

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
<i>F</i>	=	feed stream, mol s ⁻¹
FAME	=	fatty acid methyl ester
<i>H</i>	=	molar enthalpy, J mol ⁻¹
H ₂ O	=	Water
i-butene	=	Iso-butene
<i>K</i>	=	vapor-liquid equilibrium constant, dimensionless
<i>K_c</i>	=	Controller gain
<i>K_u</i>	=	Ultimate gain
<i>k</i> 1	=	reaction rate from triglyceride to diglyceride
<i>k</i> 2	=	reaction rate from diglyceride to triglyceride
<i>k</i> 3	=	reaction rate from diglyceride to monoglyceride
<i>k</i> 4	=	reaction rate from monoglyceride to diglyceride
<i>k</i> 5	=	reaction rate from monoglyceride to glycerin
<i>k</i> 6	=	reaction rate from glycerin to monoglyceride
<i>L</i>	=	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
<i>Q</i>	=	heat duty, J s ⁻¹
<i>r</i>	=	number of reaction
<i>R</i>	=	reaction rate, mol m ⁻³ s ⁻¹

LIST OF ABBREVIATIONS (Cont'd)

R	=	Liquid reflux
R_1, R_2, R_3	=	hydrocarbon chain of the fatty groups of the triglyceride
ROH	=	Alcohol
s	=	transformed stripping ratio, dimensionless
U	=	molar hold-up, mol
v	=	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