

Downstream

Refining Operations *Upgrading Processes*

CATALYTIC REFORMING

- ✓ **Octane** rating is a key measurement of how well a **gasoline** performs in an automobile engine.
- ✓ Much of the gasoline that comes from the Crude Units or from the Cracking Units does not have enough octane to burn well in cars.
- ✓ The gasoline process streams in the refinery that have a fairly low octane rating are sent to a **Reforming Unit** where their octane levels are boosted. Catalytic reformatate furnishes approximately 40% of the blending components to produce gasoline.
- ✓ Cat reforming is a primary source for benzene, toluene and xylenes(BTX).

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ISOMERIZATION

- ✓ In chemistry isomerisation is the process by which one molecule is transformation into another molecule which has exactly the same atoms, but wherein these atoms are rearranged

e.g. A-B-C → B-A-C

(these related molecules are known as isomers)

- ✓ Isomerization converts straight-chain paraffins n-pentane and n-hexane into their respective branched-chain isoparaffins having of substantially higher octane number.

n-pentane (RON **62**) ⇒ iso-pentane (RON **92**)

n-hexanes (RON **25**)⇒ iso-hexanes (RON **75**)

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ALKYLATION

- ✓ The Alkylation process in petroleum refining combines low-molecular-weight olefins (primarily a mixture of propylene and butylenes) with isobutane in the presence of a catalyst, either sulfuric acid (H₂SO₄) or hydrofluoric acid (HF).
- ✓ The product (alkylate) is composed of a mixture of high-octane, branched-chain paraffinic hydrocarbons.
- ✓ Alkylate is a premium blending stock (RON up to 98). The octane number of the alkylate depends on kind of olefins used and on operating conditions.

Example

