic and aromatic hydrocarbons are relatively higher than in paraffinic crudes.

3. Asphaltic-These crudes contain relatively a large amount of polynuclear aromatics, a high asphaltene content, and relatively less paraffins than paraffinic crudes.

COMPREHENSION

1. What are the main constituents of crude oil mixture?
2. List some important properties of crude oil.
3. Define the density, the pour point of crude oil.
4. How to determine the sulfur content of a crude oil?
5. What does ash consist of?
6. Compare the paraffinic, naphthenic and asphaltic crudes.

Section B. REVIEW EXERSISES

I. Fill in the blanks in the sentences below with the correct prepositions

1. Table salt is *composed* _____ two elements, sodium and chlorine
2. Water is *essential* _____ all life.
3. One meter is approximately *equal* _____ a yard.
4. Oxygen, fuel, and heat are all *necessary* _____ combustion.
5. Iron *combines* _____ oxygen to form rust.
6. The IUPAC rules for naming halocarbons are *based* ____ the name of the parent hydrocarbon.
7. The branch of chemistry that *deals* _____ carbon compounds is called organic chemistry.