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## ABBREVIATION

Symbol	Meaning	Unit
A	Pre-exponential or frequency factor	$s^{-1}$
A/F	Air to fuel ratio	-
CV	Calorific value	J/kg
daf	Dry and ash free	-
DTG	Differential thermogravimetry	-
d	Diameter	cm
DSC	Differential scanning calorimeter	-
$E_a$	Activation energy	kJ/mol
ER	Equivalent ratio	-
FT-IR	Fourier transform infrared spectrometer	-
g	Gravitational force, $9.81 \text{ m/s}^2$	$\text{m/s}^2$
H/C	Hydrogen to carbon ratio	-
HHV	High heating value	kJ/mol
ICTAC	International Confederation for Thermal Analysis and Calorimetry	-
L	Bed height	cm
LHV	Low heating value	kJ/mol
m	Mass	kg

MS	Mass spectrometer	-
MSW	Municipal solid waste	-
N	Number of data	-
n	Order of reaction	-
P	Pressure	Pa
R	Universal gas constant in molar (8.3145)	J/mol.K
Re	Reynolds number	-
S/C	Steam to carbon ratio	-
SBR	Steam to biomass ratio	-
SRC	Stream carbon ratio	-
T	Temperature, Average temperature	K
t	Time	s
TG	Thermogravimetry	-
TGA	Thermogravimetric analysis	-
U	Gas superficial velocity	m/s
V	Volume	m <sup>3</sup>

### Greek letters

Symbol	Meaning	Unit
$\varepsilon$	Bed voidage	-
$\phi$	Particle sphericity	-
$\mu$	Gas viscosity	kg/ms
$\rho$	Density	kg/m <sup>3</sup>
$\rho_{gas}$	Density of gas products	m <sup>3</sup> /kg

**Subscripts**

Symbol	Meaning
biomass	Biomass
g, gas	Gas production
i	Mol faction value of experiments
liquid	Liquid
mf	Minimum fluidization
p	Particle
solid	Solid



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