

江苏高校品牌专业建设工程资助项目 (编号: PPZY2015B180)

化工专业英语

谢承佳 张培培 • 主编

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学工业出版社

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· 北 京 ·

《化工专业英语》是为了提高化工技术类专业学生化工英语信息获取能力和应用能力，培养与职业能力结构要求相一致的高素质技能型人才而编写的。本教材立足于化工技术专业典型工作岗位群（开发员、操作工、安全员、检验工、环保员、销售员）建立六个典型工作情境，分别是 Product Development 产品开发、Mass Production 批量生产、Chemical Engineering Safety 化工安全、Product Testing 产品检测、Environment Protection 环境保护、Marketing & Selling 产品销售。每个情境分为学习目标、情境导入、精读、练习、语法、拓展、阅读材料等。编者从化工行业典型工作过程及职业岗位来组织内容，材料来源于英文原版书籍、杂志和英文化工方面的相关网站，由化工专业教师、英语教师与行业企业合作，突出专业英语“专业+语言”的特征，借助英语工具，开展化工专业实践，强化应用，紧密结合化工生产实际。

《化工专业英语》图文并茂、操作性强、覆盖面广、难度适中，可作为应用化工、石油化工、精细化工、环境保护、工业分析与检验等高职高专化工类专业的英语教材，也可作为从事化工产品生产工作人员的参考书。

图书在版编目（CIP）数据

化工专业英语/谢承佳，张培培主编. —北京：
化学工业出版社，2018.3
ISBN 978-7-122-31472-7

I. ①化… II. ①谢… ②张… III. ①化学工业-
英语-教材 IV. ①TQ

中国版本图书馆 CIP 数据核字（2018）第 020290 号

责任编辑：刘心怡 蔡洪伟
责任校对：王 静

装帧设计：关 飞

出版发行：化学工业出版社（北京市东城区青年湖南街 13 号 邮政编码 100011）

装 装：北京科印技术咨询服务公司海淀数码印刷分部

787mm×1092mm 1/16 印张 8 $\frac{3}{4}$ 字数 244 千字 2018 年 4 月北京第 1 版第 1 次印刷

购书咨询：010-64518888（传真：010-64519686） 售后服务：010-64518899

网 址：<http://www.cip.com.cn>

凡购买本书，如有缺损质量问题，本社销售中心负责调换。

定 价：29.00 元

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前 言

化工专业英语课程是高职院校英语教学的重要组成部分,本课程可以提高化工技术类专业学生化工英语信息获取能力和信息产出能力,使学生具备从事化学化工行业必需的英语素质和职业素养,培养与职业能力结构要求相一致的高素质技能型人才。

本教材以《高等职业教育英语课程教学要求》为建设思路,根据专业设置和学生未来就业的行业及岗位(群)需求制定体现职业教育教学理念和教学模式的行业英语课程,以化工行业企业英语职业能力需求为依据,以职业能力培养为重点,以典型化工产品生产过程为主线建立典型工作情境。

本教材基于地方企业调研,分析化工行业英语职业能力需求,对完成化工行业各岗位需要工作任务应具备的职业能力做出详细的描述,同时对工作任务、职业能力按逻辑关系进行排序,立足化工技术专业典型工作岗位群(开发员、操作工、安全员、检验工、环保员、销售员)建立六个典型工作情境,即 Product Development 产品开发、Mass Production 批量生产、Chemical Engineering Safety 化工安全、Product Testing 产品检测、Environment Protection 环境保护、Marketing & Selling 产品销售。在每一情境中,分为以下几部分。

- ① Objectives 提供本情境教学完成后学生应掌握的主要职业技能及语言技能。
- ② Warming-up 情境的导入部分,通过图文并茂的形式引入情境主体。
- ③ Text 精读部分,选择的课文与情境目标相关度高,可根据具体教学课时选择内容。
- ④ Comprehension 以选择题、填空题、问答题的形式考查学生对课文的理解。
- ⑤ Vocabulary building 选择适量的高频词汇及核心专业词汇培养学生的语言能力。
- ⑥ Exercise 通过练习巩固学生对词汇的掌握。
- ⑦ Extension 选择了一些与精读文章相关度较高的小知识培养学生的知识迁移能力。
- ⑧ Reading material 选择了一些难度较高的文章满足差异性教学,也可作为泛读课文。
- ⑨ Supplementary knowledge 介绍了科技文献、专利、说明书、操作手册、合同等常见文体,培养学生的职业能力。

本教材为校企开发教材。情境1由扬州工业职业技术学院谢承佳和南京炼油厂的朱宇清高工共同编写,情境2由扬州工业职业技术学院张培培编写,情境3由扬州工业职业技术学院陈秀清编写,情境4由扬州工业职业技术学院马振雄和谢承佳共同编写,情境5由谢承佳和南京炼油厂的谢承芳高工共同编写,情境6由扬州工业职业技术学院钱婧编写,全书由扬州工业职业技术学院张崎静主审。

由于笔者水平有限,疏漏在所难免,希望读者不吝赐教,批评指正,以便再版时更正和改进。

编者

2017年7月

Contents

Product Development	1
Warming-up What Are Substances Composed of?	2
Text A Elements and Compounds	3
Text B Systematic Nomenclature of Binary Compounds	7
Text C Properties of Aqueous Ammonia	11
Reading material The Haber Process for Ammonia Synthesis	15
Supplementary knowledge Structure of Patent Documents	17
Mass Production	21
Warming-up Development of Chemical Engineering	22
Text A Types of Chemical Reactors	23
Text B Basic Distillation Equipment and Operation	27
Text C Petrochemicals	33
Reading material Ethylene Production	38
Supplementary knowledge Structure of Equipment Manual	40
Chemical Engineering Safety	43
Warming-up What Do These Public Signs Mean?	44
Text A General rules for classification and hazard communication of chemicals	44
Text B Technical & Safety Instructions for Chemicals	48
Text C Accident Investigation Report	53
Reading material How to Use a Fire Extinguisher?	59
Supplementary knowledge Structure of Material Safety Data Sheet	64
Product Testing	69
Warming-up What Are the Usages of the Following Instruments?	70

Text A	Instruments	71
Text B	Redox Titration	75
Text C	Acid -Base Indicators	79
Reading material	Gas and Liquid Chromatography	82
Supplementary knowledge	Structure of Operating Manual	84

Environment Protection 89

Warming-up	Types of Pollution	90
Text A	Water Pollution	92
Text B	Biological Oxygen Demand Monitoring	97
Text C	Recycling and Reuse	101
Reading material	Air Pollution	105
Supplementary knowledge	Structure of a Journal-Style Scientific Paper	107

Marketing & Selling 111

Warming-up	Which Chemical Firm will be Your Target? Why?	112
Text A	BASF and Other Top Chemical Firms	113
Text B	Inquires	117
Text C	Sale & Purchase Contract for BRAZIL Iron Ore Fines	121
Reading material		127
Supplementary knowledge	Samples of Some International Trade Documents	130

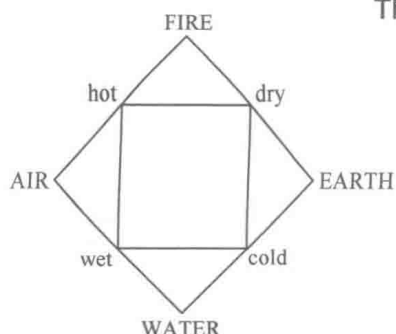
Product Development

Objectives:

After finishing this module, you are able to:

- Name chemicals properly
- Find useful information of chemicals quickly by using chemical handbooks
- Confirm useful information in the patent

What Are Substances Composed of?



The theory of four elements

As recently as a few thousand years ago, western scientists considered the whole earth to be made of 4 elements: Earth, Air, Fire, and Water. Air was the underlined element; this single substance made up everything in the world.

Discovery of oxygen

In 1774, an English cleric named Joseph Priestley observed an interesting phenomenon: when mercuric tox is heated to certain temperature, a colorless gas (later renamed oxygen by Antoine Lavoisier) and a silvery liquid metal were produced.



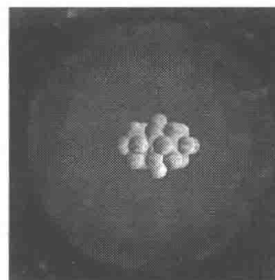
Atomic theory

ELEMENTS			
	Wt.		Wt.
○ Hydrogen	1	⊙ Copper	56
⊖ Azote	5	⊖ Lead	90
● Carbon	6	⊖ Silver	190
○ Oxygen	7	⊖ Gold	190
⊖ Phosphorus	9	⊖ Platina	190
⊕ Sulfur	13	⊖ Mercury	167

It was John Dalton, in the early 1800s, who determined that each chemical element was composed of a unique type of atom, and that atoms differed by their masses. He devised a system of chemical symbols and, having ascertained the relative weights of atoms, arranged them into a table.

Atoms combine into molecules

Italian chemist Amedeo Avogadro found that the atoms in elements were combined to form molecules. Avogadro proposed that equal volumes of gases under equal conditions of temperature and pressure contain equal numbers of molecules.



Text A Elements and Compounds

Elements are pure substances that cannot be decomposed into simpler substances by ordinary chemical changes. At present there are 109 known elements. Some common elements that are familiar to you are carbon, oxygen, aluminum, iron, copper, nitrogen, and gold.

About 85% of the elements can be found in nature, usually combined with other elements in minerals and vegetable matter or in substances like water and carbon dioxide. Copper, silver, gold, and about 20 other elements can be found in highly pure forms. Sixteen elements are not found in nature; they have been produced in generally small amounts in nuclear explosions and nuclear research. They are man-made elements.

Pure substances composed of two or more elements are called compounds. Because they contain two or more elements, compounds, unlike elements, are capable of being decomposed into simpler substances by chemical changes. The ultimate chemical decomposition of compounds produces the elements from which they are made.

The compound carbon monoxide (CO) is composed of carbon and oxygen in the ratio of one atom of carbon to one atom of oxygen. Hydrogen chloride (HCl) contains a ratio of one atom of hydrogen to one atom of chlorine. Compounds may contain more than one atom of the same element. Methane ("natural gas" CH₄) is composed of carbon and hydrogen in a ratio of one carbon atom to four hydrogen atoms. ordinary table sugar (sucrose, C₁₂H₂₂O₁₁) contains a ratio of 12 atoms of carbon to 22 atoms of hydrogen to 11 atoms of oxygen. These atoms are held together in the compound by chemical bonds.

There are over three million known compounds, with no end in sight as to the number that can and will be prepared in the future. Each compound is unique and has characteristic physical and chemical properties. Let us consider in some detail two compounds—water and mercuric oxide. Water is a

Words and expressions

element ['ɛləmənt] n. 元素
decompose [,dikəm'pəʊz] v. 分解
familiar [fə'miljə] adj. 熟悉的
oxygen ['ɒksɪdʒən] n. 氧气
aluminum [ə'lʊmɪnəm] n. 铝
copper ['kɒpə] n. 铜
nitrogen ['naɪtrədʒən] n. 氮
combine [kəm'baɪn] v. 结合

small amounts 少量
nuclear explosion 核爆炸

ultimate ['ʌltəmət] adj. 最终的

monoxide [mə'nɒksaɪd] n. 一氧化物
ratio ['reɪʃiəʊ] n. 比率
atom ['ætəm] n. 原子
chloride ['klɒraɪd] n. 氯化物
chlorine ['klɒrɪn] n. 氯

sucrose ['sjʊkros] n. 蔗糖

chemical bond 化学键

in sight 看得见
unique [ju'nik] adj. 独特的
characteristic [ˌkærəktə'rɪstɪk] adj. 典型的
property n. 性质
in detail 详细地

colorless, odorless, tasteless liquid that can be changed to a solid, ice, at 0°C and to a gas, steam at 100°C. It is composed of two atoms of hydrogen and one atom of oxygen per molecule, which represents 11.2 percent hydrogen and 88.8 percent oxygen by mass. Water reacts chemically with sodium to produce hydrogen and sodium hydroxide, with lime to produce calcium hydroxide, and with sulfur trioxide to produce sulfuric acid. No other compound has all these exact physical and chemical properties, they are characteristics of water alone.

Mercuric oxide is a dense, orange-red powder composed of a ratio of one atom of mercury to one atom of oxygen. Its composition by mass is 92.6 percent mercury and 7.4 percent oxygen. When it is heated to temperatures greater than 360°C, a colorless gas, oxygen, and a silvery liquid metal, mercury, are produced. Here again are specific physical and chemical properties belonging to mercuric oxide and to no other substance. Thus, a compound may be identified and distinguished from all other compounds by its characteristic properties.

solid ['sɒlɪd] n. 固体
steam [sti:m] n. 蒸汽
represent [ˌreprɪˈzent] v. 代表

sodium ['sɒdiəm] n. 钠
lime [laɪm] n. 石灰

dense [dens] adj. 密度大的

identify [aɪˈdentɪfaɪ] vt. 鉴定
distinguish [dɪˈstɪŋɡwɪʃ] v. 辨别

Comprehension

Choose the best answer according to the text.

- Water is composed of two atoms of hydrogen and one atom of oxygen per molecule, which represents 11.2 percent hydrogen and 88.8 percent oxygen by ().
A. mass B. volume C. mole D. molecule
- Compounds may contain more than one atom of the same element. The following selections all comply with this sentence except ().
A. CH₄ B. HCl C. C₁₂H₂₂O₁₁ D. CO₂
- Mercuric oxide is a dense, () powder composed of a ratio of one atom of mercury to one atom of oxygen.
A. green B. colorless C. orange-red D. black
- Which statement is not true according to the text? ()
A. Compound can be decomposed into simpler substances by chemical changes.
B. Gold can be found in highly pure forms in nature because it is inert.
C. Water reacts chemically with lime to produce calcium hydroxide and hydrogen gas.
D. The formula of mercuric oxide is HgO.

Vocabulary building

Active words

substance

n. [物] 物质；实质

combine

v. 结合

matter

n. 物质；事情

form

v. 形成

n. 形式

nature

n. 自然；性质

produce

v. 生产；产生

n. 农产品，产品

bond

v. 结合

n. 连接，键

react

v. 反应

property

n. 性质；财产

Useful expressions

be composed of 由…组成

be decomposed into 分解成

A reacts with B to produce C and D A 与 B

反应生成 C 和 D

ratio of ... to... 比例为……

percent by mass 质量百分比

in sight 在即，在望；看得见

Exercise

Fill in each blank with a given word or expression in their right form.

react compose bond combine property solid

1. Tannin is a plant polyphenol. It could _____ protein in solution to form sediment.

2. England, Scotland and Wales _____ the island of Great Britain.

3. An acid can _____ with a base to form a salt.

4. One _____ of red phosphorous is flammable.

5. Matter exists in three states: _____, liquid and gas.

6. These amino acids can react with each other to form a different kind of chemical _____.

Extension

The Elements

Tom Lehrer is an American singer-songwriter, satirist, pianist, and mathematician.

The Elements is one of his most famous creations, which consists of little more than the elements of the periodic table.

Listen to the song *The Elements*, and try to write down the lyrics.



Periodic Table of the Elements																0																			
I A																II A				III A		IV A		V A		VI A		VII A		He					
1	H															3	Li	4	Be															10	Ne
11	Na	12	Mg															13	Al	14	Si	15	P	16	S	17	Cl	18	Ar						
19	K	20	Ca	21	Sc	22	Ti	23	V	24	Cr	25	Mn	26	Fe	27	Co	28	Ni	29	Cu	30	Zn	31	Ga	32	Ge	33	As	34	Se	35	Br	36	Kr
37	Rb	38	Sr	39	Y	40	Zr	41	Nb	42	Mo	43	Tc	44	Ru	45	Rh	46	Pd	47	Ag	48	Cd	49	In	50	Sn	51	Sb	52	Te	53	I	54	Xe
55	Cs	56	Ba	57	*La	72	Hf	73	Ta	74	W	75	Re	76	Os	77	Ir	78	Pt	79	Au	80	Hg	81	Tl	82	Pb	83	Bi	84	Po	85	At	86	Rn
87	Fr	88	Ra	89	+Ac	104	Rf	105	Ha	106	106	107	107	108	108	109	109	110	110																
● Lanthanide Series + Actinide Series		58	Ce	59	Pr	60	Nd	61	Pm	62	Sm	63	Eu	64	Gd	65	Tb	66	Dy	67	Ho	68	Er	69	Tm	70	Yb	71	Lu						
		90	Th	91	Pa	92	U	93	Np	94	Pu	95	Am	96	Cm	97	Bk	98	Cf	99	Es	100	Fm	101	Md	102	No	103	Lr						

Work in groups

Discuss with your group members about rules of word-formation of following elements.

chlorine	oxygen	sodium	aluminum
carbon	sulfur	fluorine	nitrogen
gold	helium	hydrogen	calcium

Exercise

Match the given words or phrases with the right symbol in the periodic table of the elements.

Atomic weight	Metal	Non-metal	Man-made element
Atomic number	Rare gases	Element symbol	Arrangement of extra nuclear electrons

<div></div>	<div>92 U</div>	<div></div>	<div>2 He</div>	<div></div>	<div>103 Lr</div>	<div></div>
<div></div>	<div>5f⁶6d¹7s²</div>	<div></div>	<div>6 C</div>	<div></div>	<div>80 Hg</div>	<div></div>
<div></div>	<div>238.0</div>	<div></div>		<div></div>		<div></div>

Text B Systematic Nomenclature of Binary Compounds

(1) Binary compounds in which the electro-positive element has a fixed oxidation state. The chemical name is composed of the name of the metal, which is written first, followed by the name of the nonmetal, which has been modified to an identifying stem to which is added the suffix-ide. For example, sodium chloride, NaCl is composed of one atom each of sodium and chlorine. The compound name is sodium chloride.

Elements: sodium (metal) + chlorine (nonmetal)

Name of compound: sodium chloride

Stems of some common nonmetals are shown in the following table 1. 1.

Table 1. 1 Stems of some common nonmetals

Symbol	Element	Stem	Binary name endings
Cl	Chlorine	Chlor	Chloride
H	Hydrogen	Hydr	hydride
N	Nitrogen	Nitr	nitride
O	Oxygen	Ox	oxide

(2) Binary compounds containing metals of variable oxidation numbers and nonmetals. Two systems are commonly used for compounds in this category. The official system, designated by the International Union of Pure and Applied Chemistry (IUPAC), is known as the Stock system. In the Stock System, when a compound contains a metal that can have more than one oxidation number, the oxidation number of the metal in the compound is designated by a Roman numeral in parentheses [e. g. (II)] written immediately after the name of the metal. The nonmetal is treated in the same manner as in the previous case.

Examples:

FeCl₂ Iron (II) chloride (Fe²⁺)

FeCl₃ Iron (III) chloride (Fe³⁺)

CuCl Copper (I) chloride (Cu⁺)

CuCl₂ Copper (II) chloride (Cu²⁺)

In classical nomenclature, when the metallic

Words and expressions

binary ['bainəri] adj. 二元的

modify ['mɒdɪfaɪ] v. 修改

stem [stɛm] n. 词干

symbol ['sɪmbəl] n. 符号

variable ['vɛriəbl] adj. 可变的

oxidation numbers 氧化价态

category ['kætəgɒri] n. 种类

designate ['dɛzɪɡneɪt] v. 指定

IUPAC 国际理论和应用化学联合会

parentheses [pə'renθəsɪz] n.

parenthesis的复数形式 圆括号

manner ['mænə] n. 方式

ion has only two oxidation numbers, the name of the metal is modified with the suffixes -ous and -ic to distinguish between the two. The lower oxidation state is given the -ous ending and the higher one the -ic ending.

FeCl₂ ferrous chloride (Fe²⁺)

FeCl₃ ferric chloride (Fe³⁺)

CuCl cuprous chloride (Cu⁺)

CuCl₂ cupric chloride (Cu²⁺)

(3) Binary compounds contain two nonmetals.

The most electropositive element is named first. Between two nonmetals, the element that occurs earlier in the following sequence is written and named first in the formula: B, Si, C, P, N, S, I, Br, Cl, O, F. To each element is attached a Latin or Greek prefix indicating the number of atoms of that element in the molecule. The second element still retains the modified binary ending. The prefix mono is generally omitted except when needed to distinguish between two or more compounds. Common prefixes and their numerical equivalences are the following.

mono = 1 di = 2 tri = 3 tetra = 4 penta = 5

hexa = 6 hepta = 7 octa = 8 nona = 9 deca = 10

Examples:

CO carbon monoxide

CO₂ carbon dioxide

PCl₃ phosphorus trichloride

PCl₅ phosphorus pentachloride

(4) Exceptions using -ide endings. Three notable exceptions using the -ide ending are hydroxides (OH⁻), cyanides (CN⁻), and ammonium (NH₄⁺) compounds.

NH₄I Ammonium iodide

Ca(OH)₂ Calcium hydroxide

KCN Potassium cyanide

(5) Acids derive from binary compounds. Certain binary hydrogen compounds, when dissolved in water, form solutions that have acid properties. Because of this property, these compounds are given acid names in addition to their regular -ide names. However, not all binary hydrogen compounds are acids. To express the formula of a binary acid, it is customary to write the symbol of hydrogen first, followed by the symbol of the second element (e. g. HCl, HBr, H₂S).

To name a binary acid, place the prefix hydro- in front of, and the letter -ic after the stem of the

suffix ['sʌfiks] n. 后缀

formula ['fɔrmjələ] n. 分子式

attach [ə'tætʃ] v. 附加

prefix ['prɪfiks] n. 前缀

retain [rɪ'ten] v. 保留

omit [ə'mɪt] v. 省略

equivalence [ɪ'kwɪvələns] n. 相等

derive [dɪ'raɪv] v. 源于

dissolve [dɪ'zɒlv] v. 溶解

solution [sə'ljuʃən] n. 溶液

customary ['kʌstə'meri] adj. 习惯的

nonmetal. Then add the word "acid".

Examples: HCl Hydrochloric acid

H₂S Hydrosulfuric acid

Comprehension

Choose the best answer according to the text.

1. According to the text, which compound owns multiple? names? ()
A. CO₂ B. HCl C. NaCl D. KCN
2. Which one belongs to binary compounds only containing two nonmetals? ()
A. CO₂ B. Ca (OH)₂ C. NaCl D. KCN
3. Two systems are commonly used for binary compounds containing metals of variable oxidation numbers and nonmetals. They are ().
A. official system and Stock system
B. official system and classical nomenclature system
C. official system and IUPAC
D. IUPAC and classical nomenclature system
4. Which statement is not true according to the text? ()
A. H₂S dissolved in water will form solutions that have acid properties.
B. HCl is named as hydrochloric acid or hydrogen chloride.
C. CO is named as carbon oxide because the prefix mono is generally omitted.
D. Ferric chloride and iron (III) chloride are the same chemical.

Match the formulae with their equivalents

- | | |
|-----------------------|-------------------------|
| 1. SO ₃ | A. sodium hydroxide |
| 2. CCl ₄ | B. carbon tetrachloride |
| 3. NH ₄ Cl | C. hydrogen sulfide |
| 4. NaOH | D. ammonium chloride |
| 5. H ₂ S | E. sulfur trioxide |
| 6. CO | F. carbon monoxide |

Write the systematic nomenclature of the following chemicals.

- | | |
|------------------------|---------------------------|
| H ₂ _____ | KOH _____ |
| Ca _____ | HCl _____ |
| CO _____ | SO ₂ _____ |
| NaCl _____ | PCl ₃ _____ |
| Fe ³⁺ _____ | PCl ₅ _____ |
| Fe ²⁺ _____ | Ca(OH) ₂ _____ |

Vocabulary building

Active words

variable

adj. 可变的

n. [数] 变量

formula

n. 公式; 分子式; 配方

attach

v. 附属, 附加

retain

v. 保持

omit

vt. 省略; 遗漏; 未(做)

Useful expressions**consist of** 由...组成; 由...构成; 包括**be known as** 被称为; 被认为是**exception**

n. 例外

express

vt. 表达

n. 快车, 快递

dissolve

vt. 溶解; 解散, 解除, 消散

derive from 来源于; 衍生于**in addition to** 除了

Exercise

Fill in each blank with a given word or expression in their right form.

in addition to consist of variable be known as dissolve express

1. Solubility is the degree to which a substance dissolves in a solvent to make a solution (usually _____ as grams of solute per liter of solvent).

2. Warm the sugar slightly first to make it _____ quicker.

3. He is of a _____ mood; he never finishes what he starts.

4. Mercury is the metal which is liquid at room temperature and is better _____ quicksilver.

5. _____ Sinopec, 37 other companies have also been punished for water pollution.

6. The atmosphere _____ more than 70% of nitrogen.

Work in groups

Discuss with your group members about nomenclature of following organic substances and find out the common suffixes and prefixes.

Formula	System nomenclature	Formula	System nomenclature
CH ₄	methane	CH ₃ —	methyl
C ₂ H ₆	ethane	CH ₃ CH ₂ —	ethyl
C ₃ H ₈	propane	CH ₃ CH ₂ CH ₂ —	propyl
C ₄ H ₁₀	butane	CH ₃ OH	methanol
C ₅ H ₁₂	pentane	CH ₃ (CH ₂) ₃ CH ₂ —	pentyl
C ₆ H ₁₄	hexane	CH ₂ =CH ₂	ethylene
C ₇ H ₁₆	heptane	CH ₃ CH=CH ₂	propene
C ₈ H ₁₈	octane	CH ₃ CH ₂ CH ₂ CH=CH ₂	1-pentene
C ₉ H ₂₀	nonane	HC≡CH	ethyne
C ₁₀ H ₂₂	decane	CH ₃ C≡CH	propyne

Write the nomenclature of the following chemicals.

CH₄ _____
CH₃CH₂CH₂CH₃ _____
C₂H₅OH _____
C₆H₆ _____

Text C Properties of Aqueous Ammonia

Words and expressions

Ammonia is an important raw material for chemical industry and has a wide use in various industries. Therefore, the properties of ammonia are of importance.

Section 1 Physical and Chemical Properties

Appearance and Characters: Colorless liquid.

Melting Point (°C): -77.7

Relative Density (1 for water): 0.82/-79°C

Boiling Point (°C): -33.5

Relative Vapor Density (1 for air): 0.6

Saturated Vapor Pressure (kPa): 506.42/4.7°C

Combustion heat (kJ/mol): No data available.

Critical temperature (°C): 132.5

Critical pressure (MPa): 11.40

Logarithmic Value of Octanol/Water Distribution

Coefficient: No data available.

Flash Point (°C): No data available.

Ignition Point (°C): 651

Upper Limit of Explosion, % (V/V): 27.4

Lower Limit of Explosion, % (V/V): 15.7

Solubility: The product dissolves sodium compound, potassium compound, sulfur compound and phosphorus compound, inorganic chloride, bromide, sulfonated bodies, cyanide, nitrate, nitrite, organic amine compound, phenol, alcohol and aldehyde, etc. **Main Applications:** The product is mainly used to produce fertilizer, and can be used as fertilizer directly. In industry it is mainly used to produce dynamite, various chemical fibers and plastics. They can be used as refrigerant as well. It is widely used in wood paper pulp production, metallurgy, oil refining, rubber, leather manufacture and medicine, etc.

Section 2 Stability and Reactivity

Stability: Stable at ambient temperature.

aqueous ['ekwɪəs] adj. 水的
ammonia [ə'moniə] n. [无化] 氨

vapor ['veɪpə] n. 蒸气
saturate ['sætʃəreɪt] vt. 使饱和
combustion [kəm'bʌstʃən] n. 燃烧
critical ['krɪtɪkl] adj. 临界的
logarithmic [lɒgə'rɪðmɪk] adj. 对数的
distribution coefficient [物化] 分配系数
ignition [ɪg'nɪʃən] n. 燃烧
explosion [ɪk'splɒzən] n. 爆炸
solubility [ˌsɒljə'bɪləti] n. 溶解度
potassium [pə'tæsiəm] n. 钾
phosphorus ['fɒsfərəs] n. 磷
cyanide ['saɪə, naɪd] n. 氰化物
amine [ə'mɪn] n. [有化] 胺
phenol ['fɪnəl] n. 苯酚
aldehyde ['ældə, haɪd] n. 醛
fertilizer ['fɜːləɪzə] n. 肥料
dynamite ['daɪnə'maɪt] n. 炸药
fiber ['faɪbə] n. 纤维
refrigerant [rɪ'frɪdʒərənt] n. 制冷剂
pulp [pʌlp] n. 纸浆
metallurgy ['metələdʒɪ] n. 冶金
stability [stə'bɪləti] n. 稳定性