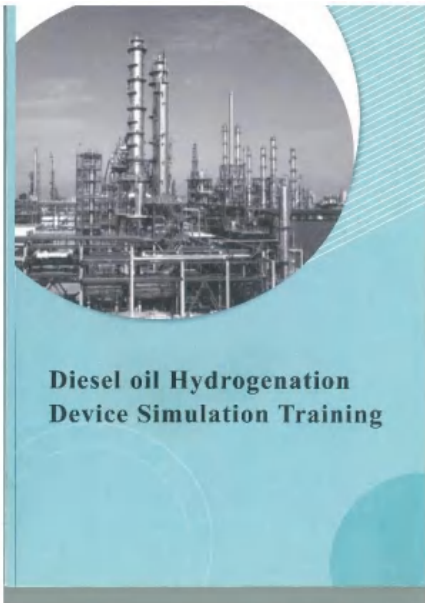


## 2. 基于多元化自主开发教学资源

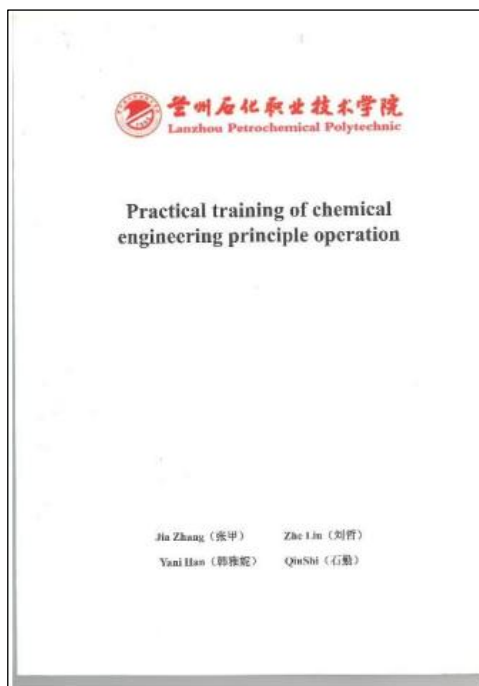
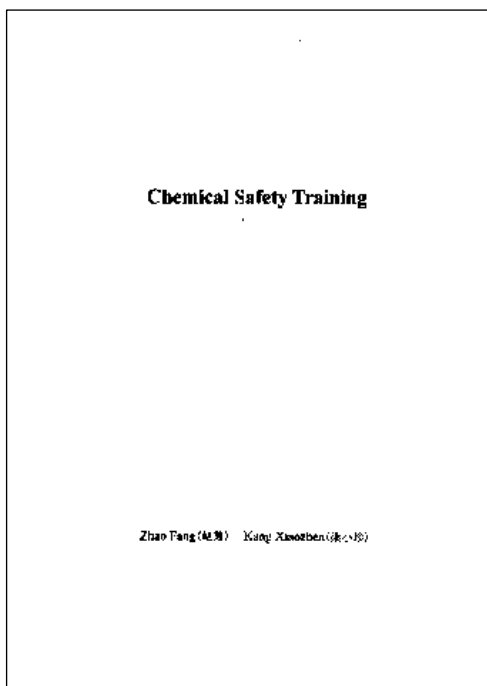
### 2.1 自编英文讲义

表 2 部分自编英文讲义

DCS 反应精馏及中试装置实训	柴油加氢半实物仿真实训
 <p><b>DCS Reaction Distillation and Pilot Plant Training</b></p>	 <p><b>DIESEL HYDROGEN PHYSICAL SIMULATION TRAINING</b></p>
柴油加氢装置仿真实训	常减压蒸馏仿真实训
 <p><b>Diesel oil Hydrogenation Device Simulation Training</b></p>	 <p><b>ATMOSPHERIC AND VACUUM DISTILLATION UNIT SIMULATION TRAINING</b></p>

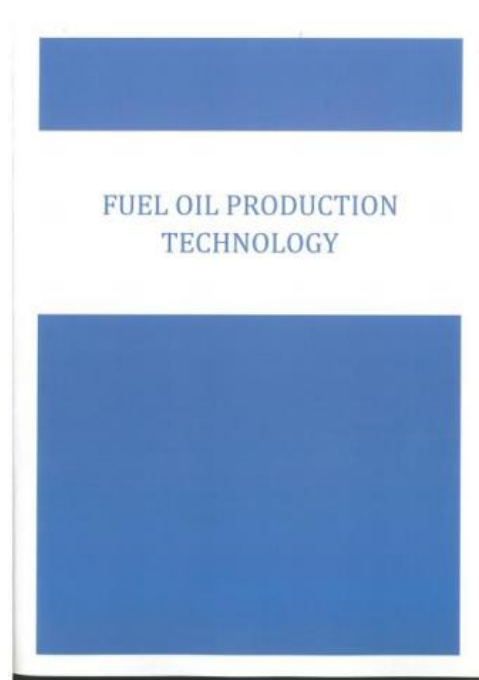
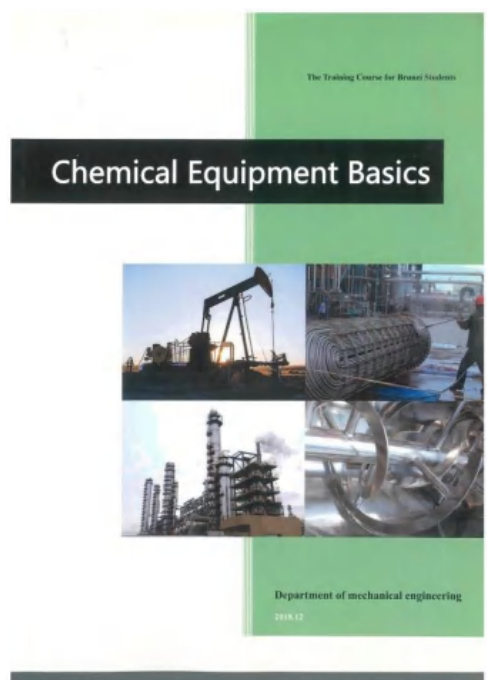
化工安全实训

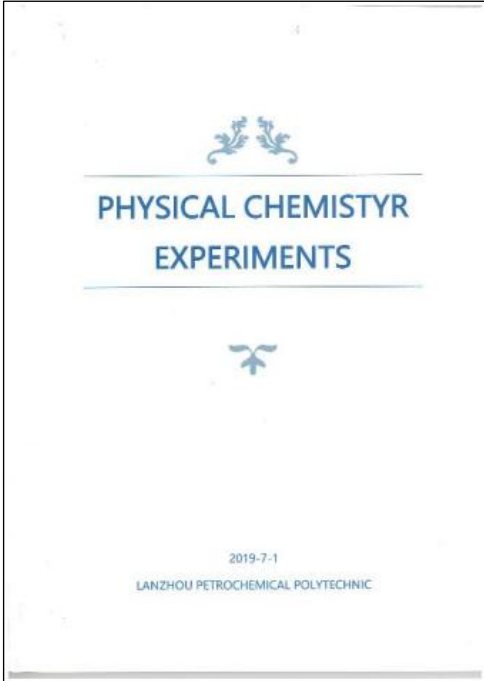
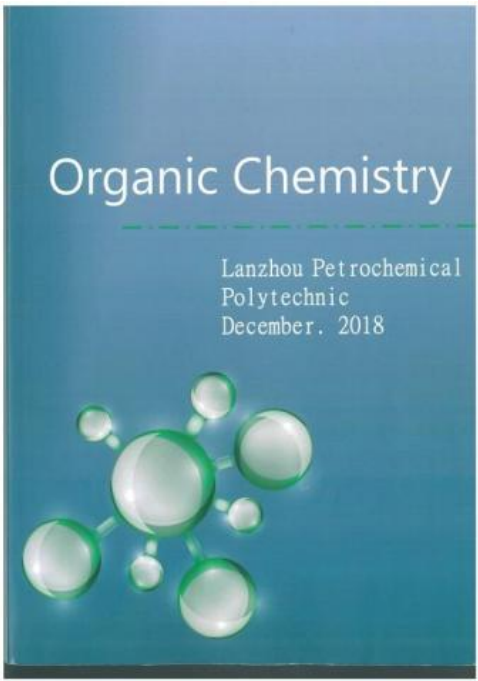
化工单元设备操作实训



化工设备基础

燃料油生产技术



物理化学	有机化学
	

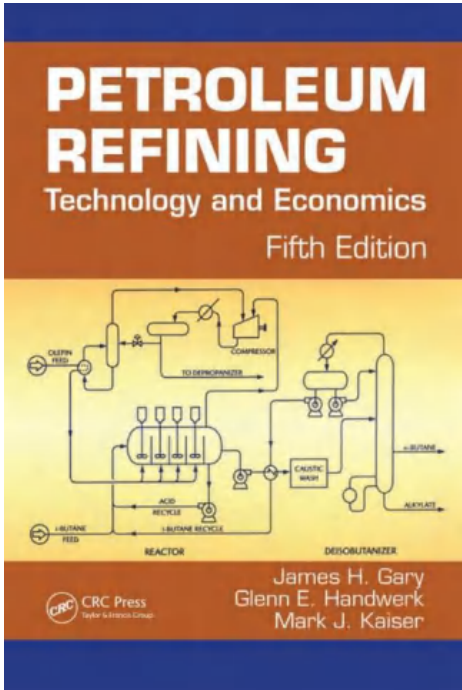
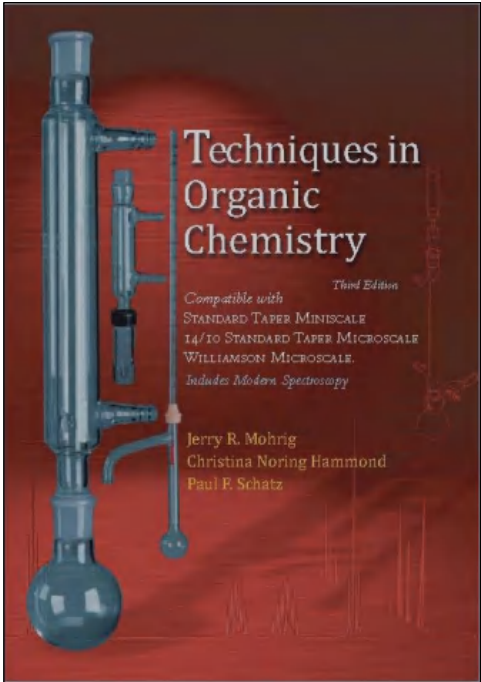
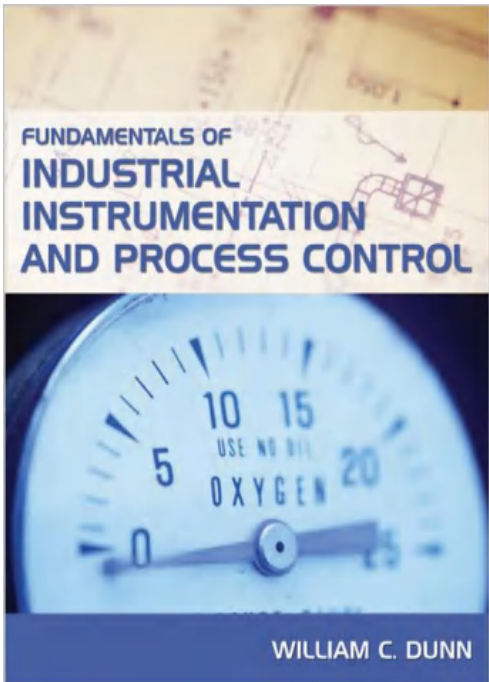

## 2.2 出版双语教材

表 3 出版双语教材

化学分析																																	
<div style="text-align: center;"> <p>高等职业教育教材</p> <p>Chemical Analysis</p> <h1>化学分析</h1> <p>(中英对照版)</p> <p>夏德强 主编</p> <p>毛建梅 夏海军 副主编</p> <table border="1" data-bbox="638 1691 965 1832"> <tr> <td>排版厂</td> <td colspan="2">汉魂</td> <td>22-0887</td> </tr> <tr> <td>排版软件</td> <td colspan="3">InDesign CS6</td> </tr> <tr> <td>文字页码</td> <td>8</td> <td>正前页码</td> <td>219</td> </tr> <tr> <td rowspan="3">总图数</td> <td></td> <td>线号数</td> <td></td> </tr> <tr> <td></td> <td>灰图</td> <td></td> </tr> <tr> <td></td> <td>替图换字</td> <td></td> </tr> <tr> <td>版心</td> <td>41行×42字</td> <td>正文颜色</td> <td>专C100M40Y0K0</td> </tr> <tr> <td>书号</td> <td>41787</td> <td>排版人员</td> <td>M</td> </tr> </table> <p>化学工业出版社 ·北京·</p> </div>				排版厂	汉魂		22-0887	排版软件	InDesign CS6			文字页码	8	正前页码	219	总图数		线号数			灰图			替图换字		版心	41行×42字	正文颜色	专C100M40Y0K0	书号	41787	排版人员	M
排版厂	汉魂		22-0887																														
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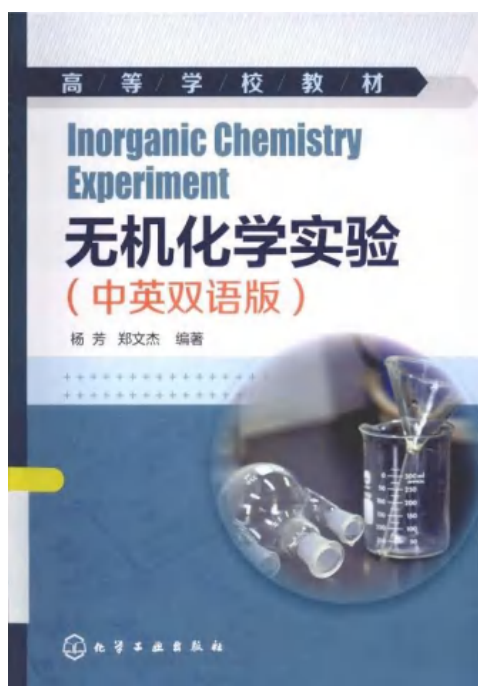
2.3 引进国外教材及双语教材

表 4 引进国外教材及双语教材

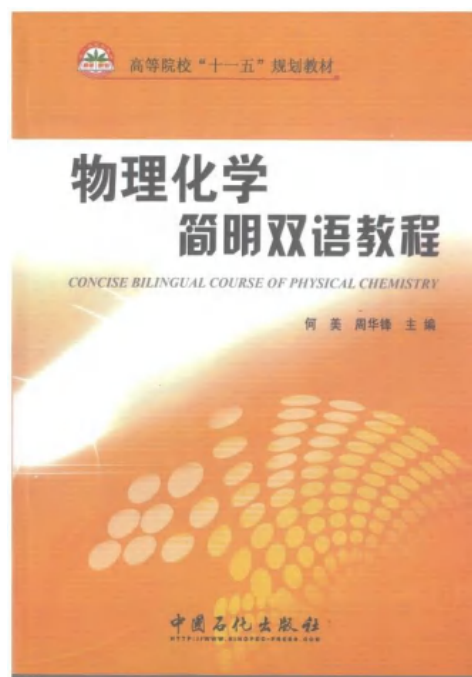
石油炼制技术	有机化学实验
	
工业仪表和过程控制	化学工程单元操作
	



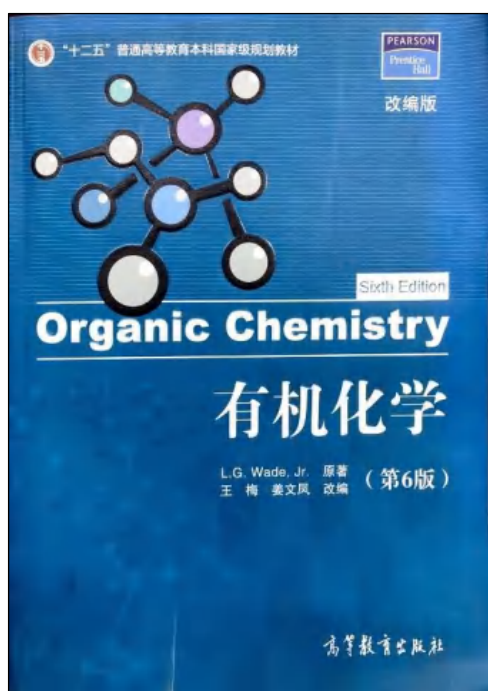
无机化学实验



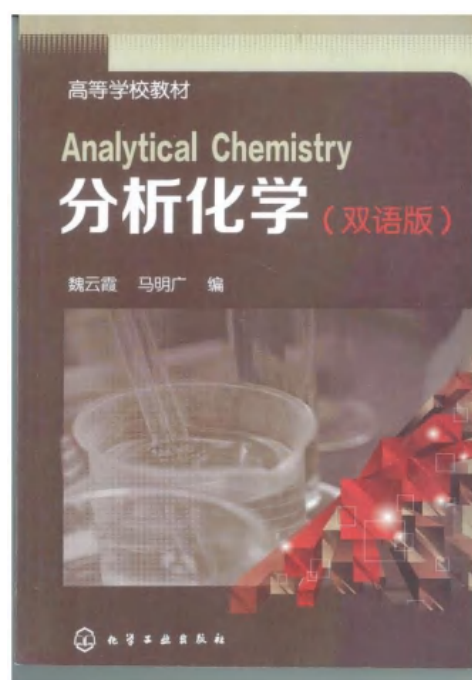
物理化学



有机化学


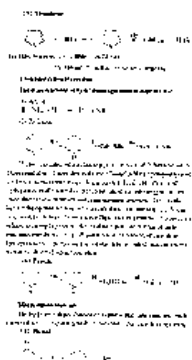


分析化学



2.4 教案

表 5 部分授课教案节选

DCS 反应精馏及中试装置实训		
<p>Lanzhou Petrochemical Polytechnic</p> <p><b>Teaching Plan</b> (The second term)</p> <p>Department: <u>College of Chemical Engineering</u> Course name: <u>DCS Reaction Distillation and Unit</u> Teacher's name: <u>Wang Hong</u></p>	<p>(New schedule of Lanzhou Petrochemical Polytechnic)</p> <p>Course Name: DCS Reaction Distillation and Pilot Plant Technology Instructor: Wang Hong Department: College of Chemical Engineering</p> <p>Teaching Objectives:</p> <p>1. Understand the principle of DCS control system.</p> <p>2. Master the operation and maintenance of DCS control system.</p> <p>3. Be able to analyze and troubleshoot DCS control system.</p> <p>Teaching Content:</p> <p>1. Introduction to DCS control system.</p> <p>2. Structure and components of DCS control system.</p> <p>3. Operation and maintenance of DCS control system.</p> <p>4. Troubleshooting of DCS control system.</p> <p>Teaching Methods:</p> <p>1. Lecture.</p> <p>2. Case study.</p> <p>3. Simulation.</p> <p>Teaching Time: 2 hours</p>	<p>兰州石化职业技术学院课程</p> <p>DCS Reaction Distillation System</p> <p>1. Introduction to DCS control system.</p> <p>2. Structure and components of DCS control system.</p> <p>3. Operation and maintenance of DCS control system.</p> <p>4. Troubleshooting of DCS control system.</p>  <p>1. Introduction to DCS control system.</p> <p>2. Structure and components of DCS control system.</p> <p>3. Operation and maintenance of DCS control system.</p> <p>4. Troubleshooting of DCS control system.</p>
催化裂化仿真实训教案		
<p>Lanzhou Petrochemical Polytechnic</p> <p><b>Teaching Plan</b> (The second term)</p> <p>Department: <u>College of Chemical Engineering</u> Course name: <u>Catalytic Cracking Simulation</u> Teacher's name: <u>Zhang Chen</u></p>	<p>1. Introduction to catalytic cracking simulation.</p> <p>2. Structure and components of catalytic cracking simulation.</p> <p>3. Operation and maintenance of catalytic cracking simulation.</p> <p>4. Troubleshooting of catalytic cracking simulation.</p> <p>5. Safety and health protection of catalytic cracking simulation.</p>	<p>1. Introduction to catalytic cracking simulation.</p> <p>2. Structure and components of catalytic cracking simulation.</p> <p>3. Operation and maintenance of catalytic cracking simulation.</p> <p>4. Troubleshooting of catalytic cracking simulation.</p> <p>5. Safety and health protection of catalytic cracking simulation.</p>
催化重整仿真实训		
<p>Lanzhou Petrochemical Polytechnic</p> <p><b>Teaching Plan</b> (The second term)</p> <p>Department: <u>College of Chemical Engineering</u> Course name: <u>Catalytic Reforming Simulation</u> Teacher's name: <u>Zhang Chen</u></p>	<p>1. Introduction to catalytic reforming simulation.</p> <p>2. Structure and components of catalytic reforming simulation.</p> <p>3. Operation and maintenance of catalytic reforming simulation.</p> <p>4. Troubleshooting of catalytic reforming simulation.</p> <p>5. Safety and health protection of catalytic reforming simulation.</p>	<p>1. Introduction to catalytic reforming simulation.</p> <p>2. Structure and components of catalytic reforming simulation.</p> <p>3. Operation and maintenance of catalytic reforming simulation.</p> <p>4. Troubleshooting of catalytic reforming simulation.</p> <p>5. Safety and health protection of catalytic reforming simulation.</p> 

## 分析化学实验

<p style="text-align: center;"><b>Lanzhou Petrochemical Polytechnic</b></p> <p style="text-align: center;"><b>Teaching Plan</b></p> <p>Department: <u>College of Petrochemical Engineering</u>          Course name: <u>Analytical Chemistry Experiments</u>          Teacher's name: <u>Wang Yanyan, Wang Shaojun</u></p>	<p style="text-align: center;"><b>Class schedule of Lanzhou Petrochemical Polytechnic</b></p> <p>Course Name: Analytical Chemistry Experiments          Course Code: 08010101          Credits: 2          Prerequisites: General Chemistry, Analytical Chemistry Theory</p> <p>Course Objectives:          1. Master the basic experimental skills and methods of analytical chemistry.          2. Understand the principles and applications of various analytical methods.          3. Develop the ability to design and conduct experiments.</p> <p>Course Content:          1. Gravimetric analysis          2. Volumetric analysis          3. Spectrophotometry          4. Instrumental analysis</p> <p>Teaching Methods:          Lecture, Demonstration, Experiment, Discussion</p> <p>Teaching Resources:          Textbook: Analytical Chemistry Experiments, Lanzhou Petrochemical Polytechnic Press</p>	<p style="text-align: center;"><b>实验目的</b></p> <p>1. 掌握重量法测定硫酸根含量的基本原理和实验操作。          2. 了解重量法测定硫酸根含量的影响因素及误差分析。          3. 培养学生严谨的科学态度和实事求是的工作作风。</p> <p style="text-align: center;"><b>实验原理</b></p> <p>硫酸根离子的测定通常采用重量法。其原理是在酸性溶液中，加入过量的氯化钡溶液，使硫酸根离子完全沉淀为硫酸钡。反应如下：  <math display="block">\text{SO}_4^{2-} + \text{Ba}^{2+} \rightarrow \text{BaSO}_4 \downarrow</math></p> <p>生成的硫酸钡沉淀经过滤、洗涤、干燥后称重。根据硫酸钡的分子量与硫酸根离子的分子量之比，计算出硫酸根离子的含量。</p> <p style="text-align: center;"><b>实验步骤</b></p> <p>1. 称取一定量的待测样品，溶于适量的水中。          2. 加入适量的盐酸，使溶液呈酸性。          3. 加入过量的氯化钡溶液，使硫酸根离子完全沉淀。          4. 静置片刻，使沉淀完全。          5. 过滤，并用蒸馏水洗涤沉淀。          6. 将沉淀连同滤纸放入烘箱中干燥。          7. 称量干燥后的硫酸钡沉淀。</p> <p style="text-align: center;"><b>实验结果与讨论</b></p> <p>根据称得的硫酸钡沉淀质量，计算出硫酸根离子的含量。实验结果应与理论值进行比较，分析误差产生的原因。</p>
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## 燃料油生产技术

<p style="text-align: center;"><b>Lanzhou Petrochemical Polytechnic</b></p> <p style="text-align: center;"><b>Teaching Plan</b> (The first term)</p> <p>Department: <u>College of Petrochemical Engineering</u>          Course name: <u>Fuel Oil Production Technology</u>          Teacher's name: <u>Ni Jie, Wang Shaojun</u></p>	<p style="text-align: center;"><b>兰州石化职业技术学院教案</b></p> <p style="text-align: center;">课题名称: <u>燃料油生产技术</u></p> <p>授课对象: <u>石油炼制专业</u></p> <p>授课时间: <u>第 1 学期</u></p> <p>授课地点: <u>理 201</u></p> <p>授课教师: <u>倪杰</u></p> <p>授课学时: <u>2 学时</u></p> <p>授课日期: <u>2018 年 9 月 10 日</u></p> <p style="text-align: center;"><b>教学目标</b></p> <p>1. 了解燃料油的生产工艺流程。          2. 掌握燃料油的质量指标及检测方法。          3. 了解燃料油的应用及环保要求。</p> <p style="text-align: center;"><b>教学重点</b></p> <p>燃料油的生产工艺流程。</p> <p style="text-align: center;"><b>教学难点</b></p> <p>燃料油的质量指标及检测方法。</p> <p style="text-align: center;"><b>教学方法</b></p> <p>讲授法、讨论法、案例分析法。</p> <p style="text-align: center;"><b>教学准备</b></p> <p>多媒体课件、教学视频、实验报告。</p>
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## 石油产品分析实训

<p style="text-align: center;"><b>Lanzhou Petrochemical Polytechnic</b></p> <p style="text-align: center;"><b>Teaching Plan</b></p> <p>Department: <u>College of Petrochemical Engineering</u>          Course name: <u>Petroleum Products Analysis</u>          Teacher's name: <u>Wang Yanyan, Wang Shaojun</u></p>	<p style="text-align: center;"><b>实训目的</b></p> <p>1. 掌握石油产品分析的基本原理和实验操作。          2. 了解石油产品分析的影响因素及误差分析。          3. 培养学生严谨的科学态度和实事求是的工作作风。</p> <p style="text-align: center;"><b>实训原理</b></p> <p>石油产品分析通常采用物理化学方法。其原理是根据石油产品的物理化学性质，通过测定其物理化学指标，来判断石油产品的质量和组成。</p> <p style="text-align: center;"><b>实训步骤</b></p> <p>1. 称取一定量的待测样品，溶于适量的溶剂中。          2. 加入适量的试剂，使待测成分发生反应。          3. 静置片刻，使反应完全。          4. 过滤，并用蒸馏水洗涤沉淀。          5. 将沉淀连同滤纸放入烘箱中干燥。          6. 称量干燥后的沉淀。</p> <p style="text-align: center;"><b>实训结果与讨论</b></p> <p>根据称得的沉淀质量，计算出待测成分的含量。实训结果应与理论值进行比较，分析误差产生的原因。</p>	<p style="text-align: center;"><b>一、石油产品分析实训</b></p> <p style="text-align: center;"><b>1. 石油产品分析实训目的</b></p> <p>1. 掌握石油产品分析的基本原理和实验操作。          2. 了解石油产品分析的影响因素及误差分析。          3. 培养学生严谨的科学态度和实事求是的工作作风。</p> <p style="text-align: center;"><b>2. 石油产品分析实训原理</b></p> <p>石油产品分析通常采用物理化学方法。其原理是根据石油产品的物理化学性质，通过测定其物理化学指标，来判断石油产品的质量和组成。</p> <p style="text-align: center;"><b>3. 石油产品分析实训步骤</b></p> <p>1. 称取一定量的待测样品，溶于适量的溶剂中。          2. 加入适量的试剂，使待测成分发生反应。          3. 静置片刻，使反应完全。          4. 过滤，并用蒸馏水洗涤沉淀。          5. 将沉淀连同滤纸放入烘箱中干燥。          6. 称量干燥后的沉淀。</p> <p style="text-align: center;"><b>4. 石油产品分析实训结果与讨论</b></p> <p>根据称得的沉淀质量，计算出待测成分的含量。实训结果应与理论值进行比较，分析误差产生的原因。</p>
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## 石油及产品概论

Lanzhou Petrochemical Polytechnic

### Teaching Plan

(The first term)

Department: College of Petrochemical Engineering  
 Course name: Introduction to Oil & Products  
 Teacher's name: Guang Hailiang, Tian Jie

## 无机化学实验

**Lanzhou Petrochemical  
Technical College**

### Teaching Plan

(The first term)

Department: College of Petrochemical Engineering  
 Course name: Experiment of inorganic chemistry  
 Teacher's name: Wang Wang, Xue Zhen

Lanzhou Petrochemical Polytechnic

Department of Petrochemical Engineering

Experiment of Inorganic Chemistry

(The first term)

Department: College of Petrochemical Engineering  
 Course name: Experiment of inorganic chemistry  
 Teacher's name: Wang Wang, Xue Zhen

兰州石化职业技术学院备课纸

Department 2 Preparation of Calcium Oxide

Experiment 1  
 1. To understand the chemical properties of peroxide of barium  
 2. To understand the chemical properties of peroxide of calcium

Experiment 2  
 1. To understand the chemical properties of peroxide of calcium hydroxide

2017-2018-1-10  
2017-10-10

## 原油蒸馏装置实训

Lanzhou Petrochemical Polytechnic

### Teaching Plan

(The first term)

Department: College of Petrochemical Engineering  
 Course name: Grade 2013 Distillation Unit Training  
 Teacher's name: Su Ruoshang, Ma Ya

Lanzhou Petrochemical Polytechnic

Department of Petrochemical Engineering

Grade 2013 Distillation Unit Training

(The first term)

Department: College of Petrochemical Engineering  
 Course name: Grade 2013 Distillation Unit Training  
 Teacher's name: Su Ruoshang, Ma Ya

兰州石化职业技术学院备课纸

Preparation of Acetylene and Acetylene Oxide

Experiment 1  
 1. To understand the chemical properties of acetylene  
 2. To understand the chemical properties of acetylene oxide



2.5 课件

表6 部分多媒体课件节选

### 燃料油生产技术

**Atmospheric and Vacuum Crude Distillation**  
Xie Lin

The production of early distillates was made by cascading the crude oil through successive stills, each operating at successively higher temperatures.

Early continuous pipestill schematic

**Introduction of crude oil distillation**

- Distillation is the separation of crude oil in atmospheric and vacuum distillation columns into groups of hydrocarbon compounds based on molecular size and boiling-point ranges.

**Desalting crude oil**

Existence form of salt

- dissolved
- suspended salt crystals

### 身边的化学

**The guarantee of baby's quiet sleep**  
— The secret of Diapers

College of Petrochemical Engineering  
Xinjie Zhang

**1 The development of diaper**

Improved style, gradually applied to life, widely used

Children, the elderly, including pets, have corresponding diapers or tablet products

In the 1980s, Tang Xinyuan, a Chinese, improved his spacesuit and invented a kind of super absorbent diaper

尿不湿

The three astronauts also used special diapers

**1 Where does formaldehyde in life come from? 生活中的甲醛来自哪里**

Artificial plate (人造板材): 本类板面家具使用的黏合剂、大芯板、中密度纤维板、细木工板等

Paint wallpaper (涂料墙纸): 黏结剂、腻子、腻子粉、腻子膏等

Tail gas and smoke (尾气烟雾): 汽车尾气、尾气、工业废气

Decorative accessories (装修辅料): 粘合剂、防腐剂、油漆、保温材料等

Textile category (纺织品类): 化纤纤维、窗帘、印花布料

articles for daily use (生活用品): 化妆品、防晒霜、杀虫剂、清洁剂、玻璃清洁剂、洗发水等

foodstuff (食品): 含有防腐剂、漂白剂、膨化剂、豆制品等

**二、海水淡化技术**

多效蒸发器法

Heat transfer fluid

Heat exchanger & steam generator

Distillation

Multi-effect distillation

Sea water

Distillate

Brine

Power for factory

Reverse osmosis

Sea water

Distillate

## 危险化学品安全



兰州石化职业技术大学

### Safety of Hazardous Chemicals

Explainer: Lishong Jiao, Xiangang Wang

College of Petroleum Chemical Engineering

#### 1. Introduction

1.1 Introduction to the course

1.1 Political Education



**What is the Chinese Dream?**


The core goal of the "Chinese Dream" can also be summarized as the goal of "two hundred years", that is, by the 20th anniversary of the founding of the Communist Party of China in 2021 and the 100th anniversary of the founding of the People's Republic of China in 2049, the Chinese nation will gradually and eventually be realized Great revival.

The concrete manifestations are **the prosperity of the country, the rejuvenation of the nation, and the happiness of the people**.

The way to achieve this is to follow **the path of socialism with Chinese characteristics**, adhere to the theoretical system of socialism with Chinese characteristics, carry forward the national spirit, and consolidate Chinese power.

The means of implementation is the five-in-one construction of **solidity economy, culture, society, and ecological civilization**.

## 无机化学



### Inorganic chemistry

Teacher: Xiayajun

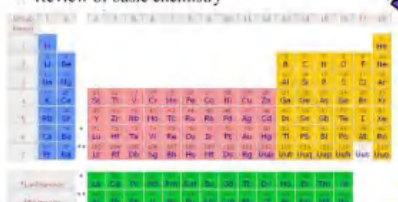
#### Chapter 1 General knowledge

\* History of inorganic chemistry

Early stage:  
1<sup>st</sup> AD: Alchemists were active in China, Egypt, and other centers of civilization early;  
1150 AD: Gunpowder was used in Chinese fireworks;  
17<sup>th</sup> century: the common strong acids ( nitric, sulfuric, and hydrochloric) were known, and more systematic descriptions of common salts;

#### Chapter 1 General knowledge

\* Review of basic chemistry



#### Chapter 1 General knowledge

\* Review of basic chemistry

Some common chemical parameters


(2) the amount of substance

It is often convenient to use the mole to describe the amount of substance which represents for n and in unit of mole.

$$n = \frac{N}{N_A}$$

N is the number of molecules,  $N_A$  is Avogadro constant, which is the number of molecules per mole. the value of  $N_A$  is  $6.02 \times 10^{23} \text{ mol}^{-1}$ .

## 物理化学



### Physical Chemistry

#### Chapter 1 Introduction

Anqi Wang & Xinjie Zhang

#### 0. Basic concepts

##### Systems

**(a) An open system:** can exchange matter and energy with its surroundings.

**(b) A closed system:** can exchange energy with its surroundings, but it cannot exchange matter.

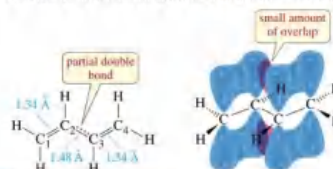
**(c) An isolated system:** can exchange neither energy nor matter with its surroundings.

Organic Chemistry  
Chapter 4  
Conjugated Systems and  
Orbital Symmetry

HONG TIAN  
Lanzhou Petrochemical Polytechnic  
December, 2018

Structure of 1,3-Butadiene

- Most stable conformation is planar.
- Single bond is shorter than 1.54 Å.
- Electrons are delocalized over molecule.



ORGANIC CHEMISTRY

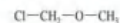
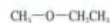
Chapter 9 Ethers, Epoxides

Man LiLi

9-1-2 IUPAC Names

IUPAC names use the more complex alkyl group as the root name, and the rest of the ether as an alkoxy group.

Examples:



IUPAC name: methoxyethane

methoxybenzene

chloromethoxymethane

common name: ethyl methyl ether

methyl phenyl ether,  
or anisole

chloromethyl methyl ether

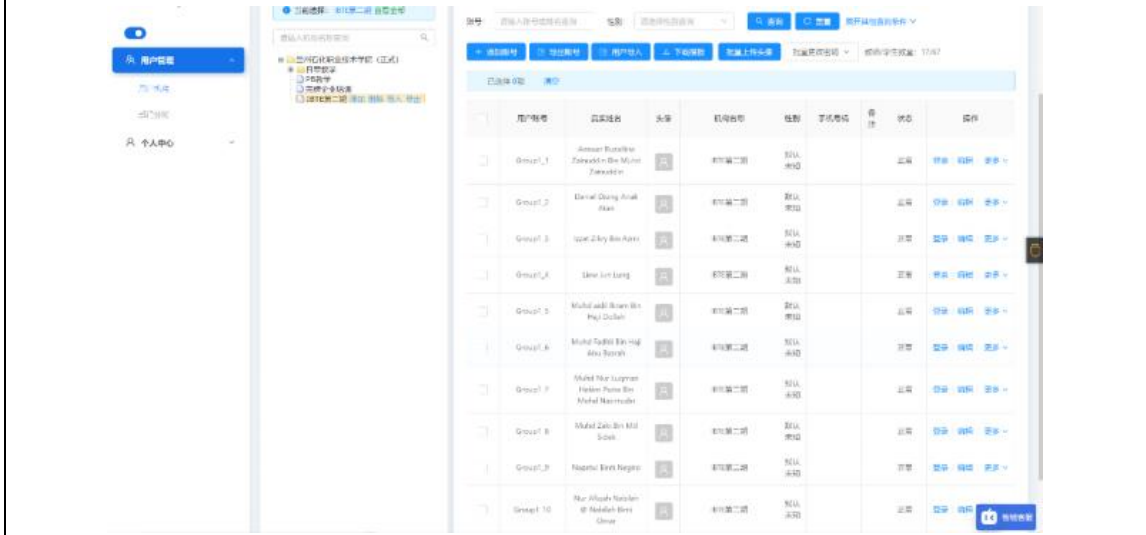
2.6 虚拟仿真

表 7 虚拟仿真资源

国家级石油化工过程虚拟仿真中心

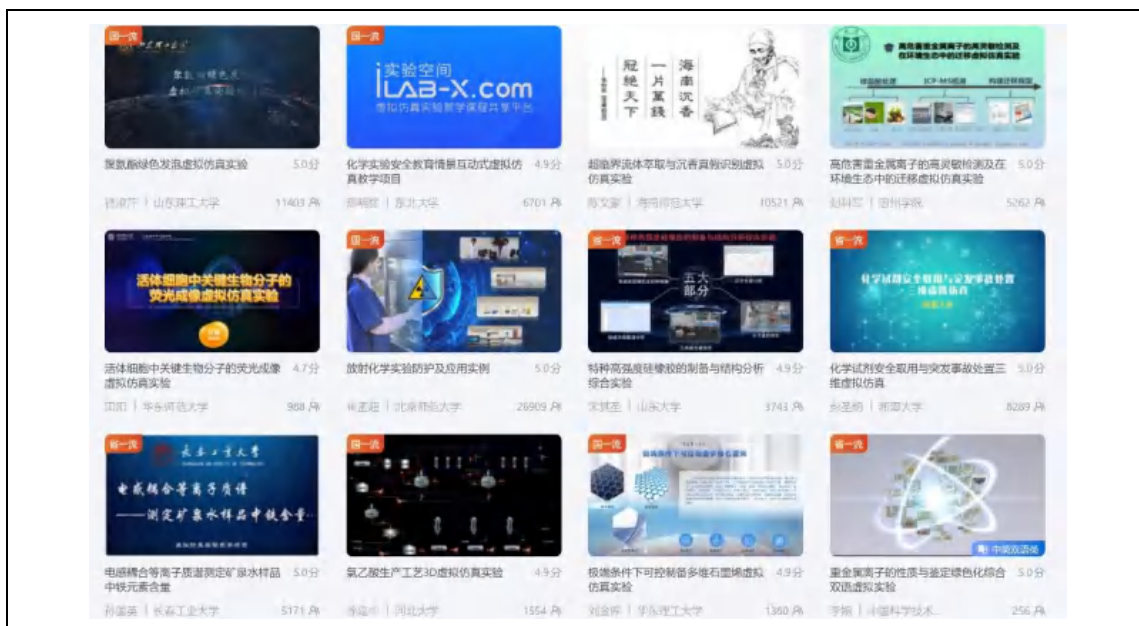
兰州石化职业技术大学——石油化工过程虚拟仿真中心



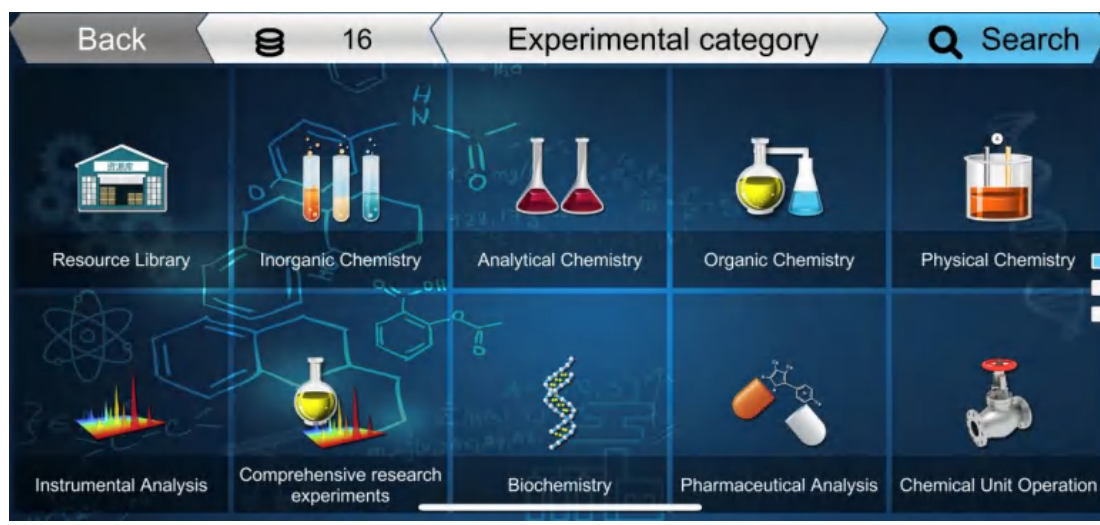


国家虚拟仿真实验平台

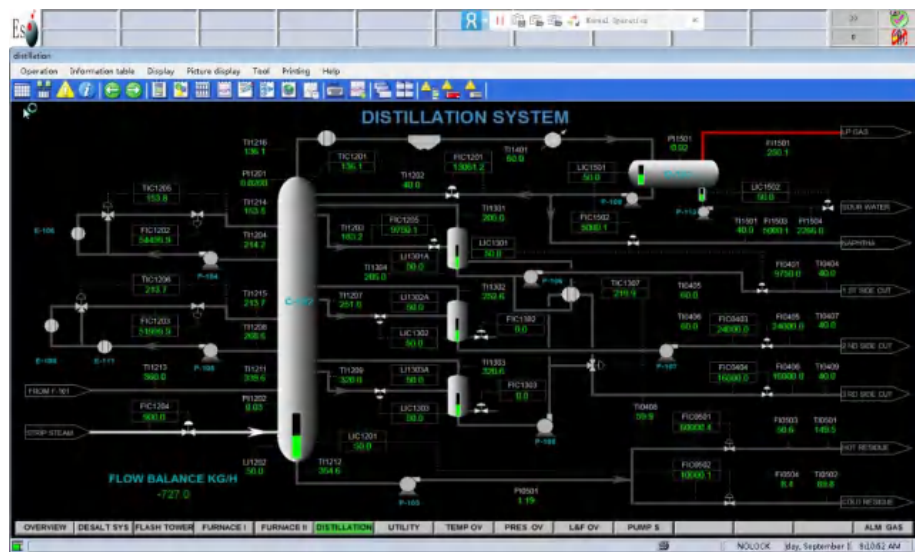
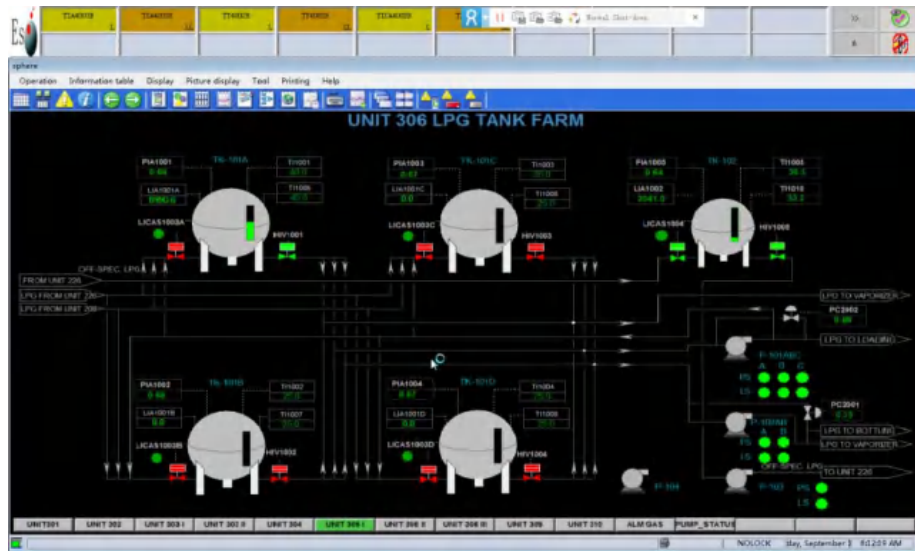
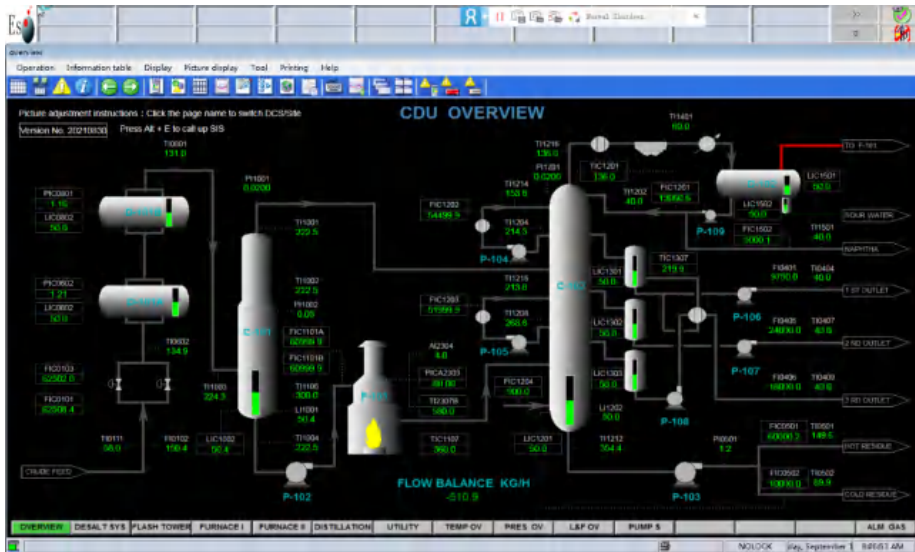




### 移动虚拟实验室



# 炼油装置虚拟仿真





## 2.7 数字化课程资源

表 8 数字化课程资源

数字化课程资源建设					
24门课程数字资源建设明细					
总牵头单位(乙方) 兰州石化职业技术学院					
序号	课程名称	承担单位	项目负责人	类型	计划交付时间
1	有机化学(补充)	石化学院	索晓宁	在线题库	2018.3.30
2	石化原料生产技术(补充)	石化学院	周艳青	在线课程	2018.3.30
3	石油化工生产技术(补充)	石化学院	赵立祥	在线课程	2018.3.30
4	高聚物生产技术(补充)	石化学院	石星丽	在线课程	2018.3.30
5	有机化学(补充)	石化学院	田红	在线课程	2018.3.30
6	物理化学(补充)	石化学院	王安琪	在线课程	2018.3.30
7	煤化学(补充)	应化学院	赵宏林	在线课程	2018.3.30
8	煤化工生产技术(补充)	应化学院	侯侠	在线课程	2018.3.30
9	化工反应原理及设备(补充)	应化学院	王雪香	在线课程	2018.3.30
10	化工安全技术(补充)	应化学院	王宏	在线课程	2018.3.30
11	有机化工生产技术(补充)	应化学院	王焕梅	在线课程	2018.3.30
12	化工机器(补充)	机械学院	顿明	在线课程	2018.3.30
13	石油化工生产技术	石化学院	李薇	在线题库	2018.3.30
14	高聚物生产技术	石化学院	罗资琴	在线题库	2018.3.30
15	化学分析	石化学院	冷宝林	在线题库	2018.3.30
16	化工制图	机械学院	刘立平	在线题库	2018.3.30
17	汽车底盘构造与维修	汽车学院	郑劲	在线题库	2018.3.30
18	化工设备基础	机械学院	赵忠宪	在线课程	2018.11.30
19	密封技术及应用	机械学院	吴笛	在线课程	2018.11.30
20	化工腐蚀与防护	机械学院	史立军	在线课程	2018.11.30
21	石化基础	石化学院	李薇	在线课程	2018.11.30
22	水污染控制技术	石化学院	夏德强	在线课程	2018.11.30
23	计算机基础	教务处	宋贤钧	在线课程	2018.11.30
24	语文	马克思学院	谷荣	在线课程	2018.11.30

**石油化工生产技术** 李薇

课程章节

- 1 石油炼制
- 1.1 石油炼制原料的生产
- 1.2 石油炼制原料的储运
- 1.3 石油炼制原料的净化
- 1.4 石油炼制原料的工艺技术
- 1.5 石油炼制原料的储运
- 1.6 石油炼制原料的储运
- 1.7 石油炼制原料的储运

**石化原料生产技术** 冯文娟

课程章节

- 1 第一单元石油及其产品的性质
- 1.1 石油及其产品的组成
- 1.2 石油产品的分类和用途
- 1.3 石油产品的储运

**化工工艺实训** 冯文娟

课程章节

- 1 化工生产概述及化工生产安全管理
- 1.1 化工生产特点
- 1.2 化工生产安全管理
- 2 乙烯裂解生产装置
- 2.1 裂解炉的构造
- 2.2 裂解炉的调试
- 2.3 裂解炉的运行操作
- 2.4 分离系统的运行操作
- 2.5 在线仿真平台

**高分子合成与加工综合实训**

课程章节

- 1 高分子合成实训安全与防护
- 1.1 高分子合成实训安全与防护
- 1.2 高分子合成实训安全与防护
- 1.3 高分子合成实训安全与防护
- 1.4 高分子合成实训安全与防护
- 1.5 高分子合成实训安全与防护