

Engineering Software

Copyright © 1996

P.O. Box 2134

Kensington, MD 20891

Phone: (301) 919-9670

E-Mail: info@engineering-4e.com

<http://www.engineering-4e.com>

Combustion

Here are some of the basic combustion information and plots when considering carbon, hydrogen and sulfur as the fuel and air as the oxidant.

Combustion Assumptions

- Fuel Temperature 298 [K]**
- Oxidant Temperature 298 [K]**
- Stoichiometric Combustion**
- No Heat Losses**

Fuel Composition -- Carbon

Element	Weight [kg/kg]
C	1.00
H	0.00
S	0.00
N	0.00
O	0.00
W	0.00

Oxidant (Air) Composition

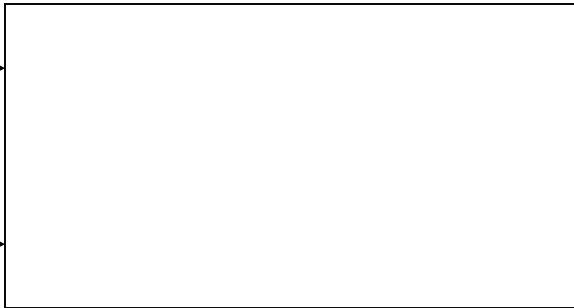
Element	Weight [kg/kg]	Mole [kmol/kmol]
N	0.767	0.790
O	0.233	0.210

Combustion Schematic Layout

Fuel -- Carbon



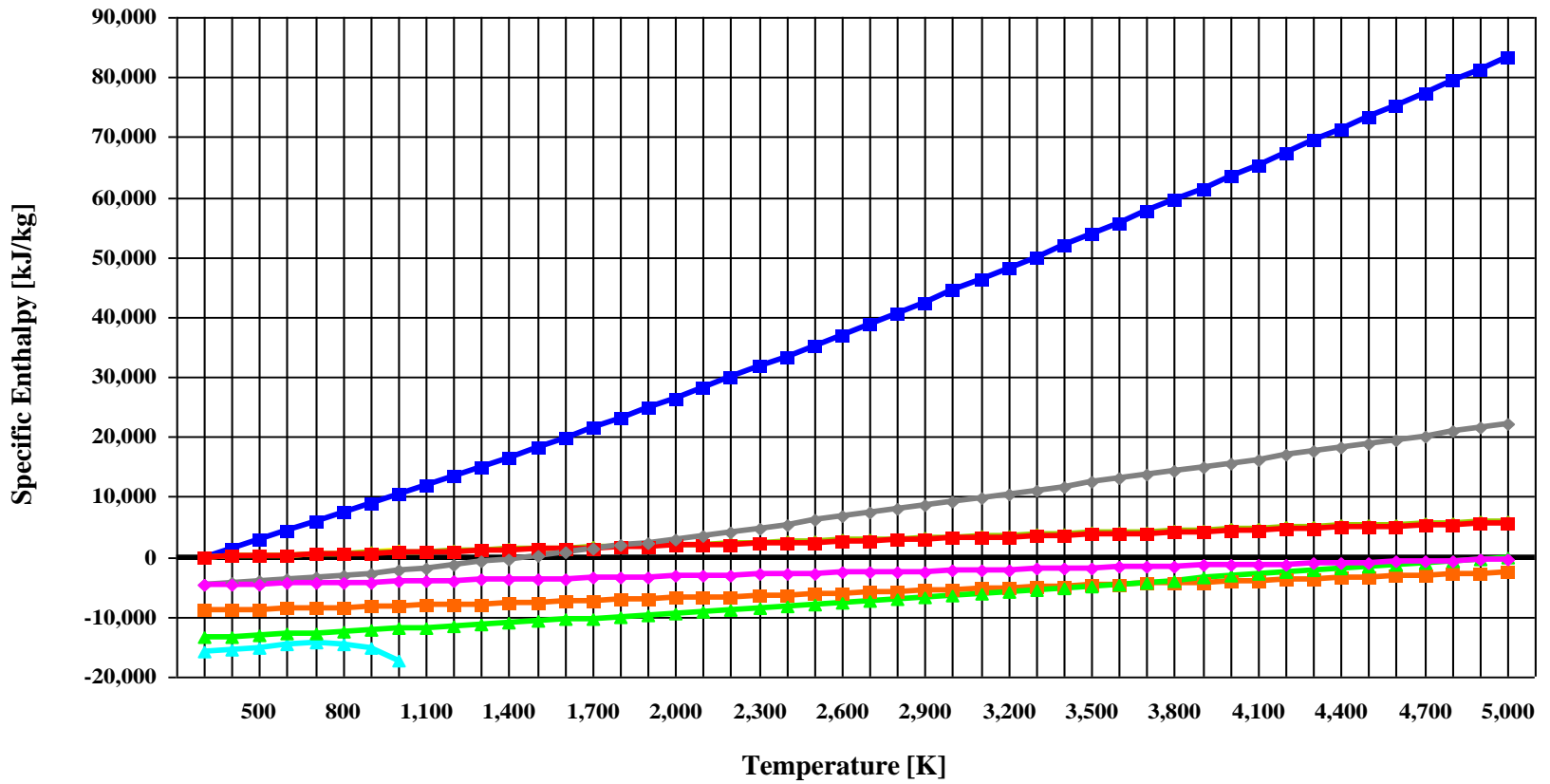
Oxidant -- Air

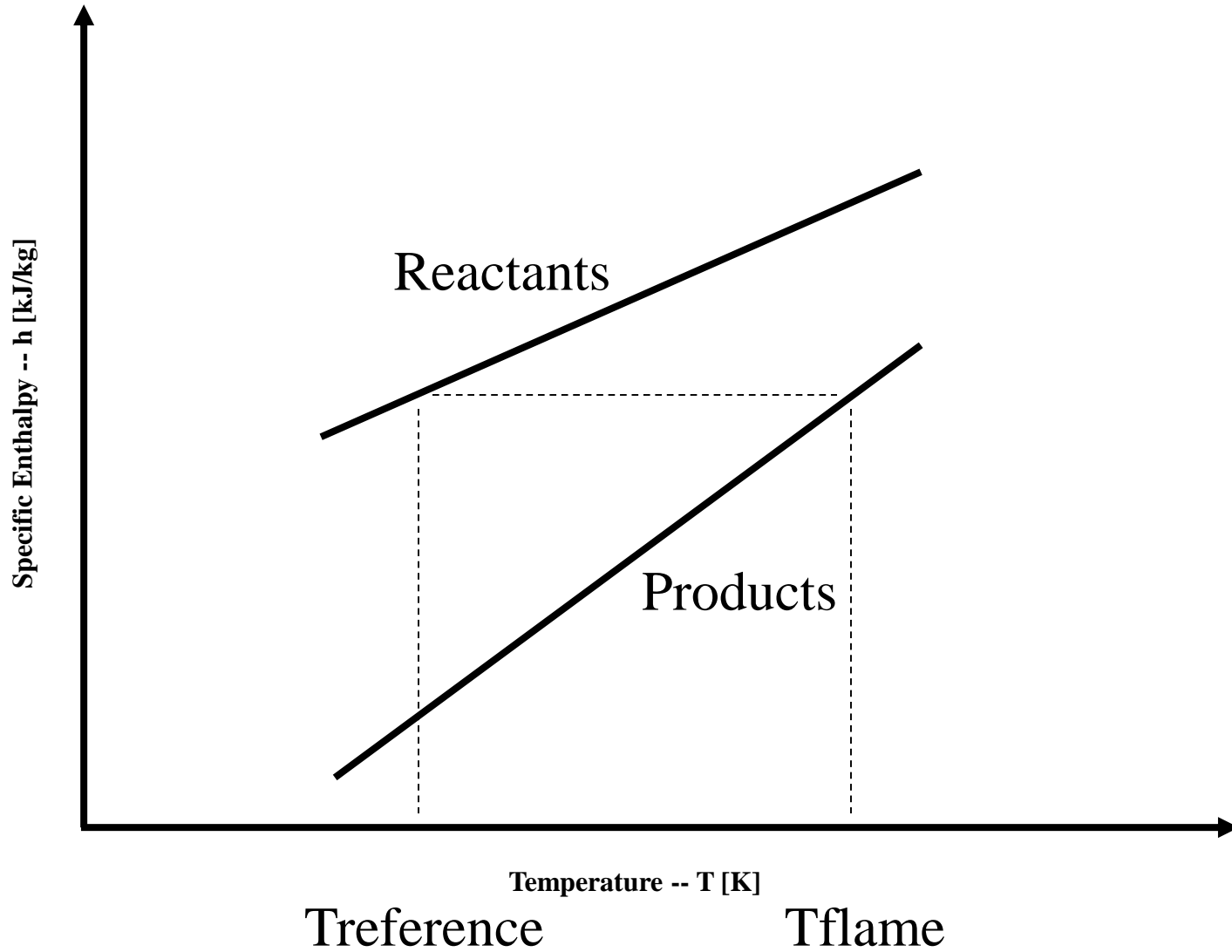


Combustion Products



Specific Enthalpy vs Temperature





Combustion $h - T$ Diagram

Combustion Products Composition

Element	Weight [kg/kg]	Mole [kmol/kmol]
CO ₂	0.295	0.210
H ₂ O	0.000	0.000
SO ₂	0.000	0.000
N ₂	0.705	0.790
O ₂	0.000	0.000

Combustion Values

Flame Temperature

2,460 [K]

Oxidant To Fuel Ratio

11.444 [/]

Fuel Composition -- Hydrogen

Element	Weight [kg/kg]
C	0.00
H	1.00
S	0.00
N	0.00
O	0.00
W	0.00

Oxidant (Air) Composition

Element	Weight [kg/kg]	Mole [kmol/kmol]
N	0.767	0.790
O	0.233	0.210

Combustion Schematic Layout

Fuel -- Hydrogen



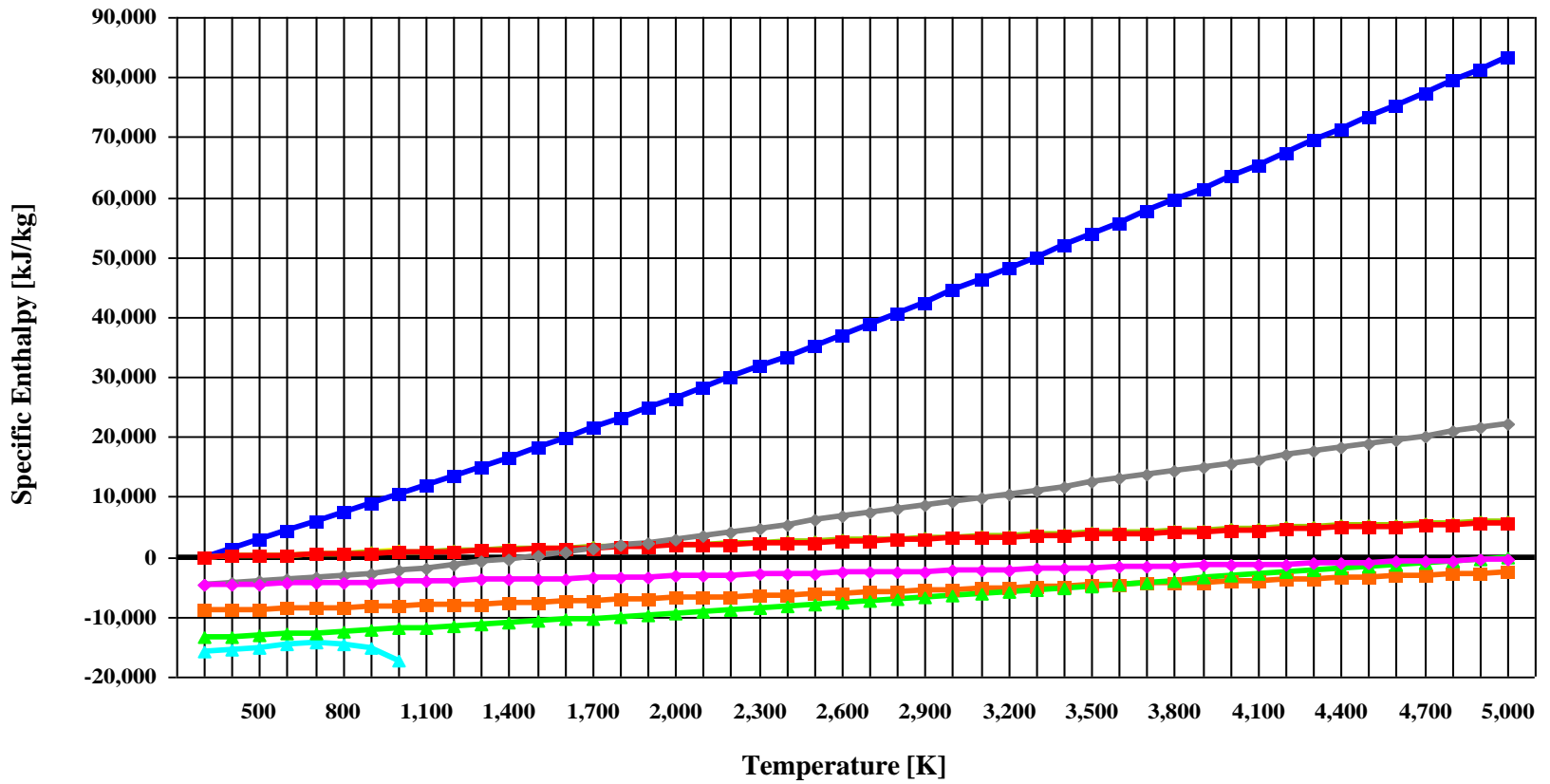
Oxidant -- Air

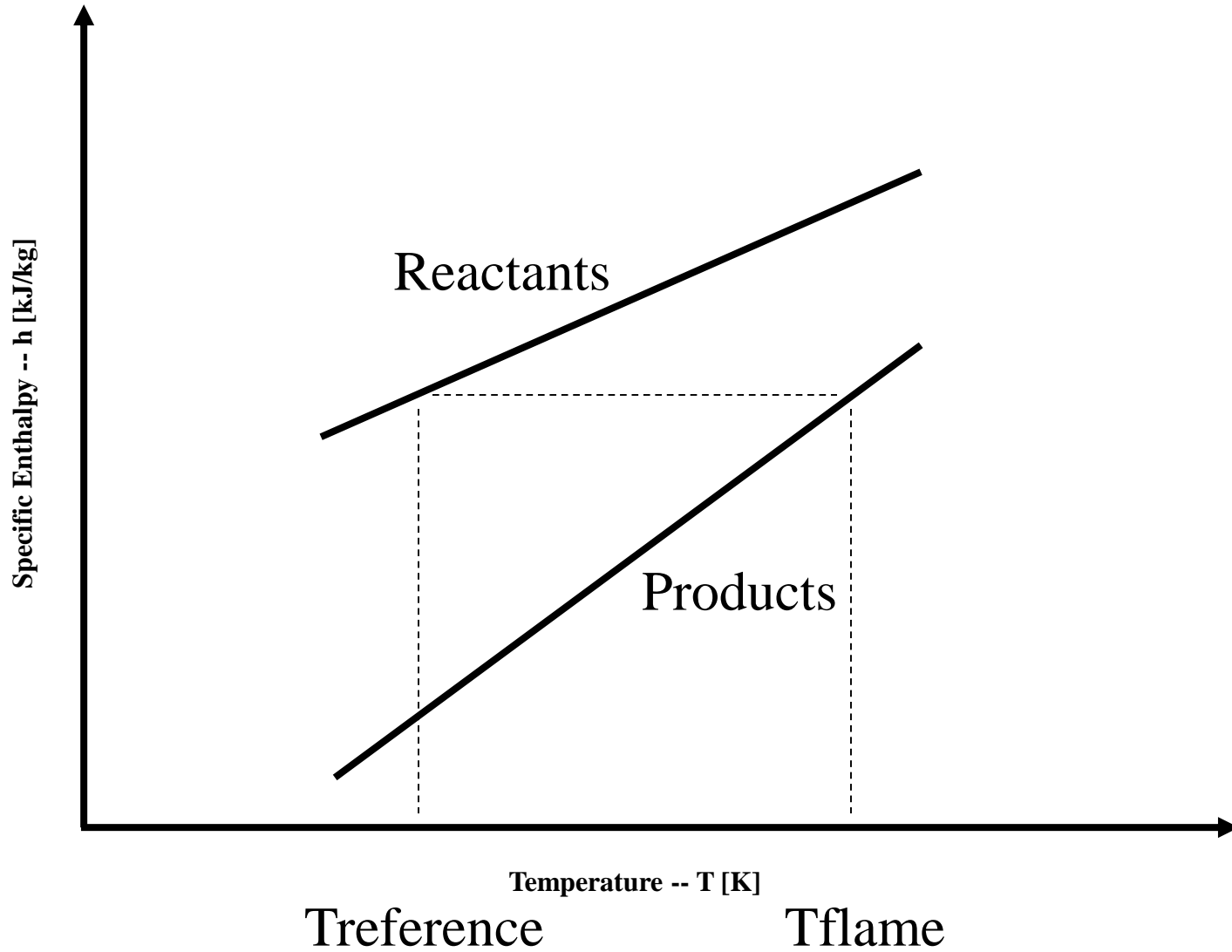


Combustion Products



Specific Enthalpy vs Temperature





Combustion $h - T$ Diagram

Combustion Products Composition

Element	Weight [kg/kg]	Mole [kmol/kmol]
CO ₂	0.000	0.000
H ₂ O	0.255	0.347
SO ₂	0.000	0.000
N ₂	0.745	0.653
O ₂	0.000	0.000

Combustion Values

Flame Temperature

2,525 [K]

Oxidant To Fuel Ratio

34.333 [/]

Fuel Composition -- Sulfur

Element	Weight [kg/kg]
C	0.00
H	0.00
S	1.00
N	0.00
O	0.00
W	0.00

Oxidant (Air) Composition

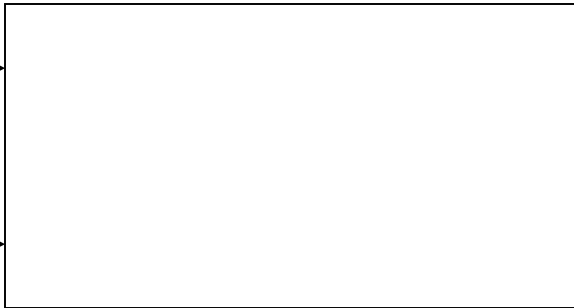
Element	Weight [kg/kg]	Mole [kmol/kmol]
N	0.767	0.790
O	0.233	0.210

Combustion Schematic Layout

Fuel -- Sulfur



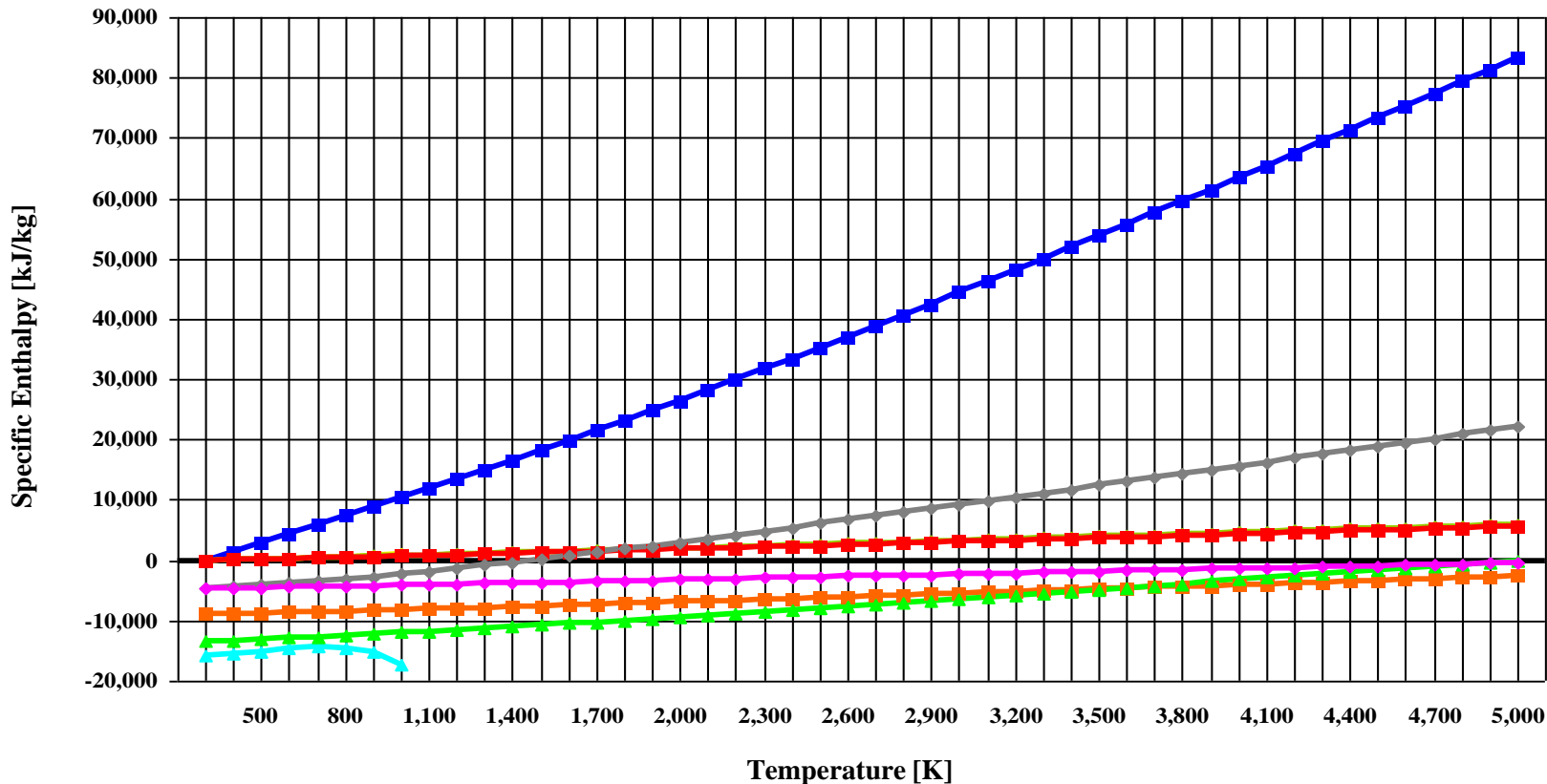
Oxidant -- Air

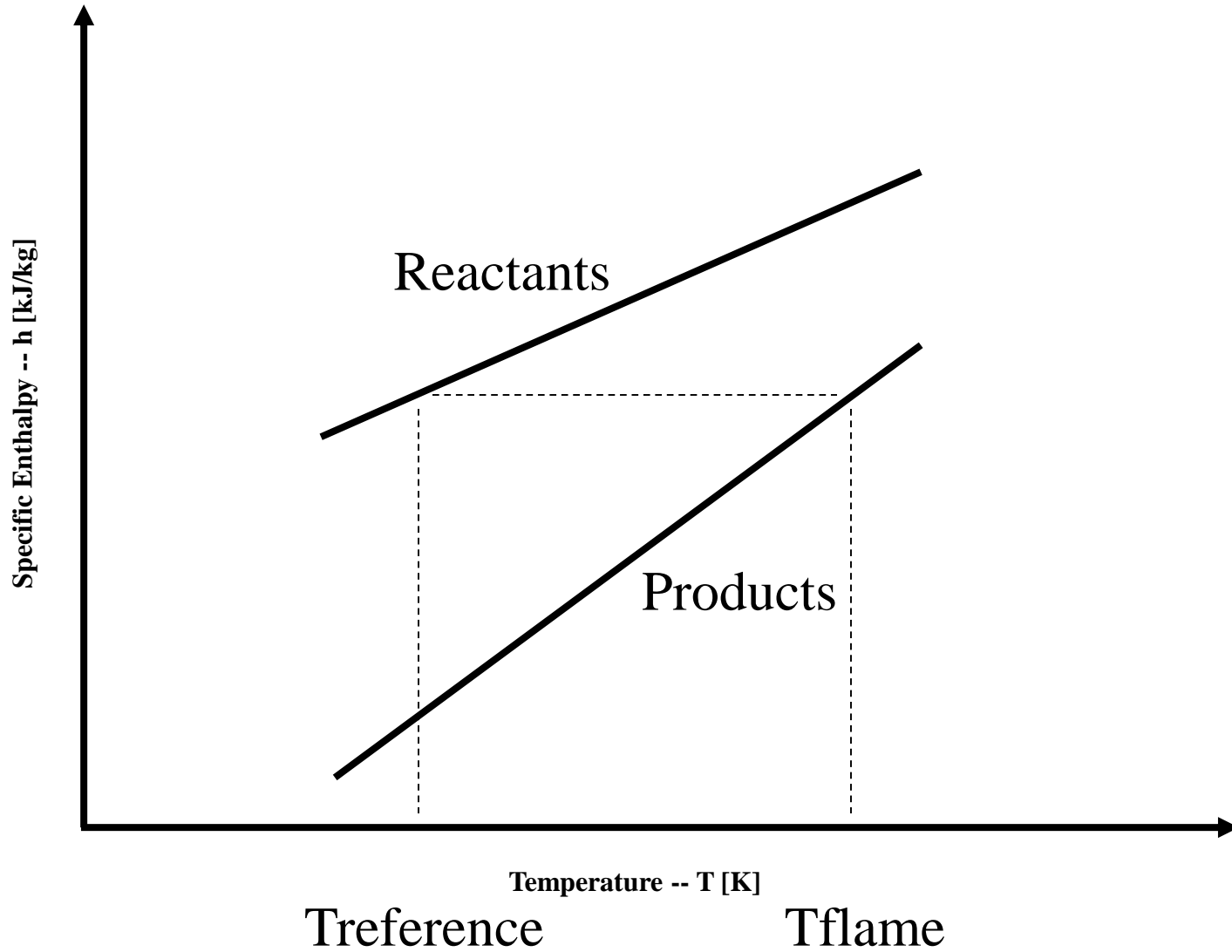


Combustion Products



Specific Enthalpy vs Temperature





Combustion $h - T$ Diagram

Combustion Products Composition

Element	Weight [kg/kg]	Mole [kmol/kmol]
CO ₂	0 . 000	0 . 000
H ₂ O	0 . 000	0 . 000
SO ₂	0 . 378	0 . 210
N ₂	0 . 622	0 . 790
O ₂	0 . 000	0 . 000

Combustion Values

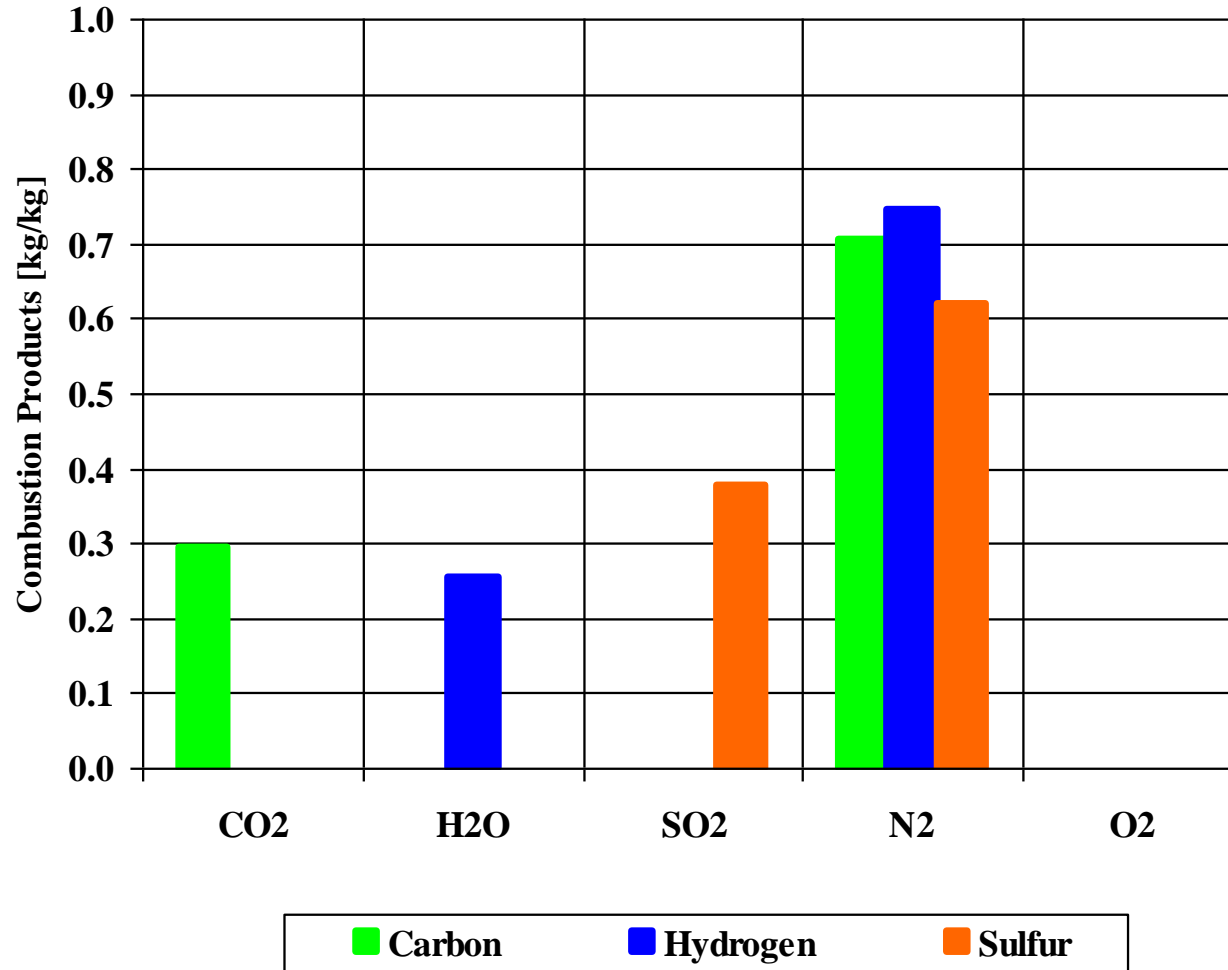
Flame Temperature

1,972 [K]

Oxidant To Fuel Ratio

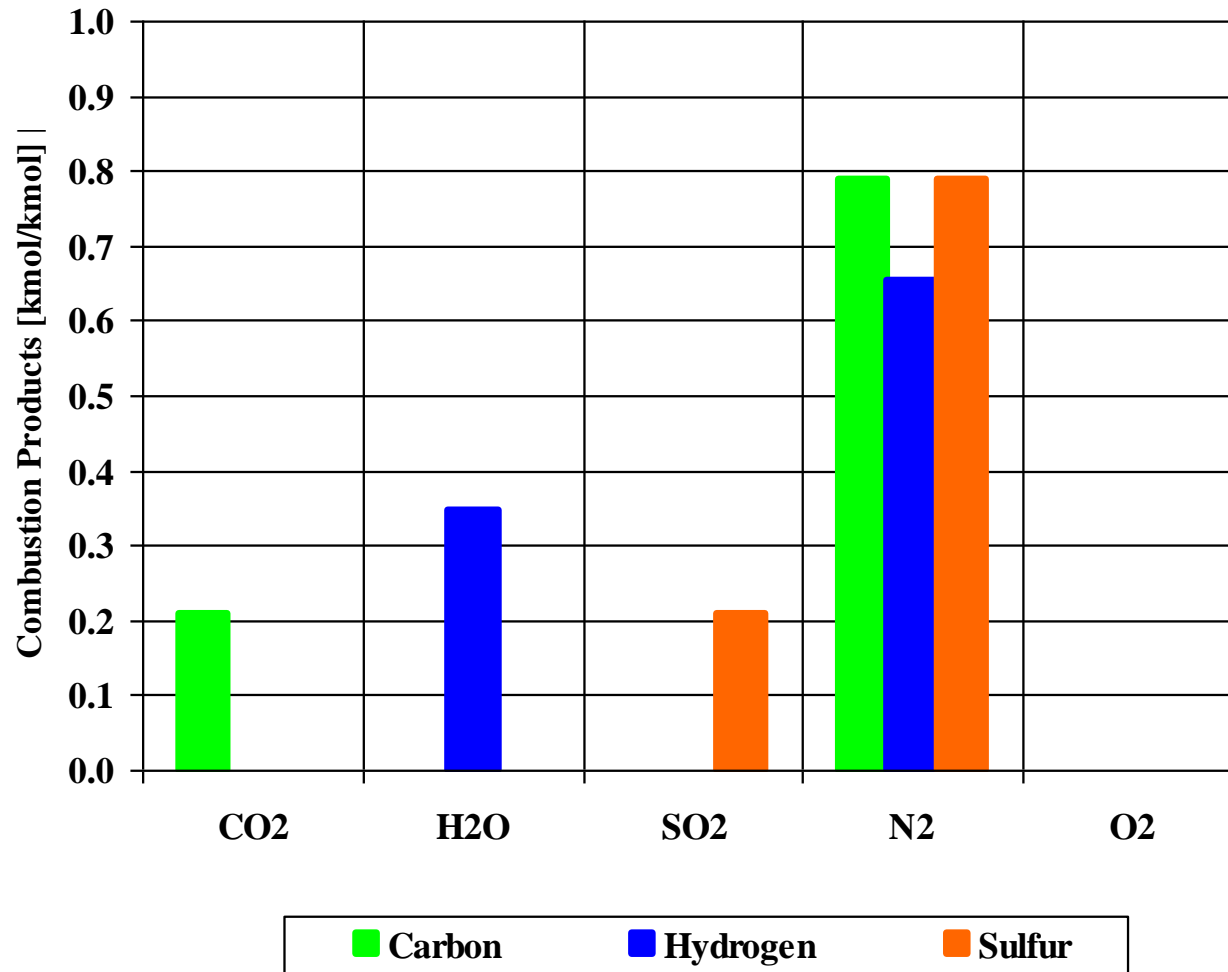
4.292 [/]

Combustion Products -- Weight Basis



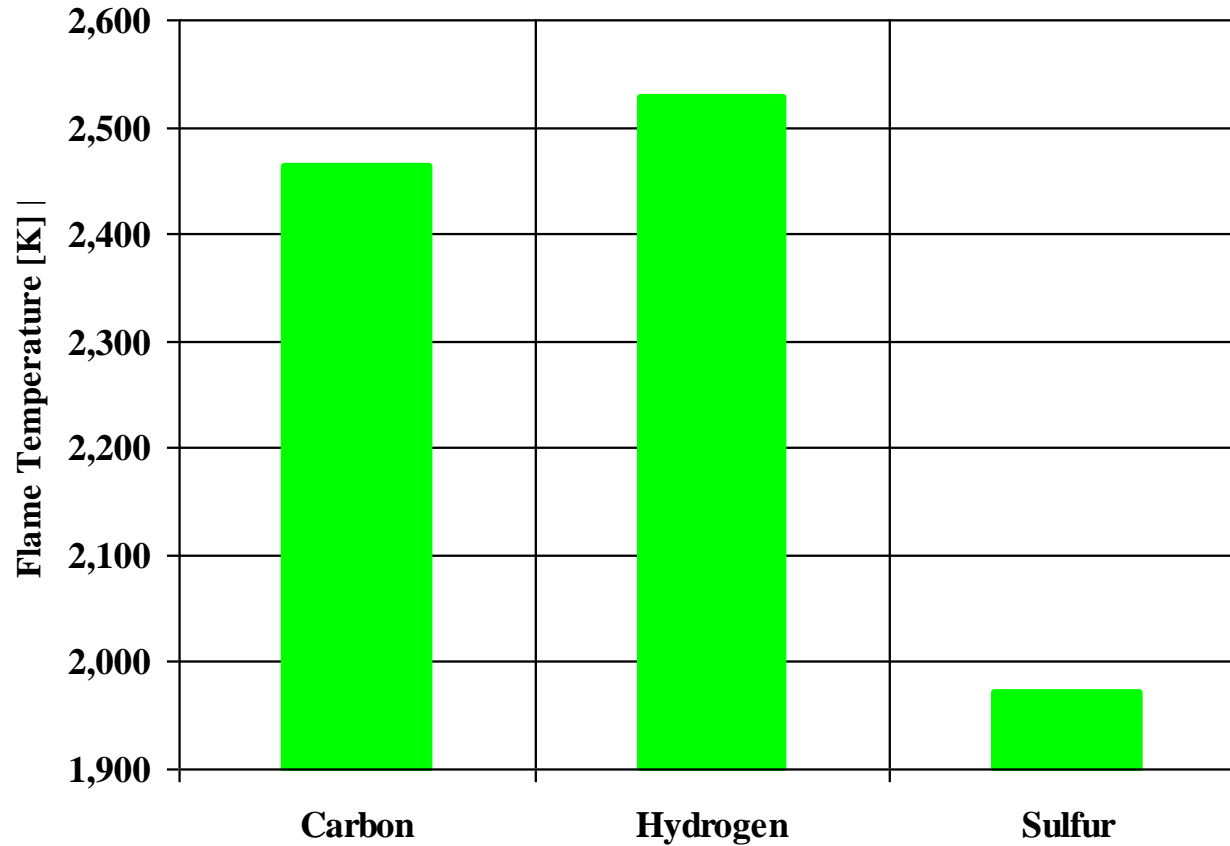
Fuel and Oxidant Inlet Temperature: 298 [K]

Combustion Products -- Mole Basis



Fuel and Oxidant Inlet Temperature: 298 [K]

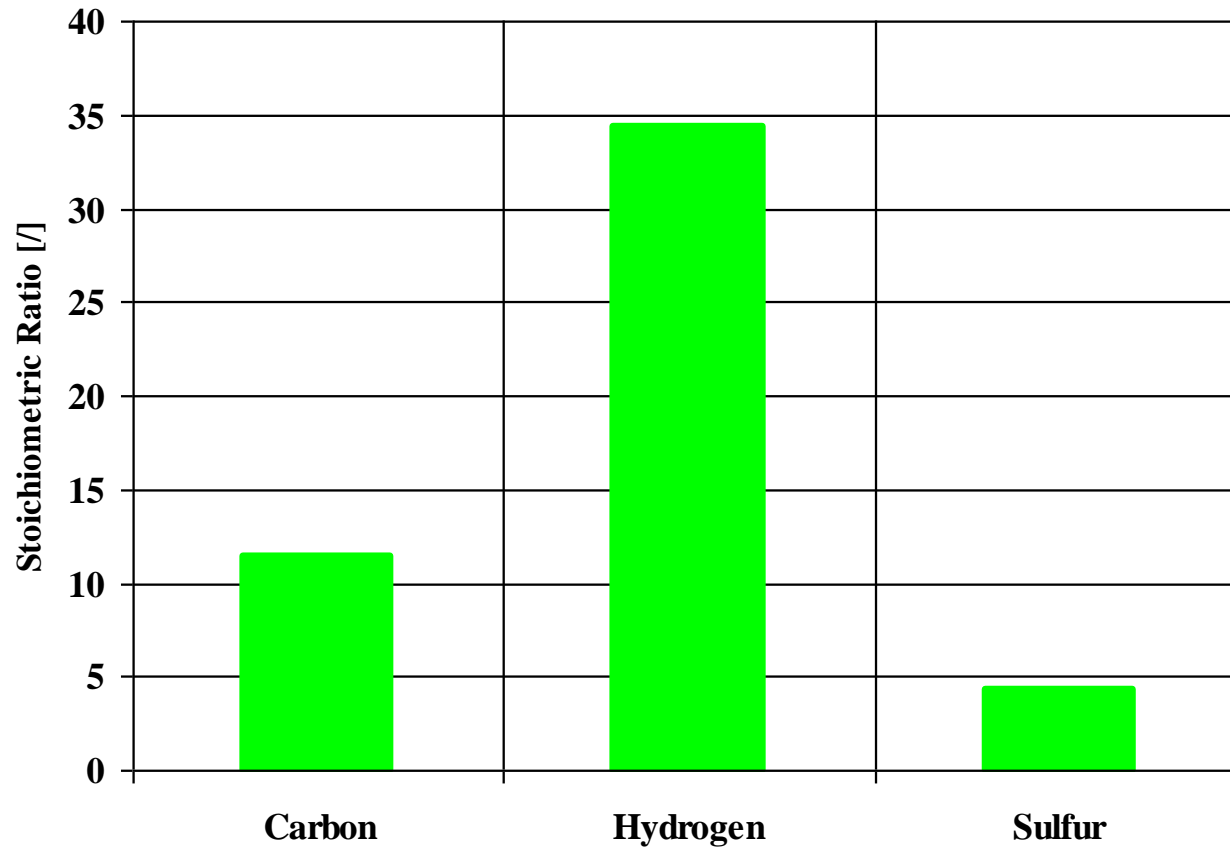
Combustion Products Flame Temperature



■ Flame Temperature [K]

Fuel and Oxidant Inlet Temperature: 298 [K]

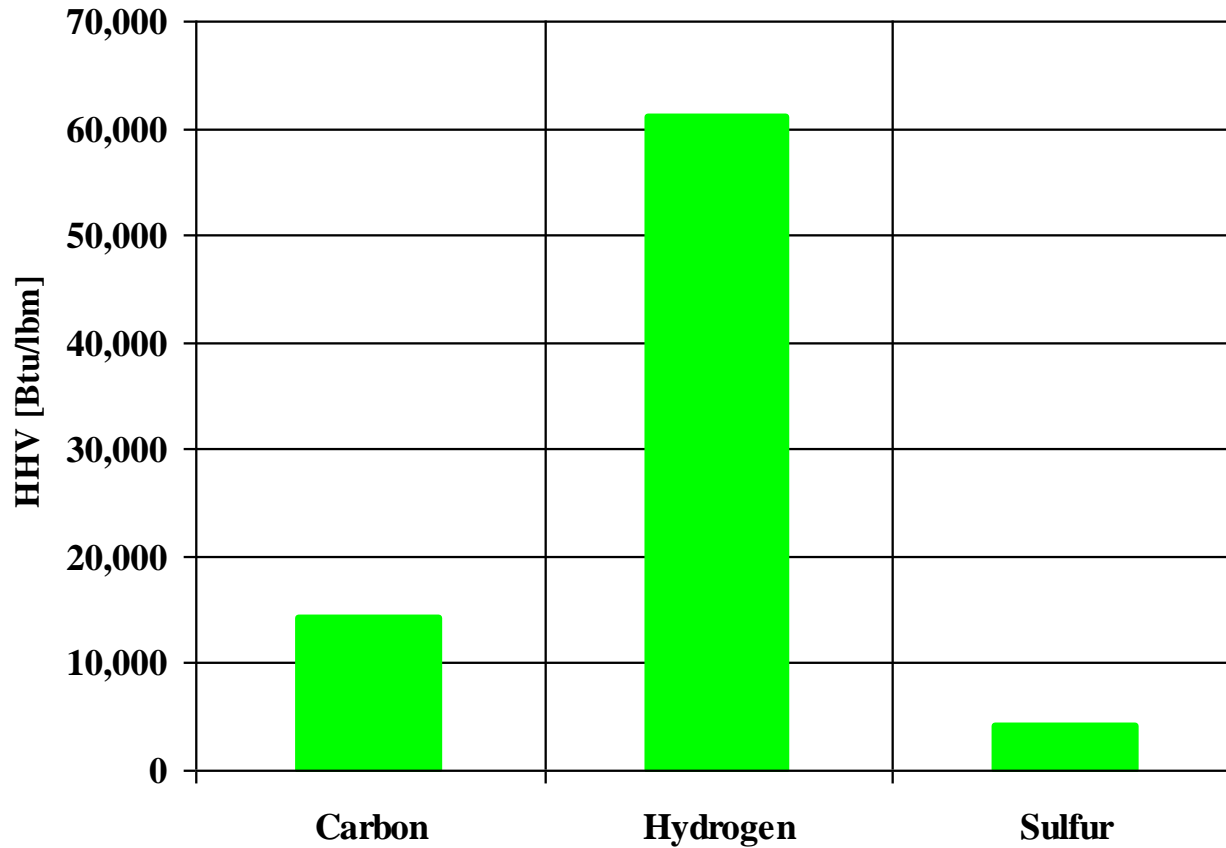
Combustion Stoichiometric Ratio



■ Stoichiometric Ratio (Oxidant to Fuel) [l]

Fuel and Oxidant Inlet Temperature: 298 [K]

Higher Heating Value (HHV)



■ HHV [Btu/lbm]

Fuel and Oxidant Inlet Temperature: 298 [K]

Request for Free Information

To get a free evaluation copy of the **Engineering Software** product line, place an order, find out more about how you can profit or benefit from the product line, visit the **Engineering Software** web site at: <http://www.engineering-4e.com> or send an e-mail to info@engineering-4e.com or call **(301) 919-9670**.