T.Y.B.Sc. Applied Component
Choice Based Credit System

SEMESTER V

PETROCHEMCALS

COURSE CODE: USACPET501 CREDITS: 02 LECTURES: 60

Unit-I

.1 The Chemistry of Petroleum Kingdom. (2L)

1.1.1 Compounds of Straight Run Gasolines.

1.1.2 Kerosene and Gas Oil Fractions.

1.1.3 Non-hydrocarbon Constituents

1.2 PETROLEUM EXPLORATION & PRODUCTION. (7L)

1.2.1 Introduction

1.2.2 Formation of Oil and Gas

1.2.3 Characteristics of crude oils

1.2.4 Oils & Gas Exploration

1.2.5 Drilling for Oil and Gas

1.2.6 Production of Crude oil and Natural gas

1.3 Petroleum Products (6L)

1.3.1 Liquified Petroleum Gases (Composition, properties, extraction & Uses.)

1.3.2 Naphthas (Composition, Manufacture, properties & Uses.)

1.3.3 Kerosene (Composition, properties, extraction & Uses.)

1.3.4 Diesel Fuel (Composition, Properties & Uses)

Unit-II

2.1 INORGANIC CHEMICALS FROM PETROLEUM. (6L)

2.1.1 Sulphur byproducts

2.1.2 Hydrogen

2.1.3 Petroleum coke

2.1`4 Nitrogen compounds

2.2 REFINERY PROCESSES AND PRODUCTS.

2.2.1 Chemical Composition **(2L)**

2.2.2 Distillation – separation based on relative volatilities – fractions obtained with flow sheet diagrams**.** **(2L)**

2.2.3Conditions of conversion processes (catalyst, temperature, pressure etc.) Mentioned below

–Pyrolysis, Catalytic cracking and hydrocracking, Isomerization, Alkylation, Reforming **(5L)**

Unit-III

3. PREPARTION OF PETROCHEMICALS

3.1 From Propylene: **(3L)**

Isopropanol, cumene, glycerin, and acrylonitrile

3.2 From acetylene: **(4L)**

Vinyl chloride, Chloroprene, acrylonitrile and acetaldehyde

3.3 From C4 – hydrocarbons : **(3L)**

Butadiene, isobutene and butane

3.4 From aromatic hydrocarbon: **(5L)**

Aniline, chlorobenzene ,D.D.T, Xylene,

Unit-IV

4. Alternative sources for Fuels

4.1 Natural Gas (CNG) **(3L)**

4.2 Propane, Hydrogen & Alcohols **(5L)**

4.3 Biofuels **(3L)**

4.4 Other Fuels **(2L)**

4.5 Wind and solar Energy **(2L)**

PRACTICALS

SEMESTER V

PETROCHEMICALS

COURSE CODE: USACPET5P1 **CREDITS: 02**

I- APPLIED Experiments:

- Determination of Specific gravity and viscosity of Oil
- To check the quality of Petrol
- To check the quality of Diesel

II-Experiments (Demonstration):

i) Cloud point

ii) Pour point

iii) Aniline point

III–Preparations:

1. Nitrobenzene to Dinitrobenzene.
2. Hydroquinone to Benzoquinone
3. Succinic acid into Succinic anhydride (Sublimation method)

SEMESTER VI

PETROCHEMICALS

COURSE CODE: USACHFC601 CREDITS: 02 LECTURES: 60

Unit-I

1.1 Chemicals from C_3, C_4 and Higher Alkanes

1.1.1 Products from Propane **(5L)**

1.1.2 Chemicals from Propylene**.**

1.1.3 Derivatives of hydrocarbons Higher than Butanes.

1.2. General study of the following reactions used in petrochemical industry (10L)

1. 2.1 Oxidation
1. 2.2 Ammoxidation
1. 2.3 Hydroformylation (oxo reaction)
1. 2.4 Hydration of olefins
1. 2.5 Chlorination

1.2.6 Polymerization (free radical and ionic)

Unit-II

2.1 Sources of higher olefins and aromatic hydrocarbons secondary materials from petrochemicals with flow sheet diagrams. **(5L)**

2.2. UNIT OPERATIONS (10L)

2.2.1 Extraction

2.2.2 Filtration

2.2.3 Crystallization

2.2.4 Drying
2.2.5 Evaporation
2.2.6 Cooling

Unit-III

3.1 INDUSTRIAL CHEMICALS (7L)

3.1.1 Plastic: polyvinyl chloride, polystyrene.
3.1.2 Synthetic elastomers- styrene, Butadiene rubber, polychloroprene, nitrile rubber.

3.2 SYNTHETIC DETERGENTS (8L)

3.2.1 Introduction of Soap and Detergents
3.2.2 Classification of detergents
3.2.3 Surface active agents
3.2.4 Wetting agents
3.2.5 Emulsifying agents
3.2.6 Preparation of Dodecyl Benzene sulphate.
3.2.7 Finishing of Detergents

Unit-IV

Environmental pollution control in petroleum refineries

4.1 Air pollution (6L)

4.1.1 Introduction
4.1.2 Air Pollutants from refining operation
4.1.3 Air Pollution control technique

4.2 Water Pollution (6L)

4.2.1 Introduction of water pollution
4.2.2 Types of water pollution
4.2.3 Control of water pollution in petroleum refining.
4.2.4 Study of various parameters of polluted water.

4.3 Land Pollution (2L)

4.4 Carbon Credit (1L)

PRACTICALS

SEMESTER VI

PETROCHEMICALS

COURSE CODE: USACHFC6P1 **CREDITS: 02**

I- Experiments

1. Determination of acid number of an oil.
2. Determination of acidity and alkalinity of given hydrocarbon
3. Estimation of Formaldehyde from given formalin sample

II- Applied Experiments (Demonstration): -

i) Flash /fire point

ii) Calorific value of a fuel

iii) Steam Distillation

III – Preparations:

i) Benzoylation of β-naphthol

ii) Phthalic anhydride to phthalimide

iii) Cinnamic acid to dibromo cinnamic acid

IV- Industrial visit: Industrial visit report is to be incorporated in the journal

References:

1. Advanced Petroleum Refining, G. N. Sarkar
2. Petroleum Refining Technology, Dr. Ram Prasad
3. Petroleum Industries Technology and Process, Chhitta Ranjan Lahiri, Dipa Biswas.
4. A Text Book on Petro Chemicals, Dr. B. K. Bhaskararao.
5. A. I. Vogel: Text book of Quantitative Analysis including Instrumental Analysis.
6. A. I. Vogel: Text book of Quantitative Organic Analysis.
7. Advanced Practical Organic Chemistry 3rd Edition,N.K.Vishnoi,Vikas Publication,
8. Practical Organic Chemistry by Mann and Saunders.
9. Vogel's Textbook of Quantitative Chemical Analysis 5th Edition
10. Vogel's Qualitative Inorganic Analysis 5th Edition