

1998 Worldwide Refining Survey

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Survey Editor

All figures in barrels per calendar day

All figures are
as of 1-1-99

LEGEND

Numbers identify processes in table

Coking

1. Fluid coking
2. Delayed coking
3. Other

Thermal Processes

1. Thermal cracking
2. Visbreaking

Catalytic Cracking

1. Fluid
2. Other

Catalytic Reforming

1. Semiregenerative

2. Cyclic
3. Continuous regen.
4. Other

Catalytic Hydrocracking

1. Distillate upgrading
2. Residual upgrading
3. Lube oil manufacturing
4. Other
- c. Conventional (high-pressure) hydrocracking: (>100 barg or 1,450 psig)
- m. Mild to moderate hydrocracking (<100 barg or 1,450 psig)

Catalytic Hydrotreating

1. Residual desulfurization
2. Heavy gas oil desulfurization
3. Catalytic cracker and cycle stock treatment
4. Mid distillate
5. Other

Catalytic Hydrotreating

1. Pretreating cat reformer feeds
2. Naphtha desulfurizing
3. Naphtha olefin or aromatics saturation
4. Straight-run distillate
5. Pretreating cat cracker feeds

6. Other distillates
7. Lube oil "polishing"
8. Other

Alkylation

1. Sulfuric acid
2. Hydrofluoric acid

Polymerization/Dimerization

1. Polymerization
2. Dimerization

Aromatics

1. BTX
2. Hydrodealkylation

3. Cyclohexane
4. Cumene

Isomerization

1. C₄ feed
2. C₅ feed
3. C₅ and C₆ feed

Oxygenates

1. MTBE
2. ETBE
3. TAME
4. Other

Hydrogen

- Production:
1. Steam methane reforming
 2. Steam naphtha reforming
 3. Partial oxidation
- a. Third-party plant
- Recovery:
4. Pressure swing adsorption
 5. Cryogenic
 6. Membrane
 7. Other

FOOTNOTES

- A Previously listed as Sonatrach.
- B Flexicoking.
- C Dewaxing.
- D Deasphalting.
- E Previously listed as Ampol Refineries.
- F Semi-cyclic.
- G LCGO.
- H Houdry.
- I FCC pretreat.
- J Mid distillate dewaxing.

- K Solvent extraction.
- L Previously listed as Ervin.
- M TCC.
- N High conv. soaker cracking.
- O Previously listed as Schmierstoff Raffinerie.
- P Previously listed as Beta Raffineriegesellschaft Wilhelmshaven mbH.
- Q Previously listed as EKO-Hellenic Refineries & Chemicals.
- R Steam LPG reforming.

- S LPG.
- T Eureka.
- U Estimate.
- V RCC.
- W Isomax.
- X Demex.
- Y Residue.
- Z ROSE.
- AA MEK dewaxing.
- BB Previously listed as Hanwha Energy Co. Ltd.
- CC Previously listed as Yukong Ltd.

- DD Integration of Shell Co. of Thailand and Star Petroleum Refining Co. refineries.
- EE VGO.
- FF FCC feed.
- GG Previously listed as Texaco Refining & Marketing Inc.
- HH Previously listed as Shell Martinez Refining Co.
- II Previously listed as Star Enterprise.
- JJ Previously listed as Shell Norco Refining Co.

- KK Previously listed as Petro Source Refining Partners.
- LL Previously listed as Mobil Oil Corp.
- MM Previously listed as BP Oil Co.
- NN Isocracker.
- OO HOC.
- PP Previously listed as Howell Hydrocarbons & Chemicals Inc.
- QQ Previously listed as Crysen Refining Inc.

- RR Previously listed as Shell Anacortes Refining Co.
- SS Paraffin wax.
- TT Previously listed as BHP Hawaii Inc.
- UU Previously listed as Mapco.

Capacity expressed in barrels per calendar day (b/cd) is the maximum number of barrels of input that can be processed during a 24-hr period, after making allowances for the following:

- Types and grades of inputs to be processed.
- Types and grades of products to be manufactured.
- Environmental constraints associated with refinery operations.
- Scheduled downtime such as mechanical problems, repairs, and slowdowns.

Capacity expressed in barrels per stream day (b/sd) is the amount a unit can process when running at full capacity under optimal feedstock and product slate conditions. Most U. S. capacity figures have historically been reported in b/sd, but all capacities are reported in b/cd here, as they will be in following years.

Totals

When an asterisk (*) appears beside a refinery location, this indicates that the figure has been converted from b/sd to b/cd by using the conversion factor 0.95 for crude oil and vacuum distillation units, and 0.90 for all downstream cracking and conversion units. Refining processes not covered are noted here.

Process definitions

- Hydrocracking includes processes where 50% of the feed or more is reduced in molecular size.
- Hydrotreating includes processes where 10% of the feed or less is reduced in molecular size.
- Hydrotreating includes processes where essentially no reduction in the molecular size of the feed occurs.
- Hydrogen volumes presented here represent either generation or upgrading to 90+% purity.

Catalytic reforming definitions

- Semiregenerative reforming is characterized by shutdown of the reforming unit at specified intervals, or at the operator's convenience, for in situ catalyst regeneration.
- Cyclic regeneration reforming is characterized by continuous or continual regeneration of catalyst in situ in any one of several reactors that can be isolated from and returned to the reforming operation. This is accomplished without changing feed rate or octane.
- Continuous regeneration reforming is characterized by the continuous regeneration of part of the catalyst in a special regenerator, followed by continuous addition of this regenerated catalyst to the reactor.
- Other includes nonregenerative reforming (catalyst is replaced by fresh catalyst) and moving-bed catalyst systems.

REFINERY SHUTDOWNS

SOUTH AMERICA

1. Mobil Oil Barbados Ltd. - Bridgetown, Barbados. 4,000 b/cd capacity, January 1998.

U.S.

1. Shell Odessa Refining Co. - Odessa, Tex. 28,300 b/cd capacity, November 1998.