

## GLOSSARY OF SYMBOLS AND ABBREVIATIONS

A	Angstrom ( $10^{-10}$ meter)
amu	atomic mass unit
ANL	Argonne National Laboratory
APCI	Air Products and Chemicals, Inc.
API	American Petroleum Institute, gravity
AR&TD	Advanced Research and Technology Development (Program)
ASDA	Antisolvent Deashing (Process)
ASF	Anderson-Schulz-Flory
ATB	atmospheric tower bottoms
atm	atmosphere
bb1	barrel
BCL	Brown Coal Liquefaction (Process)
BN	binaphthyl
BPD	barrels per day
BPSD	barrels per stream day
BRSC	Burns and Roe Services Corporation
Btu	British thermal unit
BTX	benzene, toluene, and xylene
°C	degrees Celsius
CANMET	Canada Centre for Mineral and Energy Technology
CC-ITSL	Close-Coupled Integrated Two-Stage Liquefaction
C-E	Combustion Engineering
cf	cubic foot
CH	carbon-hydrogen
cm	centimeter
COED	Char, Oil, and Energy Development (Process)
COGARN	Coal Gasification Advanced Research Needs (Panel)
COIL	HRI coprocessing process
COLIRN	Coal Liquefaction Research Needs (Panel)
Consol	Consolidation Coal Company
CSD	Critical Solvent Deashing (Process)
CSF	Consol Synthetic Fuel (Process)
CTSL	Catalytic Two-stage Liquefaction
d	day
DHP	dihydrophenanthrene
DIBE	di-isobutyl ether
DITSL	Doubly Integrated Two-Stage Liquefaction
DMF	dimethyl ether
DMMF	dry, mineral-matter-free
DNM	dinaphthyl methane
DOE	Department of Energy
ECLP	Exxon Coal Liquefaction Plant
EDS	Exxon Donor Solvent (Process)
EI	evaporative index
EP	end point

EPA	Environmental Protection Agency
EPRI	Electric Power Research Institute
ESR	electron spin resonance
EXAFS	extended X-ray absorption fine structure
°F	degrees Fahrenheit
FBR	fluidized-bed reactor
FCC	fluidized-bed catalytic cracker
FERWG	Fossil Energy Research Working Group
FIMS	field-ionization mass spectrometry
FL	fluoranthene
FRG	Federal Republic of Germany
ft	foot
FT	Fischer-Tropsch
FTIR	Fourier-transform infrared spectroscopy
FTS	Fischer-Tropsch Synthesis
g	gram
$\Delta G$	Gibbs free energy
gal	gallon
GC	gas chromatography
GHSV	gas hourly space velocity
GPH	gas phase hydrogenator
GSSTFR	gas-solid-solid trickle flow reactor
$\Delta H$	enthalpy of reaction
HAS	higher-alcohol synthesis
HBR	hanging-basket reactor
H/C	hydrogen-to-carbon ratio
HD	heavy distillate
HDN	hydrodenitrogenation
HDS	hydrodesulphurization
HHV	higher heating value
HPLC	high-performance liquid chromatography
hr	hour
HR	hydrotreated resid
HRI	Hydrogen Research, Inc.
HTR	hydrotreater
hv	high volatile
ICC	International Congress of Catalysis
ICI	Imperial Chemical Industries
IEA	International Energy Agency
IFP	Institut Francais du Petrol
IGCC	integrated coal gasification combined cycle
in	inch
IR	infrared
ITSL	Integrated Two-Stage Liquefaction
J	Joule

°K	degrees Kelvin
l	liter
lb	pound
LCI	Lummus Crest, Inc.
LHSV	liquid hourly space velocity
LPG	liquefied petroleum gases
LR	Lurgi Ruhrgas
LTR	light thermal resid
LU	Lehigh University
LV	liquid volume
m	meter
MAF	moisture ash-free
MAS	metanolo piu alcoli superiori
M <sub>c</sub>	average molecular weight between cross-links
METC	Morgantown Energy Technology Center
MIBE	methyl isobutyl ether
min	minute
MS	mass spectrometry
MTBE	methyl tertiary-butyl ether
MTG	methanol-to-gasoline
NEDO	New Energy Development Organization (Japan)
NMR	nuclear magnetic resonance
NTSL	Non-integrated Two-Stage Liquefaction
OER	Office of Energy Research
OFE	Office of Fossil Energy
OOCF	Ohio-Ontario Clean Fuels, Inc.
OPA	Office of Program Analysis
ORC	Occidental Research Corporation
p	pressure
Pa	Pascal
PCAH	polycyclic aromatic hydrocarbons
PCT	physical, chemical, and thermal (properties)
PDU	process development unit
PETC	Pittsburgh Energy Technology Center
PNA	polynuclear aromatics
PNL	Pacific Northwest Laboratory
POC	proof of concept
PONA	paraffins, olefines, naphthenes, and aromatics
POX	partial oxidation
ppm	parts per million
PRC	Peoples Republic of China
psi(g)	pounds per square inch (gauge)
R&D	research and development
RHT	radical hydrogen transfer
RITSL	Reconfigured Integrated Two-Stage Liquefaction
ROM	run of mine

s second  
 SAIC Science Applications International Corporation  
 SCF standard cubic foot  
 SCFD standard cubic feet per day  
 SCS Southern Company Services  
 SCT short contact time  
 SEHT Snamprogetti, Enichem, and Haldor Topsoe  
 SG synthetic gas  
 SMDS Shell Middle Distillate Synthesis  
 SRC Solvent Refined Coal (Process)  
 STY space time yield

T temperature  
 TAME tertiary-amyl butyl ether  
 TBA tertiary-butyl alcohol  
 THF tetrahydrofuran  
 THFL tetrahydrofluoranthene  
 THQ tetrahydroquinoline  
 TIGAS Topsoe Integrated Gasoline Synthesis Process  
 TLU thermal liquefaction unit  
 TPD tons per day  
 TPSD tons per stream day  
 TR thermal resid  
 TSL Two-Stage Liquefaction  
 TSP total suspended particulate

UCC Union Carbide Corporation  
 U.K. United Kingdom  
 UP&L Utah Power and Light  
 U.S. United States  
 UV ultraviolet

VGO vacuum gas oil

WGS water gas shift  
 WHSV weight hourly space velocity  
 wt weight

x probability of chain growth  
 XANES X-ray absorption near edge structure

yr year

ZSM-5 zeolite catalyst

#### PREFIXES

k kilo ( $10^3$ )  
 m milli ( $10^{-3}$ )  
 MM Mega ( $10^6$ )

$\mu$       micro ( $10^{-6}$ )  
N      normal  
n      nano ( $10^{-9}$ )  
p      pico ( $10^{-12}$ )