Biomass Pyrolysis

Hemi-Cellulose composition was fixed at 30% mass fraction.

Vary Cellulose mass fraction from 0 to 70%.

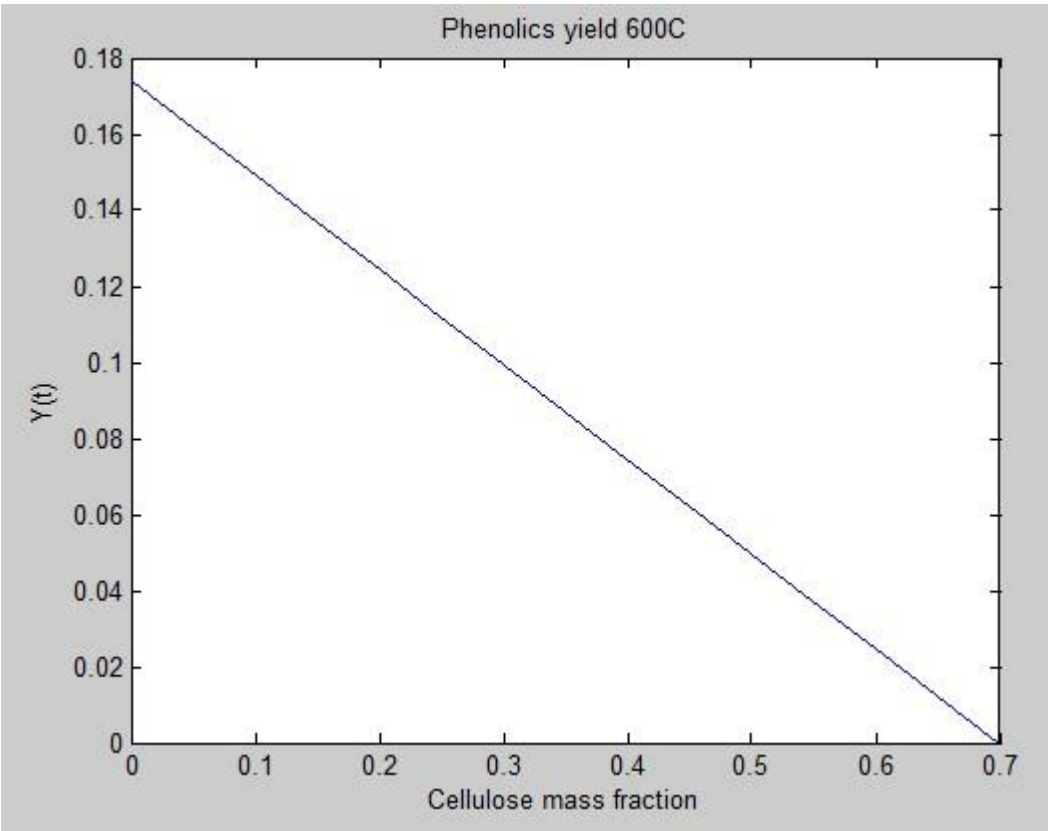
All yields are in mass fractions.

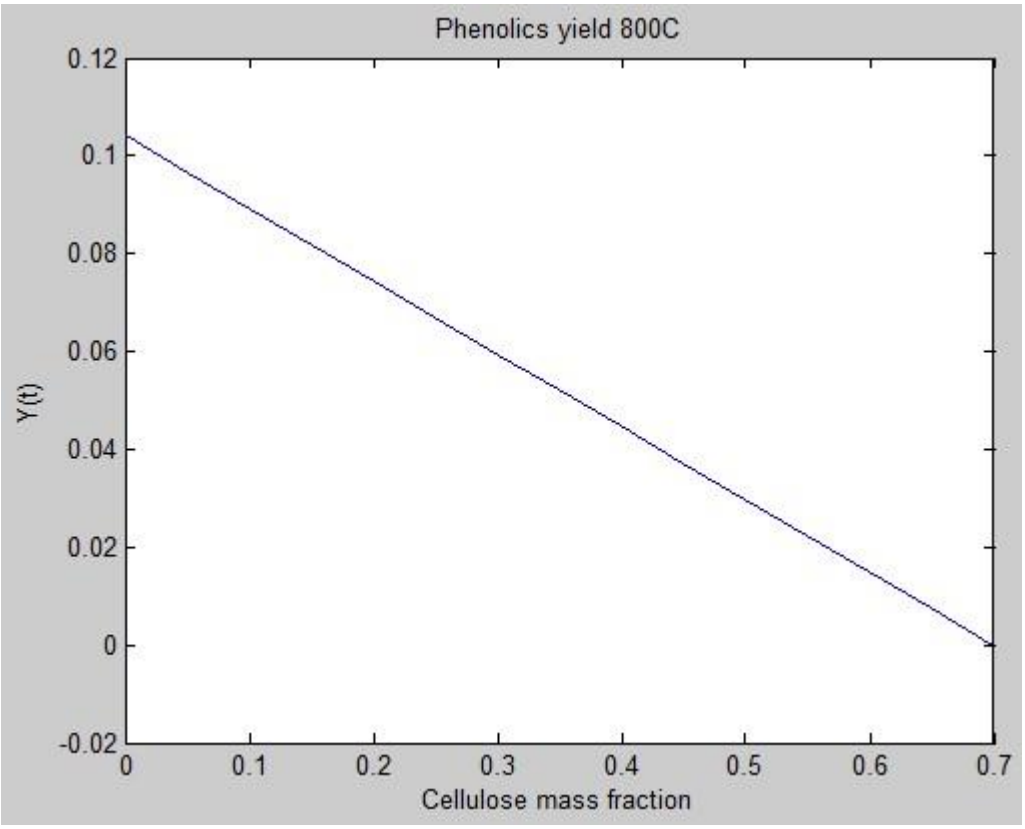
Observations:

- Some graphs show unexpected values when Cellulose mass fraction is equal to 0.
- Most graphs are perfectly linear.
- Quantity of trapped gases is negligible at higher temperatures.

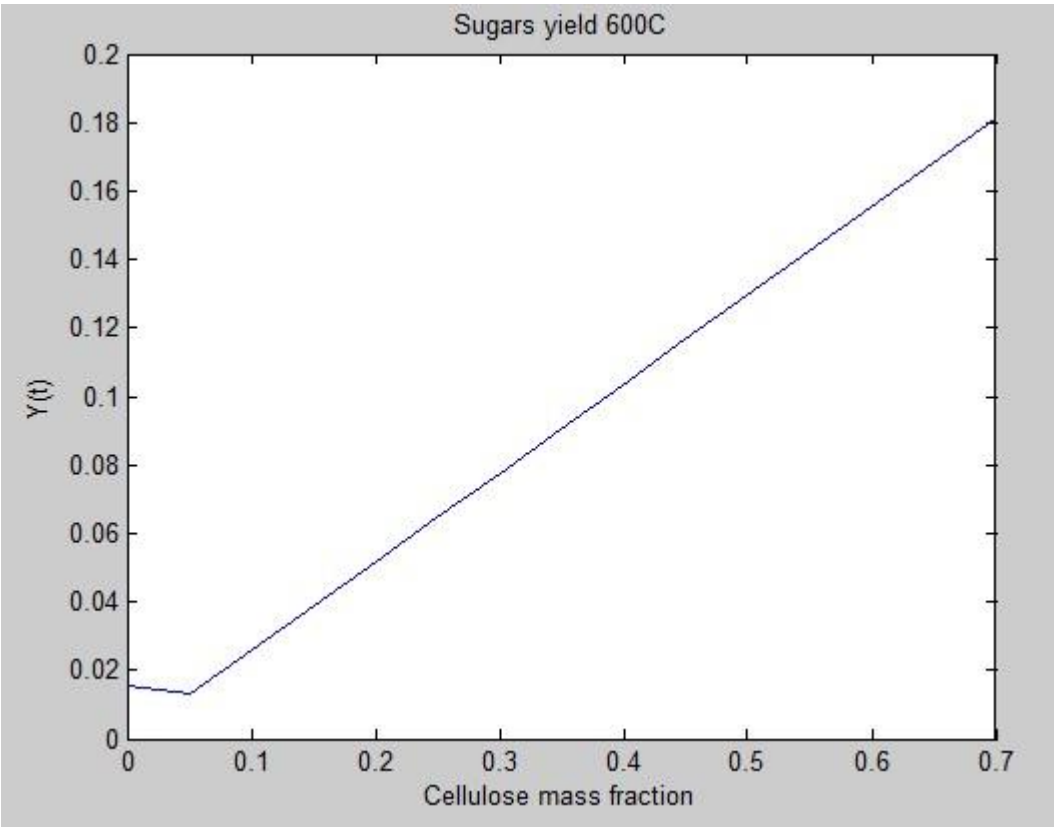
The region where cellulose mass fraction is between 30% and 55% is most commonly observed.

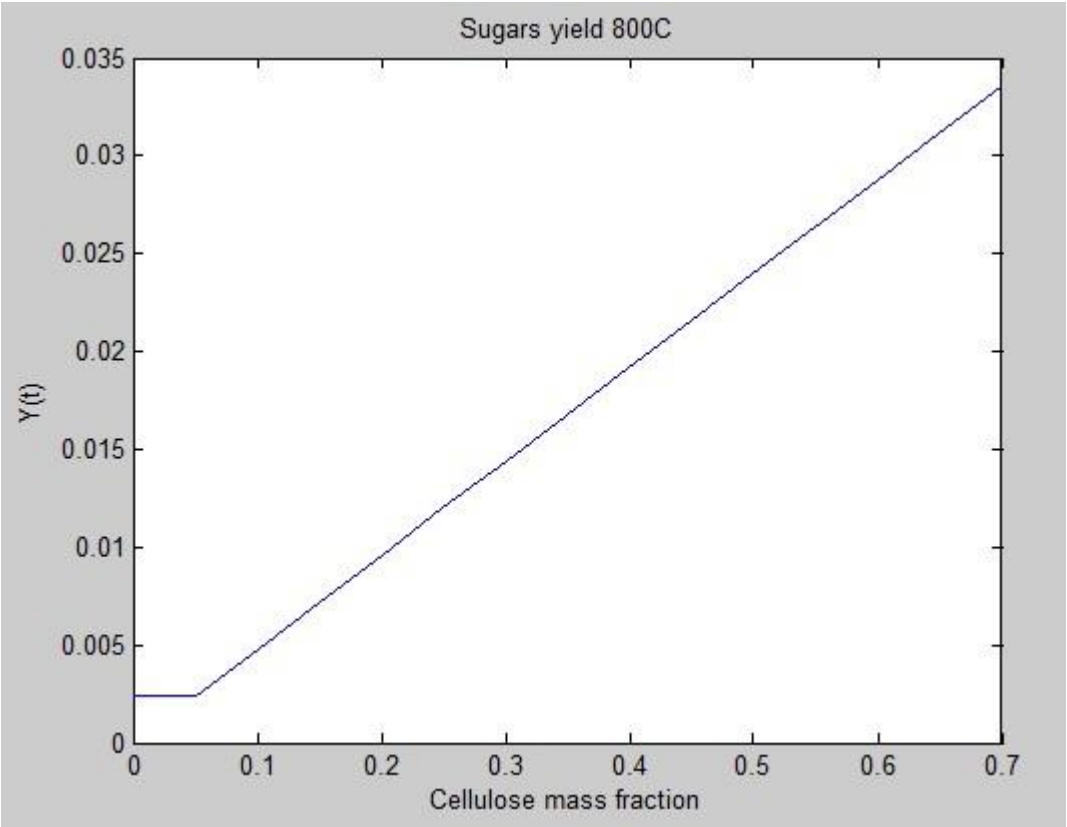
Phenolics: (p-Coumaryl,phenol,sinupaldehyde)



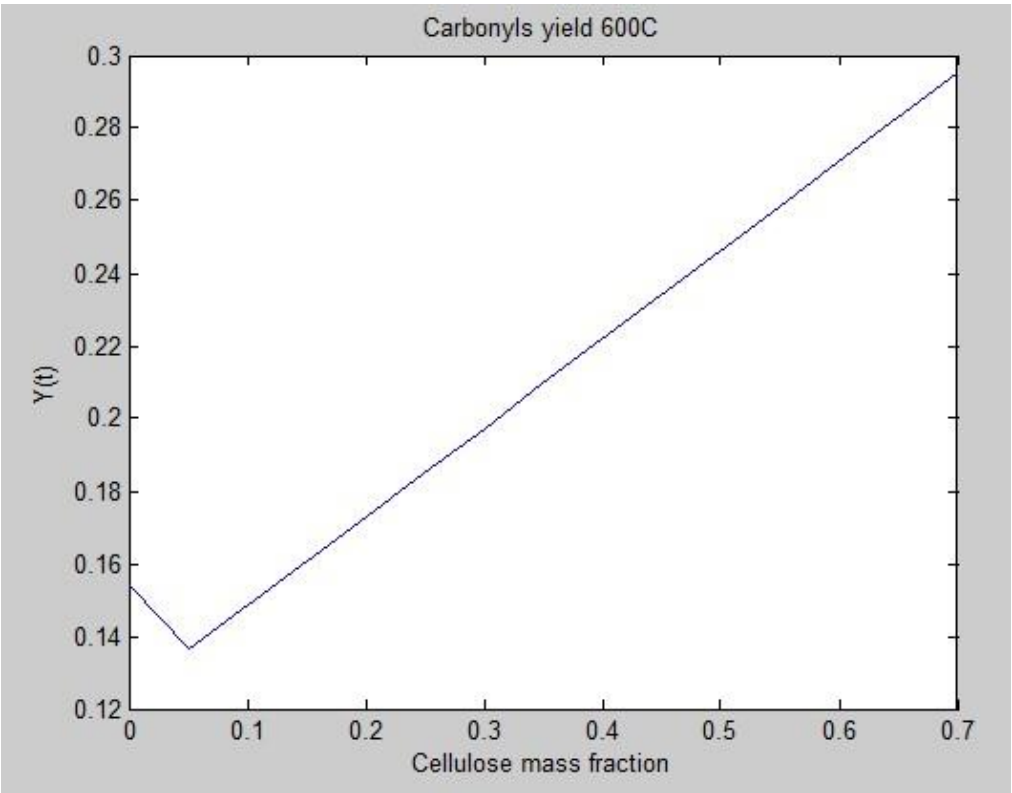


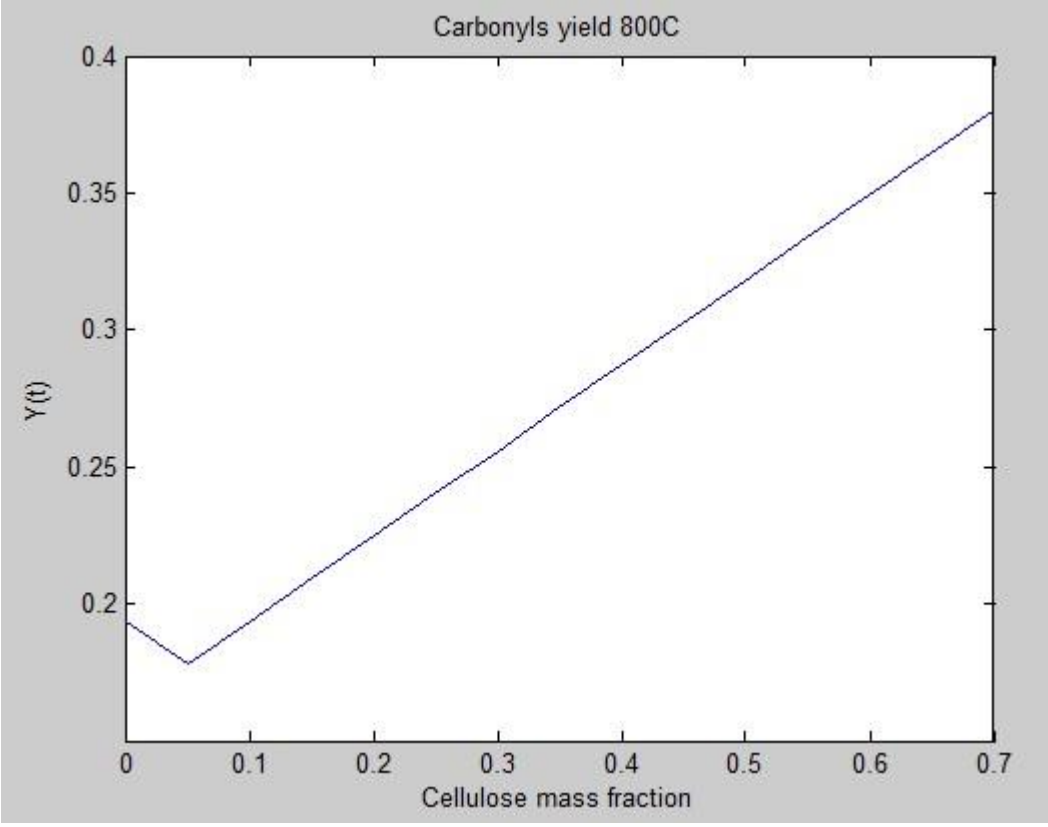
Sugars: (Xylose, Levoglucosan)



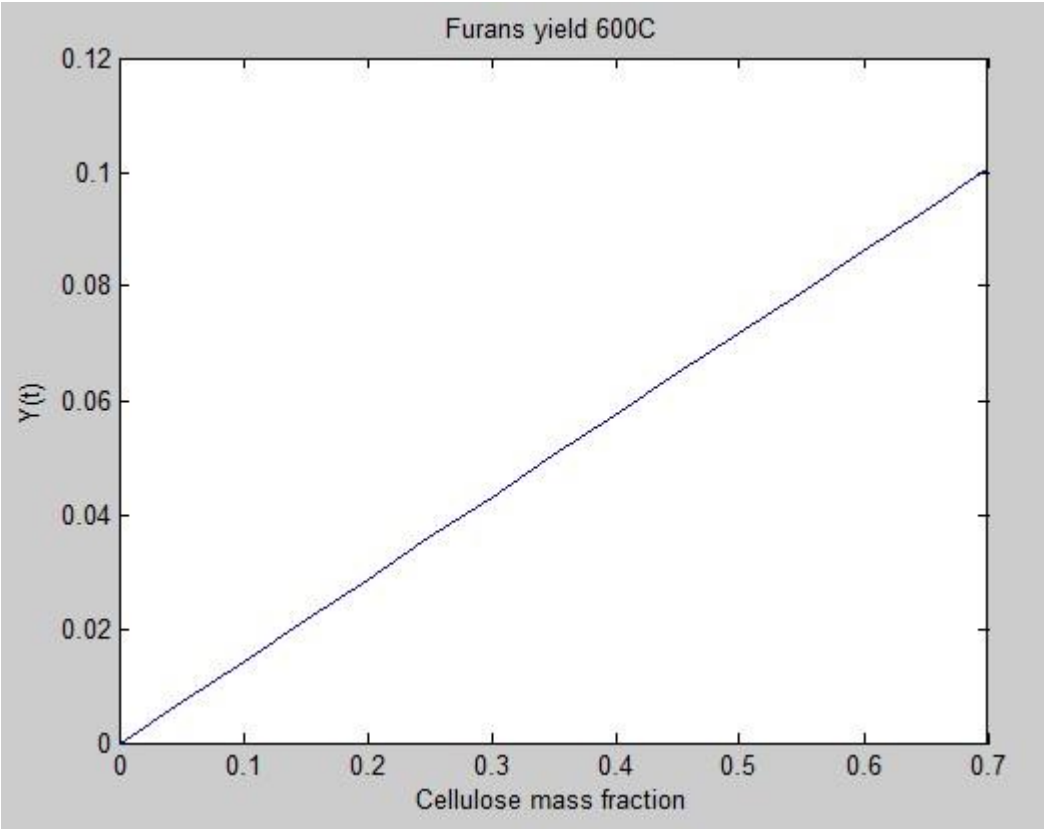


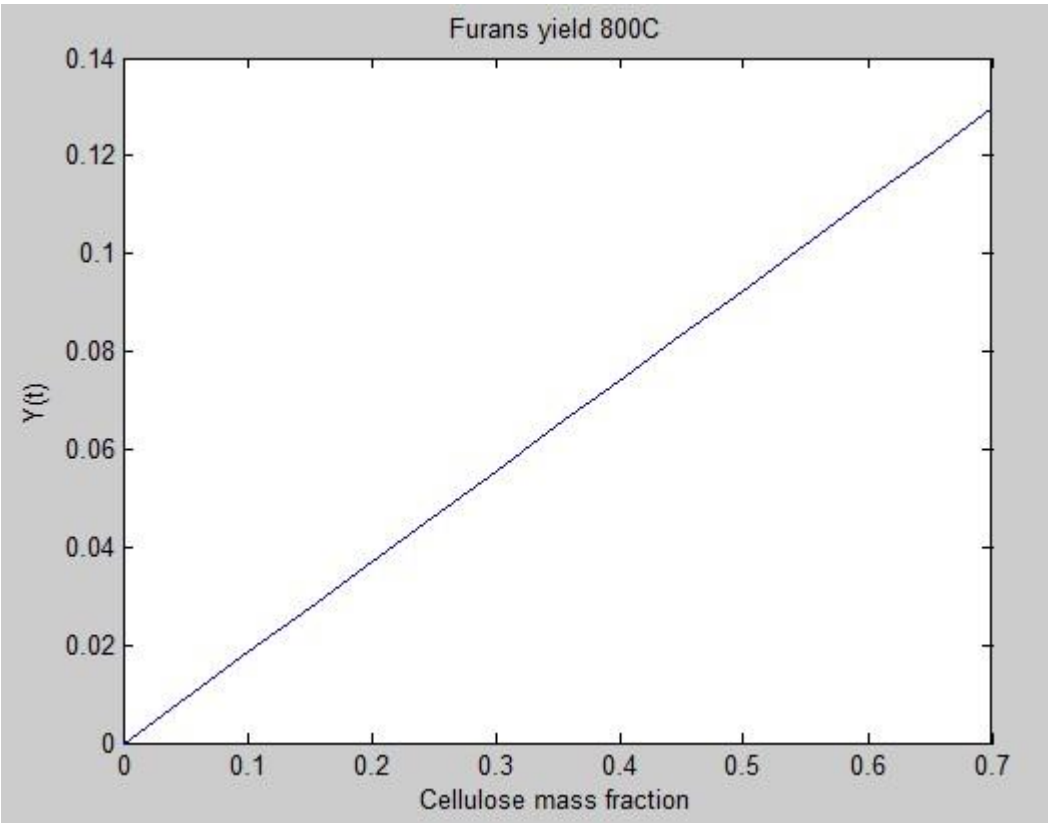
Carbonyls: (Acetaldehyde, Acetone, formic acid, formaldehyde, hydroxyl-acetaldehyde, glyoxal)



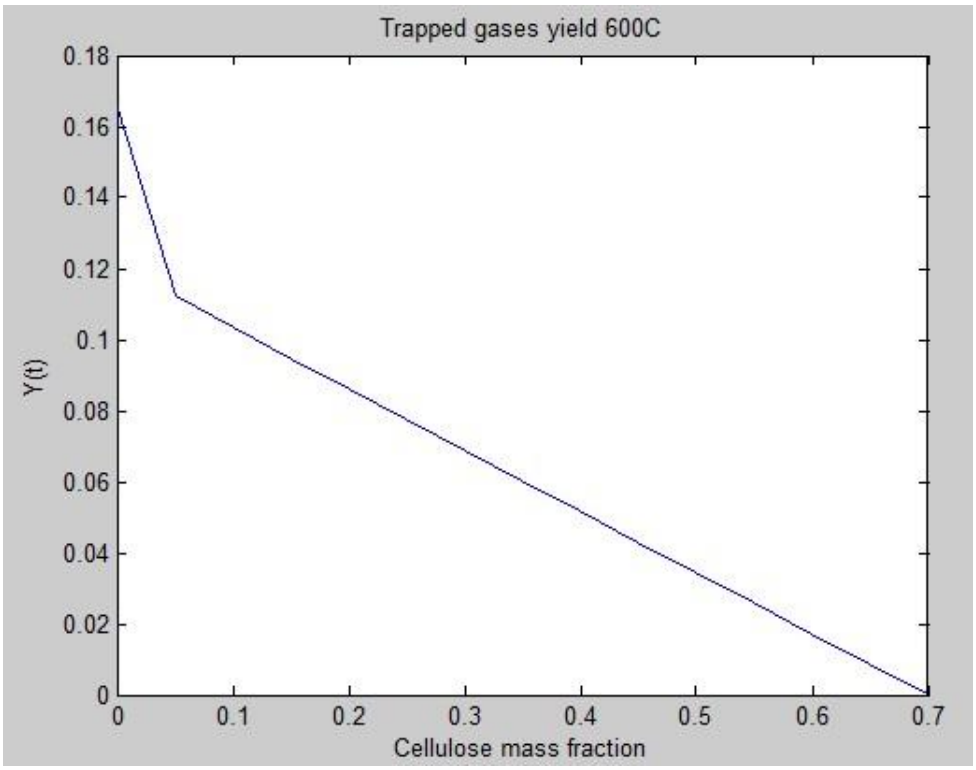


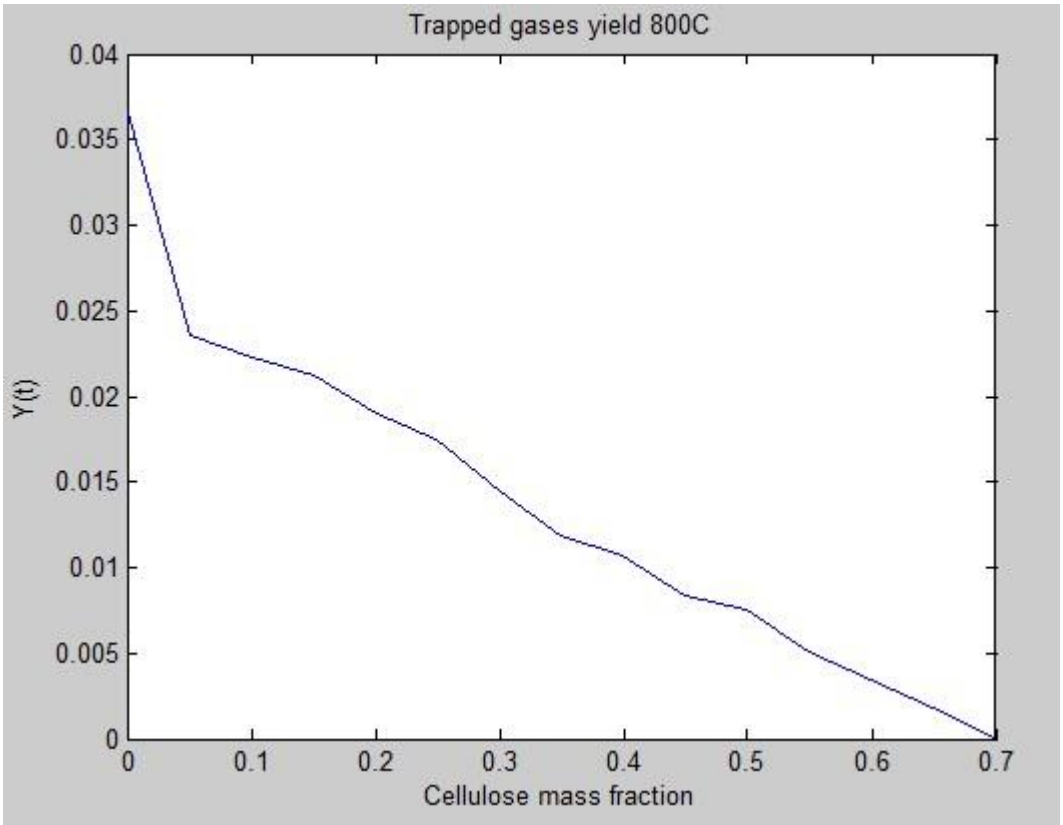
Furans: (Hydroxy methyl furfural)



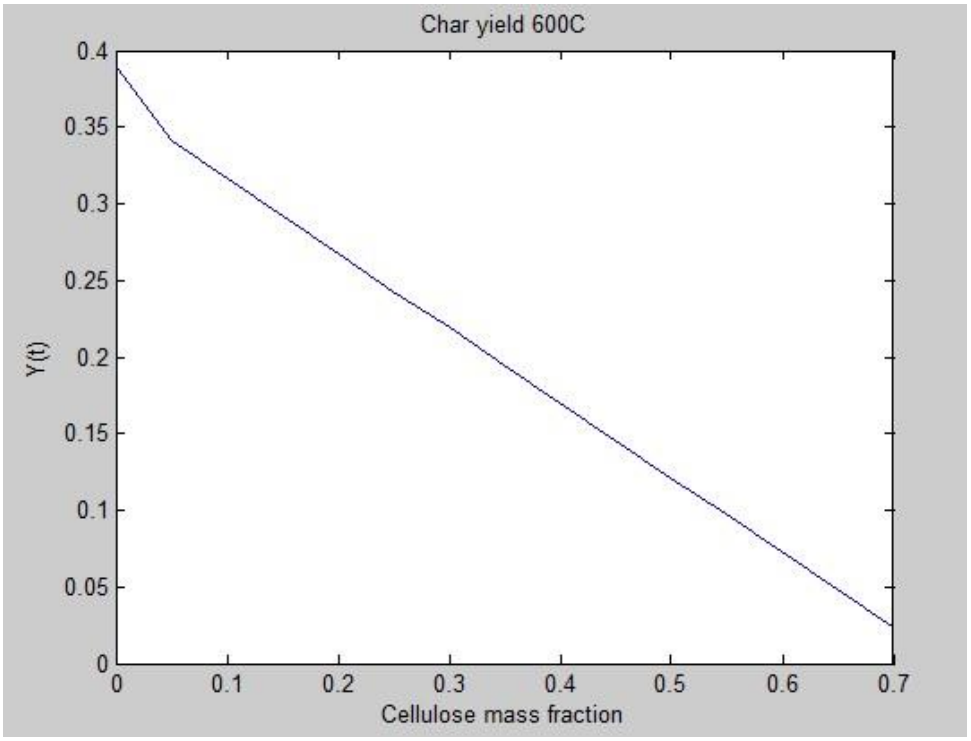


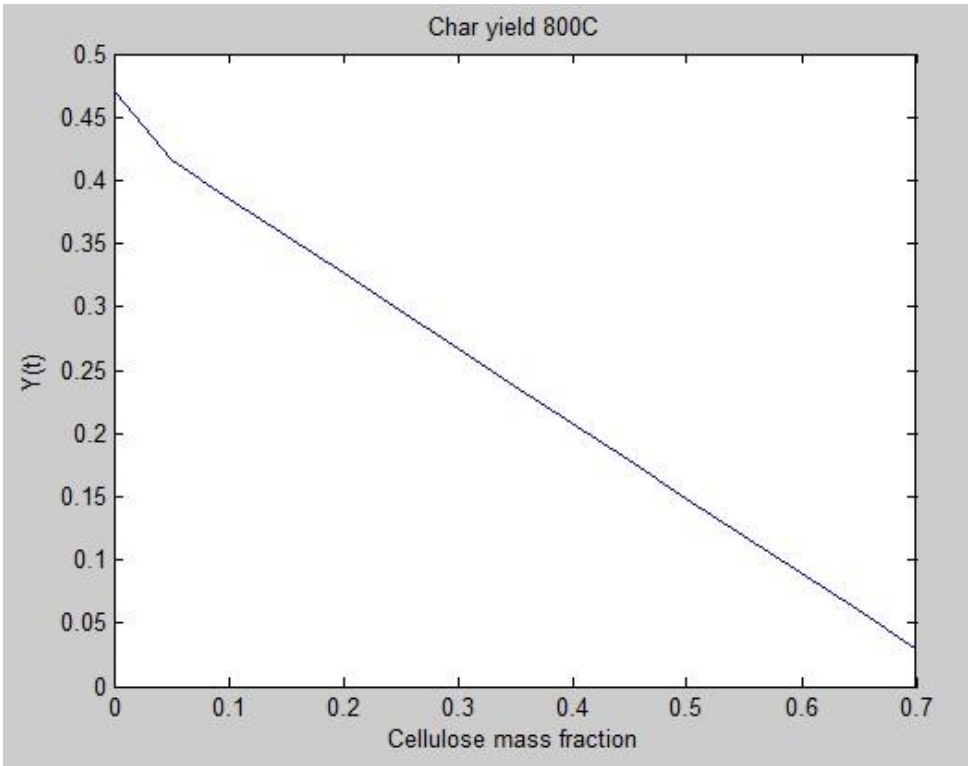
Trapped Gases: (Hydrogen, Methanol, carbon monoxide, methane, ethylene, carbon dioxide)



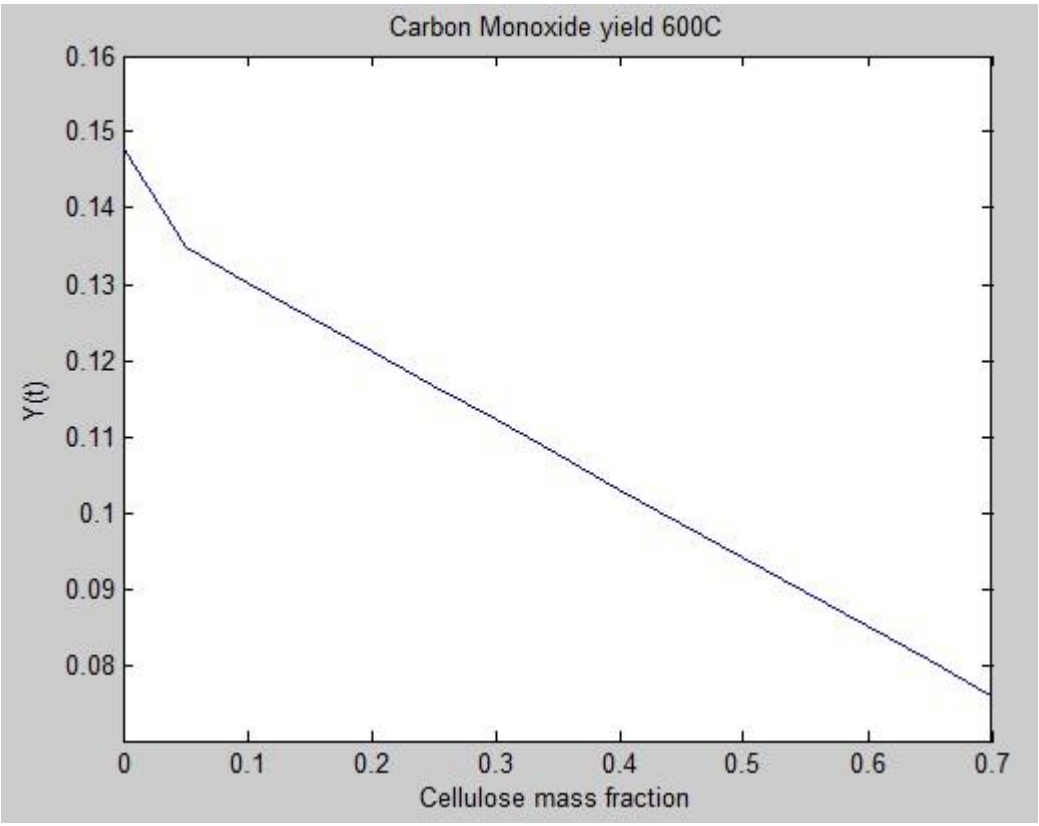


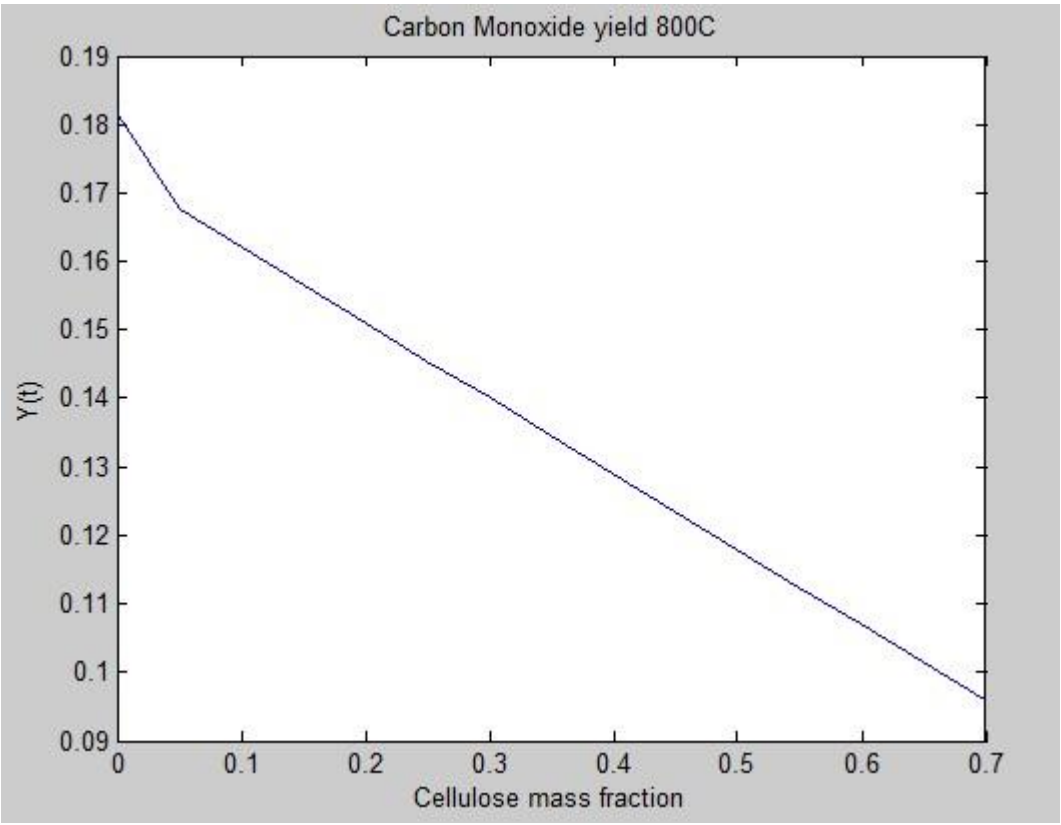
Char:


Char yield 600C
Y(t)
Cellulose mass fraction
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.1
0.2
0.3
0.4
0.5
0.6
0.7

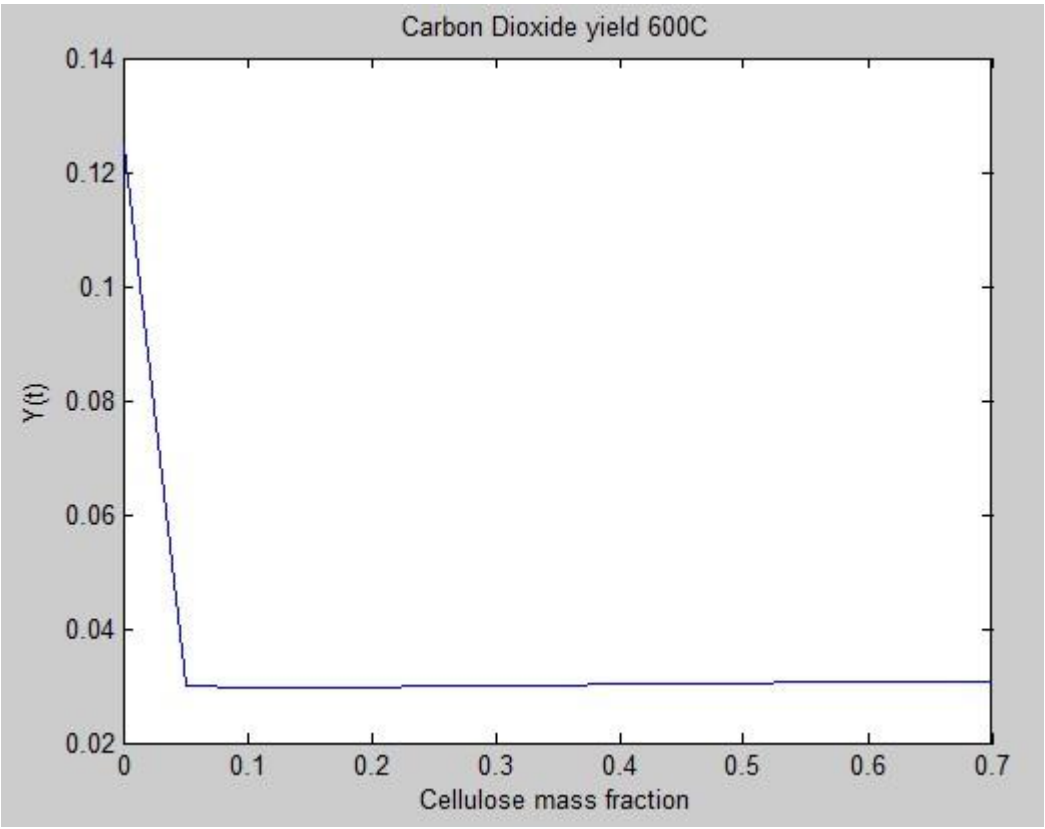

Char yield 800C
Y(t)
Cellulose mass fraction
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0.1
0.2
0.3
0.4
0.5
0.6
0.7

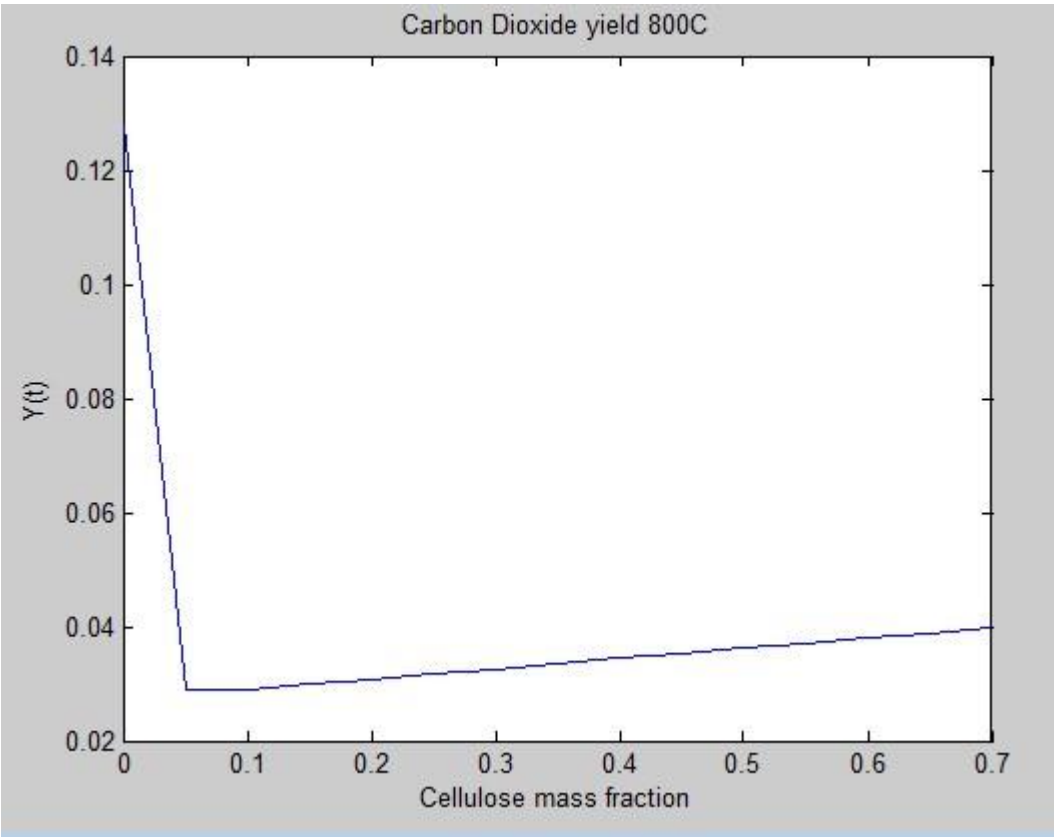
Carbon Monoxide:



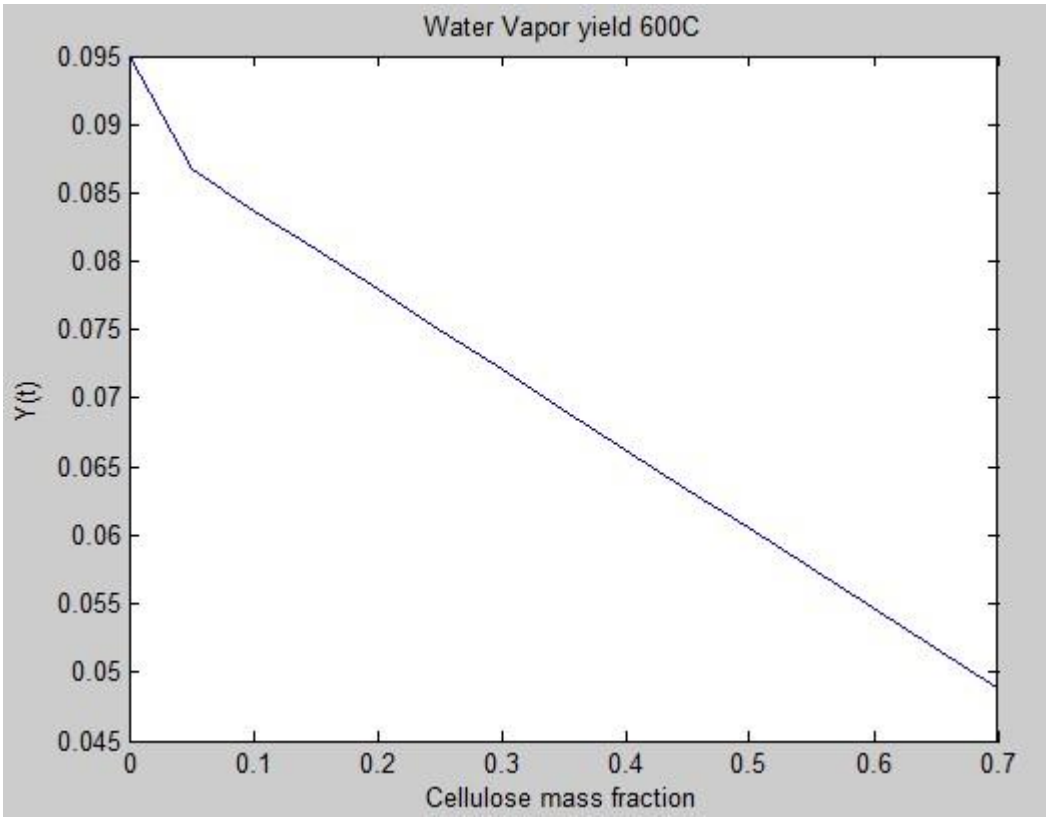


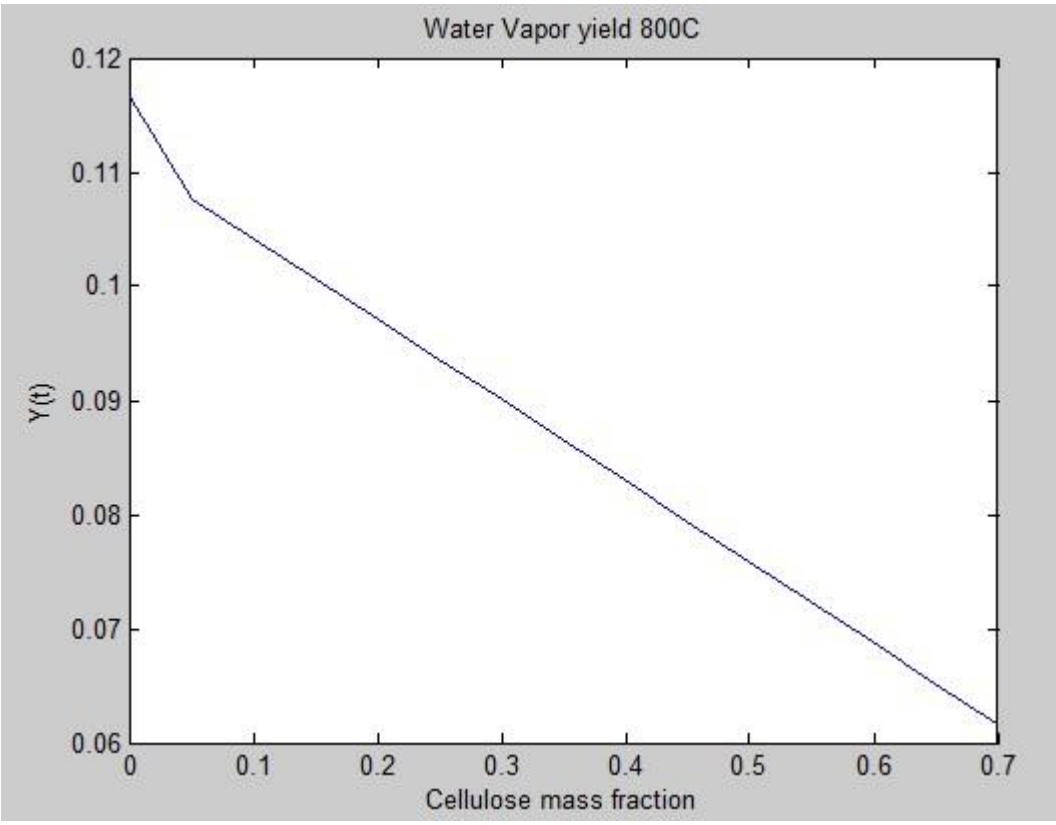
Carbon Dioxide



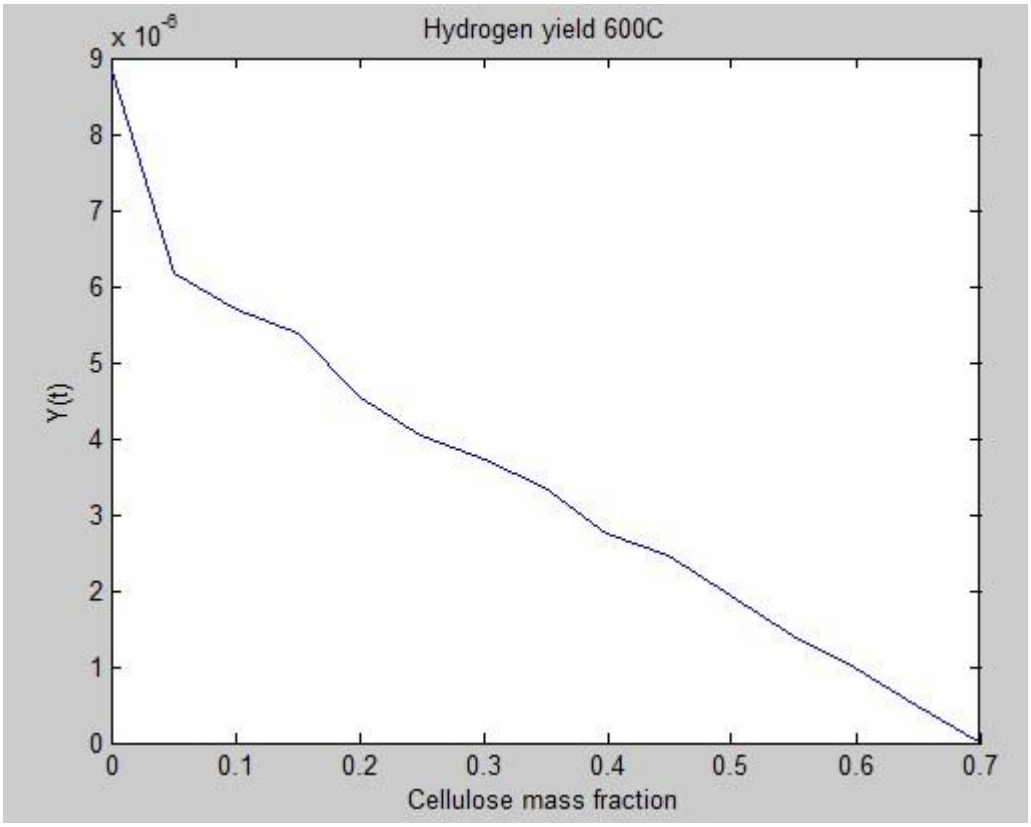


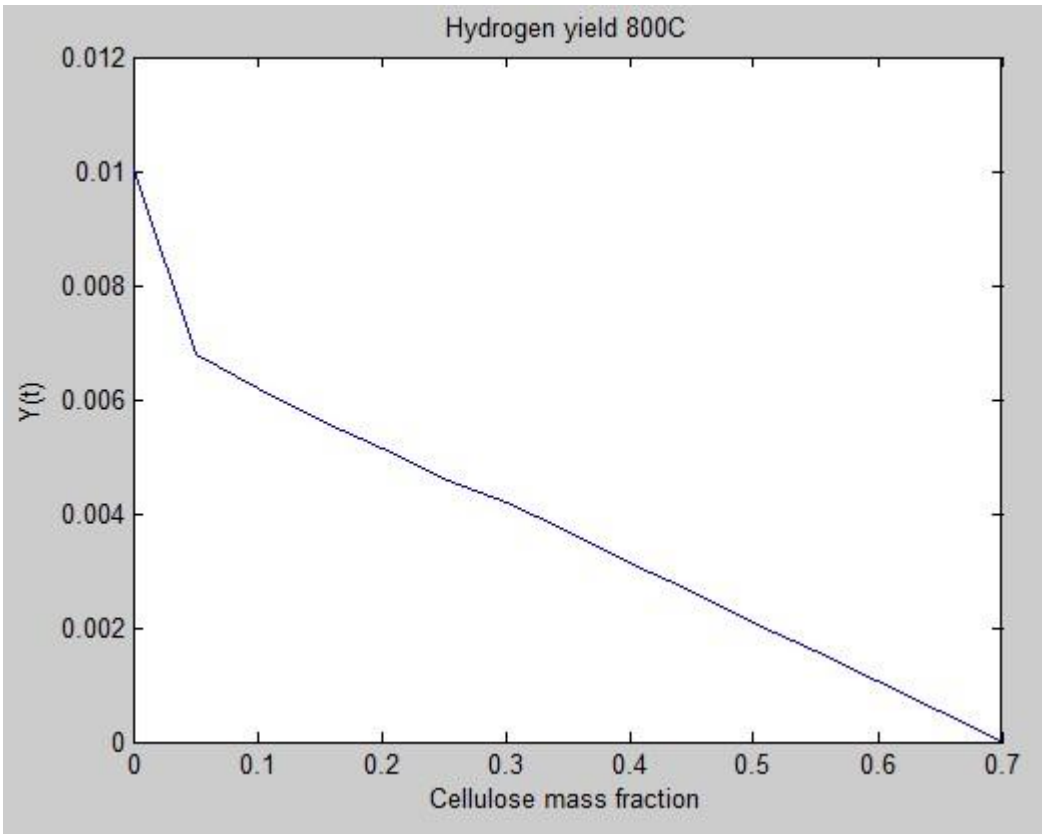
Water Vapor


Water Vapor yield 600C
0.095
0.09
0.085
0.08
0.075
0.07
0.065
0.06
0.055
0.05
0.045
Y(t)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Cellulose mass fraction

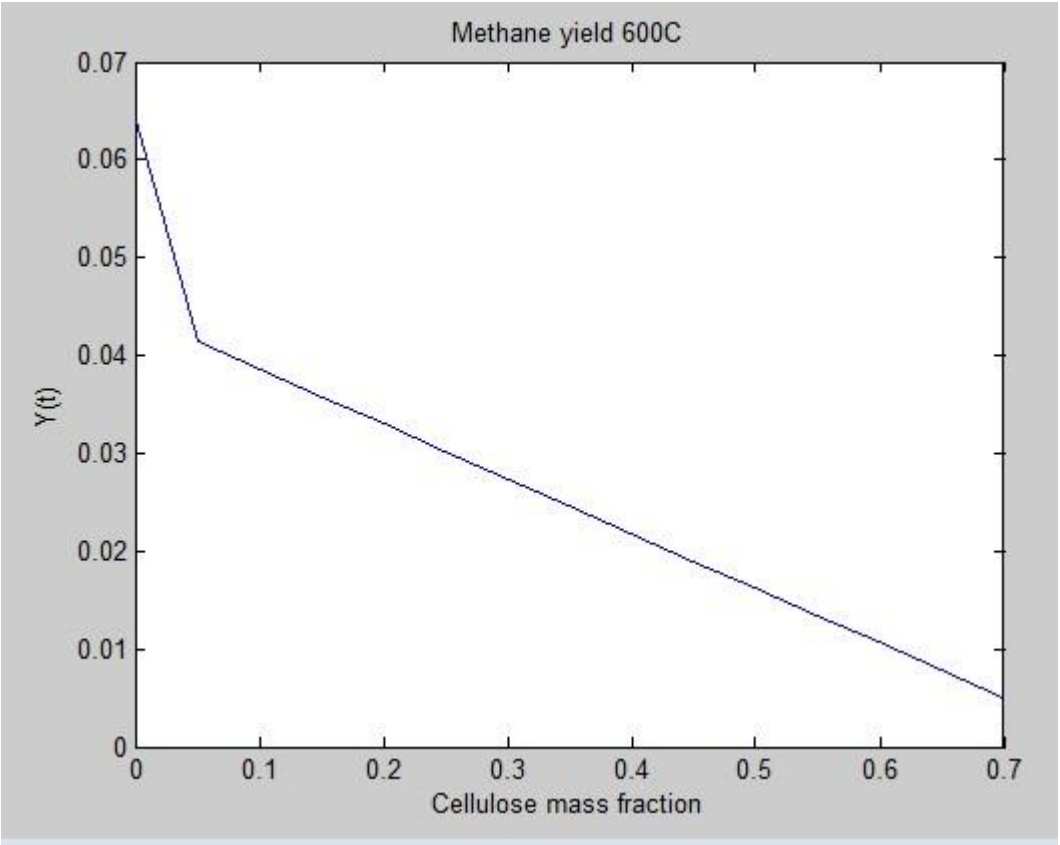

Water Vapor yield 800C
0.12
0.11
0.1
0.09
0.08
0.07
0.06
Y(t)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Cellulose mass fraction

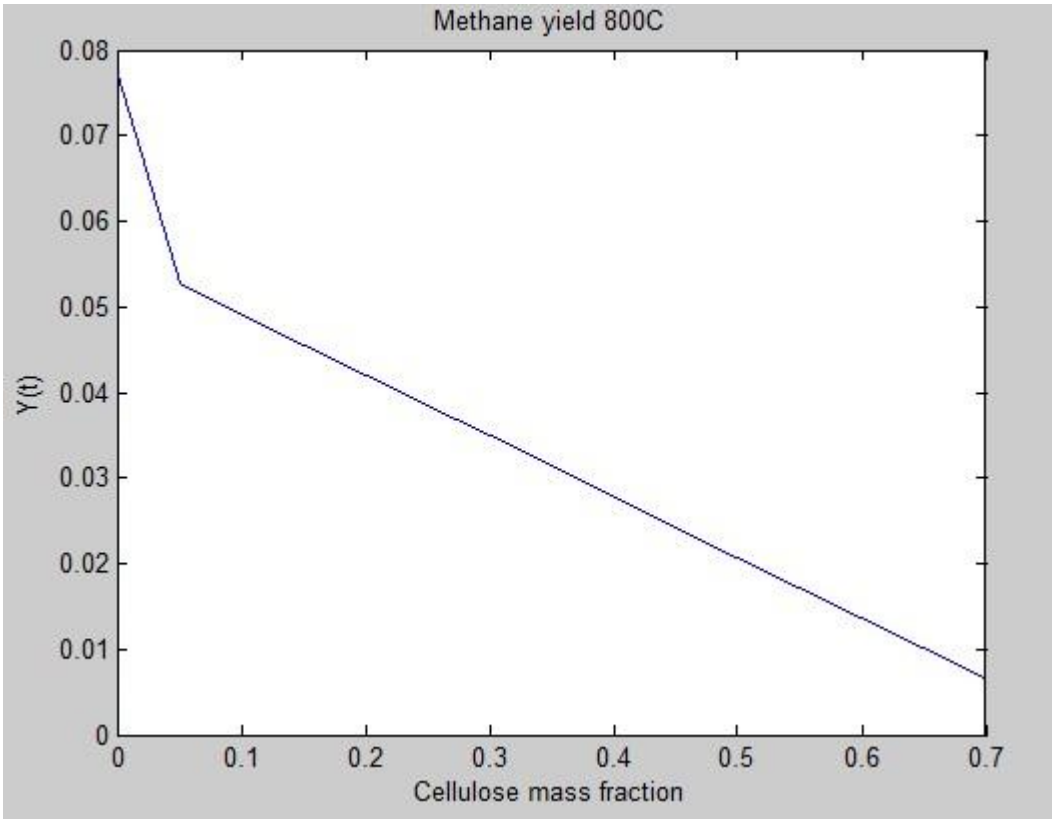
Hydrogen


Hydrogen yield 600C
x 10^-6
Y(t)
Cellulose mass fraction
0
1
2
3
4
5
6
7
8
9
0.1
0.2
0.3
0.4
0.5
0.6
0.7


Hydrogen yield 800C
Y(t)
Cellulose mass fraction
0
0.002
0.004
0.006
0.008
0.01
0.012
0.1
0.2
0.3
0.4
0.5
0.6
0.7

Methane


Methane yield 600C
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Y(t)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Cellulose mass fraction


Methane yield 800C
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Y(t)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Cellulose mass fraction