Main reactions during biomass gasification

Primary devolatilization				
Biomass	→	Primary tar (CH_xO_y) CO, CO_2, CH_4, C_2H_4, H_2O Carbon		*[eq.1]*
Tar cracking and reforming				
Primary tar	→	Secondary tar CO, CO_2, CH_4, C_2H_4, H_2		*[eq.2]*
Homogenous gas-phase-reactions			ΔH	
Secondary tars	→	C, CO, H_2		*[eq.3]*
$H_2 + 0{,}5\ O_2$	→	H_2O	-242 kJ/mol	*[eq.4]*
$CO + 0{,}5\ O_2$	→	CO_2	-283 kJ/mol	*[eq.5]*
$CH_4 + 0{,}5\ O_2$	→	$CO + 2\ H_2$	-110 kJ/mol	*[eq.6]*
$CH_4 + CO_2$	→	$2\ CO + 2\ H_2$	+247 kJ/mol	*[eq.7]*
$CH_4 + H_2O$	→	$CO + 3\ H_2$	+206 kJ/mol	*[eq.8]*
$CO + H_2O$	→	$CO_2 + H_2$	-40,9 kJ/mol	*[eq.9]*
Heterogenous reactions				
$C + O_2$	→	CO_2	-393,5 kJ/mol	*[eq.10]*
$C + 0{,}5\ O_2$	→	CO	-123,1 kJ/mol	*[eq.11]*
$C + CO_2$	→	$2\ CO$	+159,9 kJ/mol	*[eq.12]*
$C + H_2O$	→	$CO + H_2$	+118,5 kJ/mol	*[eq.13]*
$C + 2\ H_2$	→	CH_4	-87,5 kJ/mol	*[eq.14]*

[eq.4]	*H_2 – Combustion (oxidation)*
[eq.5]	*CO - Combustion (oxidation)*
[eq.6]	*CH_4 - Combustion (oxidation)*
[eq.7]	*Dry reforming reaction*
[eq.8]	*Steam reforming methanisation*
[eq.9]	*Water-gas-shift reaction*
[eq.10]	*Oxidation of carbon*
[eq.11]	*Partial oxidation*
[eq.12]	*Boudoard equilibrium*
[eq.13]	*Water gas reaction (steam reforming)*
[eq.14]	*Methane production reaction*