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Solvent deasphalting by ROSE® process

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Glossary

$	US dollars
°C	Degree Celsius
AD	Atmospheric distillation
AR	Atmospheric residue
Barg	Bar gauge
BFD	Block flow diagram
BFW	Boiling feedwater
BLI	Battery limits investment
bpd	Barrels per day
Btu	British thermal units
Capex	Capital expenses
CCR	Conradson carbon residue
cP	Centipoise
CTC	Crude-to-chemicals
cf	Cubic feet
CW	Cooling water
DAO	Deasphalted oil
DRU	Diluent recovery unit
ECA	Emission control area
FCC	Fluid catalytic cracking
ft	feet
GO	Gas oil
gpm	Gallons per minute
h	Hours
HDS	Hydrodesulfurization
HFO	Heavy fuel oil
HSFO	High-sulfur fuel oil
HT	Hydrotreating unit
IMO	International Maritime Organization
JV	Joint venture
kbpd	Thousand barrels per day
kg	Kilograms
kJ	Kilojoules
kPa	Kilopascal absolute
kPg	Kilopascal gauge
lb	Pound
LEDA	Low energy deasphalting process
LGO	Light gas oil
lv%	Liquid volume percent
MMbpd	Million barrels per day
MMlb/y	Million pounds per year
MMt	Million metric tons
MMt/y	Million metric tons per year
mol%	Molar percent
OWT	Oily water treatment
Opex	Operating expenses
OSBL	Outside battery limits
PEP	Process Economics Program
PFD	Process flow diagram
ppb	Parts per billion
ppm	Parts per million
ppmw	Parts per million by weight
psi	Pounds per square inch
psia	Pounds per square inch absolute
psig	Pounds per square inch gauge

R&D	research and development
RDC	rotating disc-contactor
RFCC	Residue fluid catalytic cracking
ROI	Return on investment
S/F	Solvent-to-feed
s	Second(s)
SAGD	Steam-assisted gravity drainage
SARA	Saturates, aromatics, resins, and asphaltenes
SDA	Solvent deasphalting
scf	Standard cubic feet
scm	Standard cubic meter
STM	Steam
t	Metric ton
TBP	True boiling point
TFC	Total fixed capital
USGC	US Gulf Coast
vol%	Volume percent
VD	Vacuum distillation
VGO	Vacuum gas oil
VR	Vacuum residue
w	Weight
wt%	Weight percent
y	Year

Abstract

Stricter environmental regulations and technological advances have substantially reduced the market for residual fuels, making the ability to upgrade bottom-of-the-barrel streams a key competitive differentiator for refineries. This is particularly relevant given the industry's shift to low-sulfur marine fuels, which intensifies the need to process heavy fractions. As demand for transportation fuels declines, some refineries are evaluating non-energy products to preserve the value of processed crude, with solvent-based lubricant production emerging as a viable option for facilities equipped with solvent deasphalting (SDA) units. A major advantage of SDA is its lower capital expenditure (capex) and operational expenditure (opex) relative to other residue-upgrading routes, such as hydrogen-addition technologies, although those alternatives typically deliver higher conversion.

Three previous Process Economics Program (PEP) reports address certain aspects of SDA, but none are dedicated exclusively to SDA, and a comprehensive economic analysis of SDA has not yet been conducted. In this review, we will review the current industrial status of SDA. A brief technology overview of the major SDA processes will be presented, followed by a detailed technoeconomic assessment of KBR's Residuum Oil Supercritical Extraction (ROSE®) technology.

This is PEP's independent assessment based on information presented in open literature, such as patents or technical articles, and may not reflect in whole or in part the actual plant configuration. It is believed that these sources are sufficient to represent the process and process economics within the range of accuracy necessary for the economic evaluation of the conceptual process design of this technology.

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