

LIST OF ABBREVIATIONS

AcOH	=	Acetic acid
ASTM	=	American Society for Testing and Materials
B	=	Biodiesel
D	=	Distillate
DEG	=	Di-ethylene glycol
EO	=	Ethylene oxide
EG	=	Ethylene glycol
EQ	=	Equilibrium
F	=	feed stream, mol s^{-1}
FAME	=	fatty acid methyl ester
H	=	molar enthalpy, J mol^{-1}
H_2O	=	Water
i-butene	=	Iso-butene
K	=	vapor-liquid equilibrium constant, dimensionless
K_c	=	Controller gain
K_u	=	Ultimate gain
k1	=	reaction rate from triglyceride to diglyceride
k2	=	reaction rate from diglyceride to triglyceride
k3	=	reaction rate from diglyceride to monoglyceride
k4	=	reaction rate from monoglyceride to diglyceride
k5	=	reaction rate from monoglyceride to glycerin
k6	=	reaction rate from glycerin to monoglyceride
L	=	Liquid flow rate, mol s^{-1}
n-butene	=	Normal butene
MeOH	=	Methanol
MeOAc	=	Methyl acetate
MTBE	=	methyl tert-butyl ether
MESH	=	Material, equilibrium, mole fraction summation and enthalpy balance
Q	=	heat duty, J s^{-1}
r	=	number of reaction
R	=	reaction rate, $\text{mol m}^{-3} \text{s}^{-1}$

LIST OF ABBREVIATIONS (Cont'd)

R	=	Liquid reflux
$R1, R2, R3$	=	hydrocarbon chain of the fatty groups of the triglyceride
ROH	=	Alcohol
s	=	transformed stripping ratio, dimensionless
U	=	molar hold-up, mol
ν	=	stoichiometric coefficient, dimensionless
V	=	Vapor flow rate, mol s^{-1}
x	=	mole fraction in the liquid-phase, dimensionless
y	=	mole fraction in the vapor-phase, dimensionless
z	=	mole fraction in either vapor or liquid-phase, dimensionless
ε	=	reaction volume, m^3
τ_I	=	Integral time

Subscripts

i	=	Component index
j	=	Stages index
m	=	reaction index

Superscripts

F	=	feed stream
L	=	liquid-phase
V	=	Vapor-phase