— University of Mosul —
College of Petroleum & Mining Engineering

Title of the lecture

Lecture Four

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3. Refinery Configuration

The refinery configuration can range from single topping for crude distillation to high conversion refinery for petro-refinery. This will depend on the factors indicated in the following sections

3. Refinery Configuration

3.1. Type of Products

In this case, refining is carried out by increasing the hydrogen/carbon (H/C) ratio. This can be achieved either by hydrogenation processes such as hydrotreating, hydrocracking or by carbon rejection processes such as thermal cracking (coking) and FCC. The products of such processes are shown in Fig. 1.2 (Speight, 1999). Some products can also be produced by special refining operations, like in catalytic reforming, isomerization and alkylation. In Figure 1.2, the products are classified in terms of average carbon number and H/C ratios.

3. Refinery Configuration

3.2. Environmental Regulation

Modern regulations in many countries require a low level of contaminants like sulphur. This requires the change of severity or design of hydroconversion units which can produce ultra low sulphur products. Clean fuels are gaining great interest, and completely new refinery configurations are now being introduced to produce clean fuels from new refinery feeds and configurations. Additional units have been added to existing refineries to handle untreated gas emissions and refinery waste water due to changes in environmental regulations.

3. Refinery Configuration

3.3. Crude Assay and Quality

Crude quality is getting heavier worldwide. Existing refineries, which are designed to handle normal crudes are being modified to handle heavy crude. New technology for upgrading is used to obtain clean and light products from lower cost feeds. The crude assay will determine the yields of different cuts and consequently, the refinery configuration.

3. Refinery Configuration

3.4. Refinery-petrochemical Integration

The growth of the petrochemical industry has put pressure on refineries to either change their configuration or operating conditions to produce more aromatics and gases. FCC has been developed to petro-FCC which produces high yield of gases. The phasing out of the idea of increasing the octane number by increasing aromatic content has changed the role of the catalytic reformer to produce a high yield of aromatics as BTX feedstock. The addition of gasification units to process vacuum residue has opened the way for the addition of a variety of petrochemicals.

3. Refinery Configuration

3.5. Development of New Technology

If a new technology is developed to give better yields, save energy, meet environmental regulations and product specifications, then this technology might replace old technology in existing and new refineries, depending on the economics. Other factors, which might influence the refinery configuration, are feedstock availability, product markets and a company's strategic objectives.