Ignition Temperature of Impregnated Carbons

C. B. Summers and J. L. Kovach

NUCON International Inc.

Factors Influencing Ignition Temperature

- Surface Area
- Particle Size
- Air Velocity
- Bed Depth
- Contaminants (Impregnants)

ASTM D3466-76

- Based on work by Kovach and Millham
- Specifications based on operating conditions similar to Hanford and Savannah River
- 100 FPM Velocity
- 1 inch deep bed

The Caveat

- The ignition temperature as determined by this test cannot be interpreted as the probable ignition temperature of the same carbon under operating conditions of a specific application unless those conditions are essentially the same as those in this procedure

ANSI 509-1976

- Specified properties for activated carbons

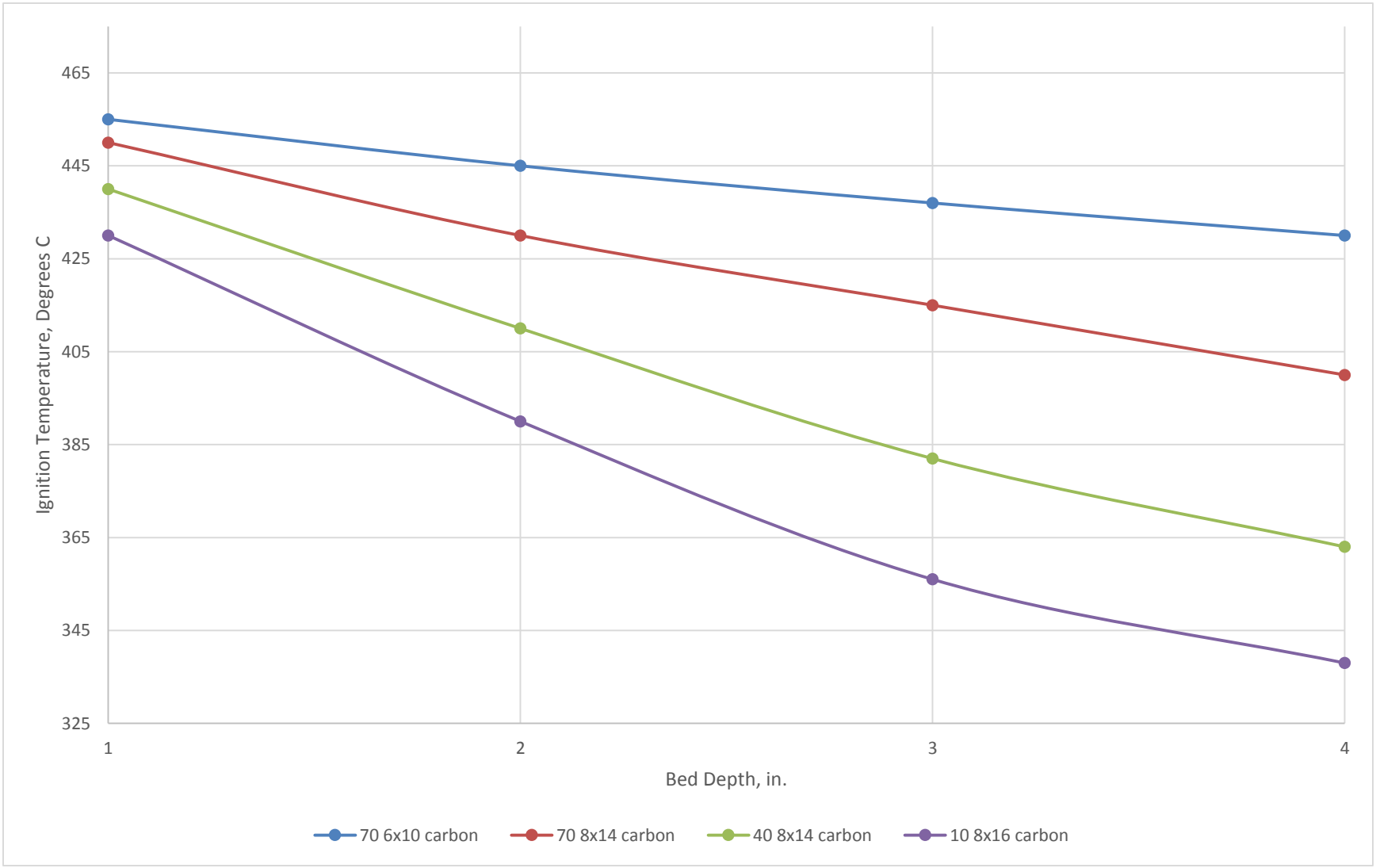
330° C

The Discrepancy

- Standard Test
- 100 FPM
- 1 inch deep bed

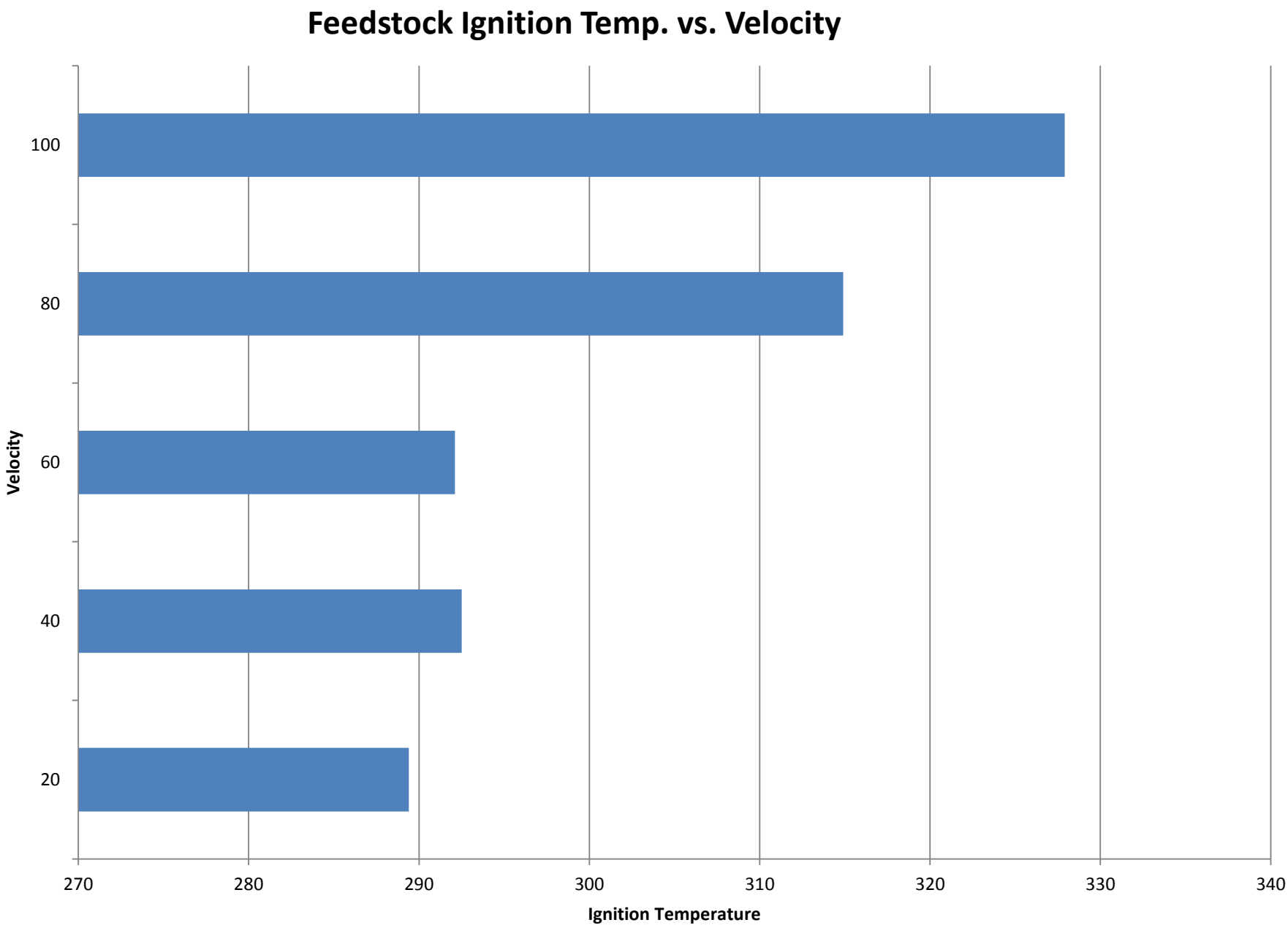
- Operating Conditions
- 40 FPM
- 2 inch deep bed

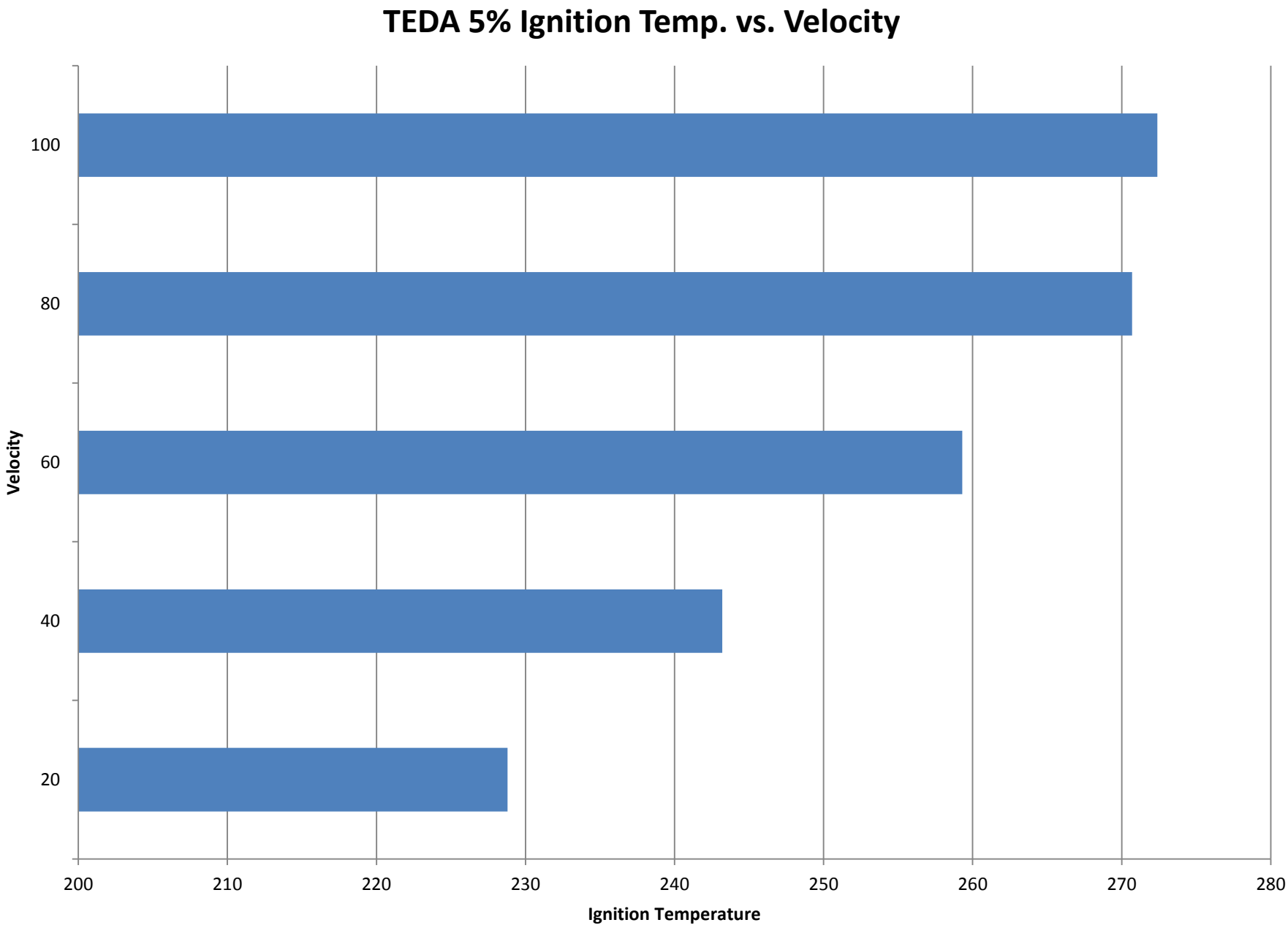
Effect of Bed Depth and Particle Size on Ignition Temperature

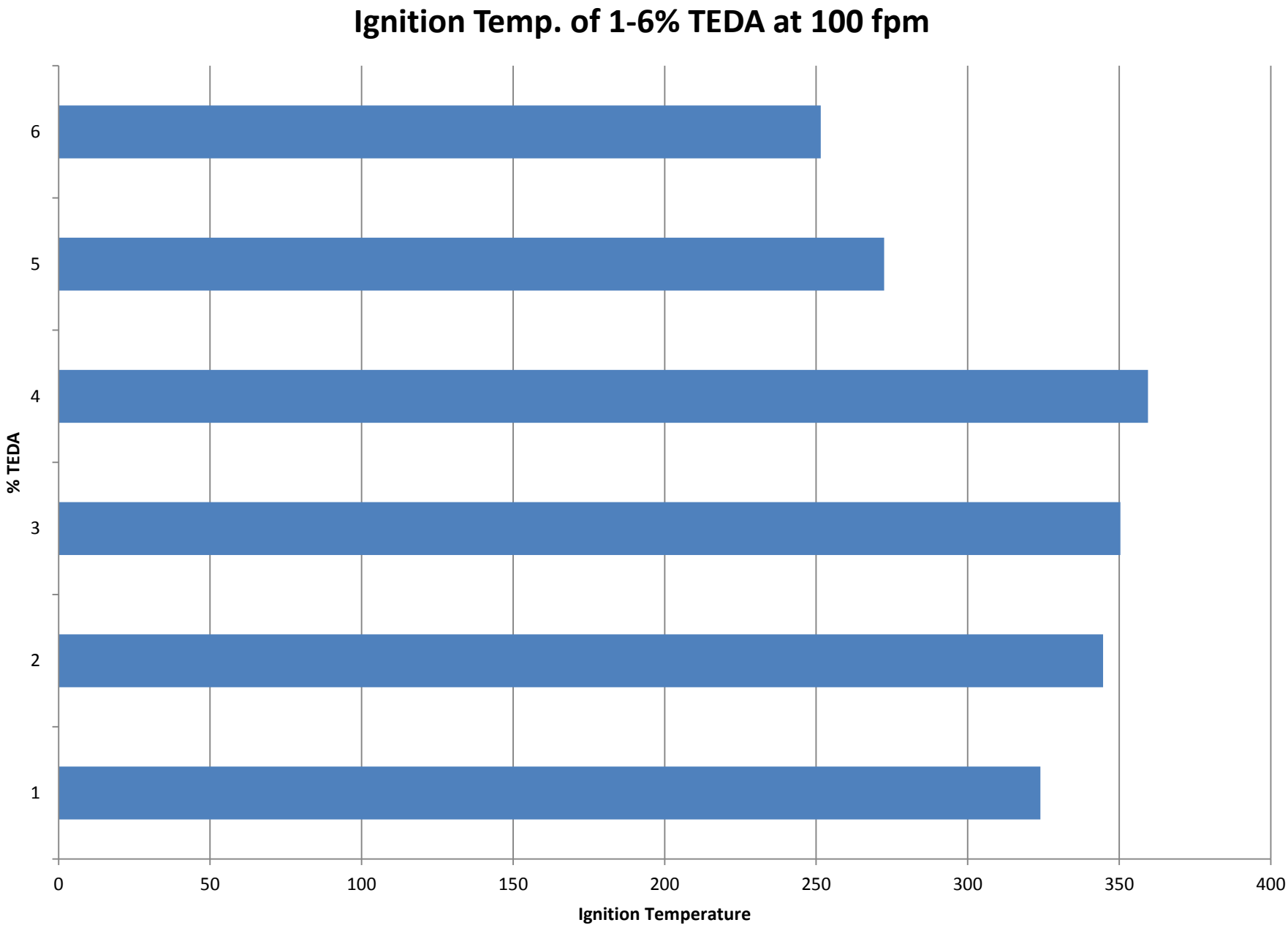


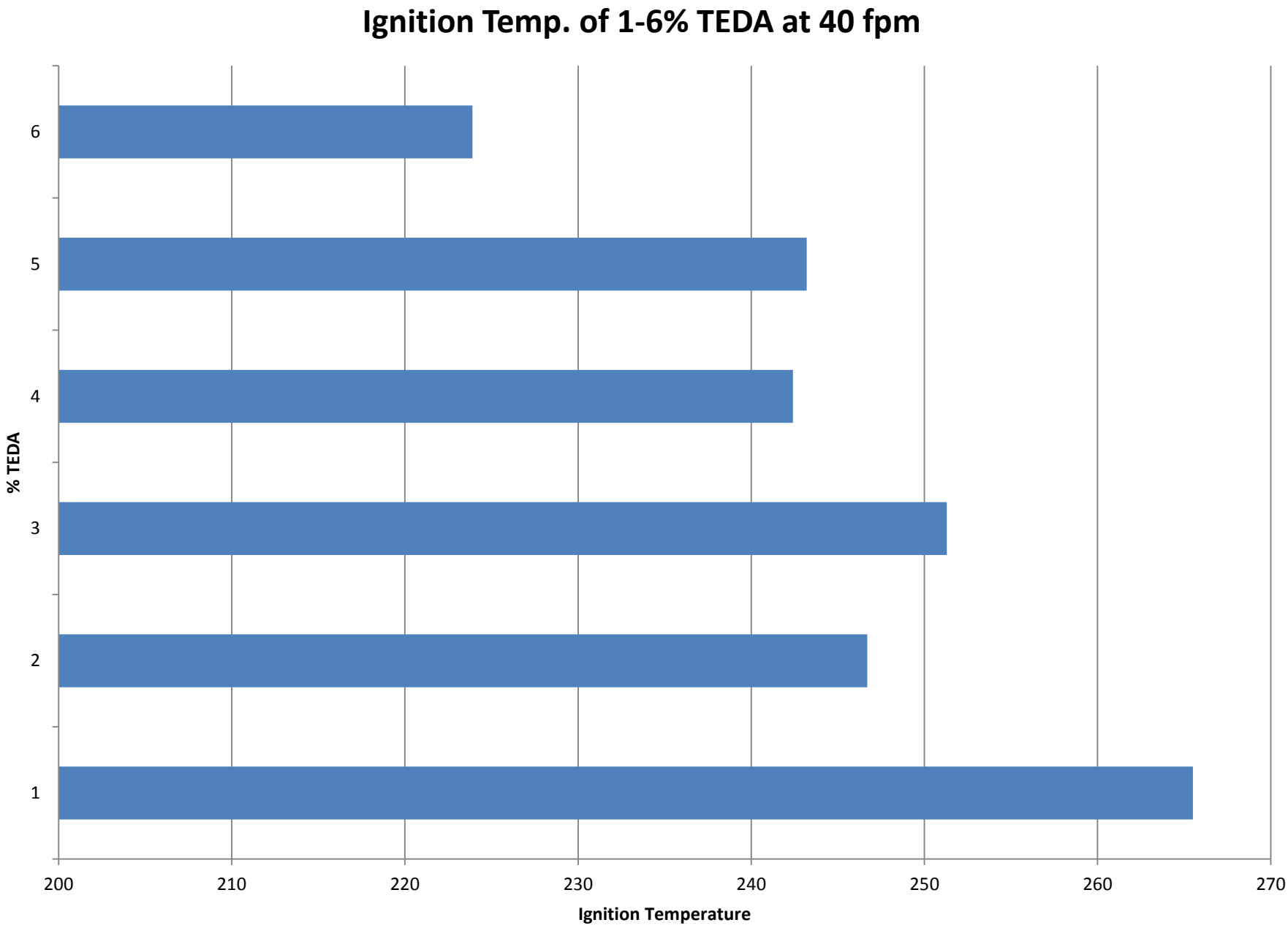
TEDA

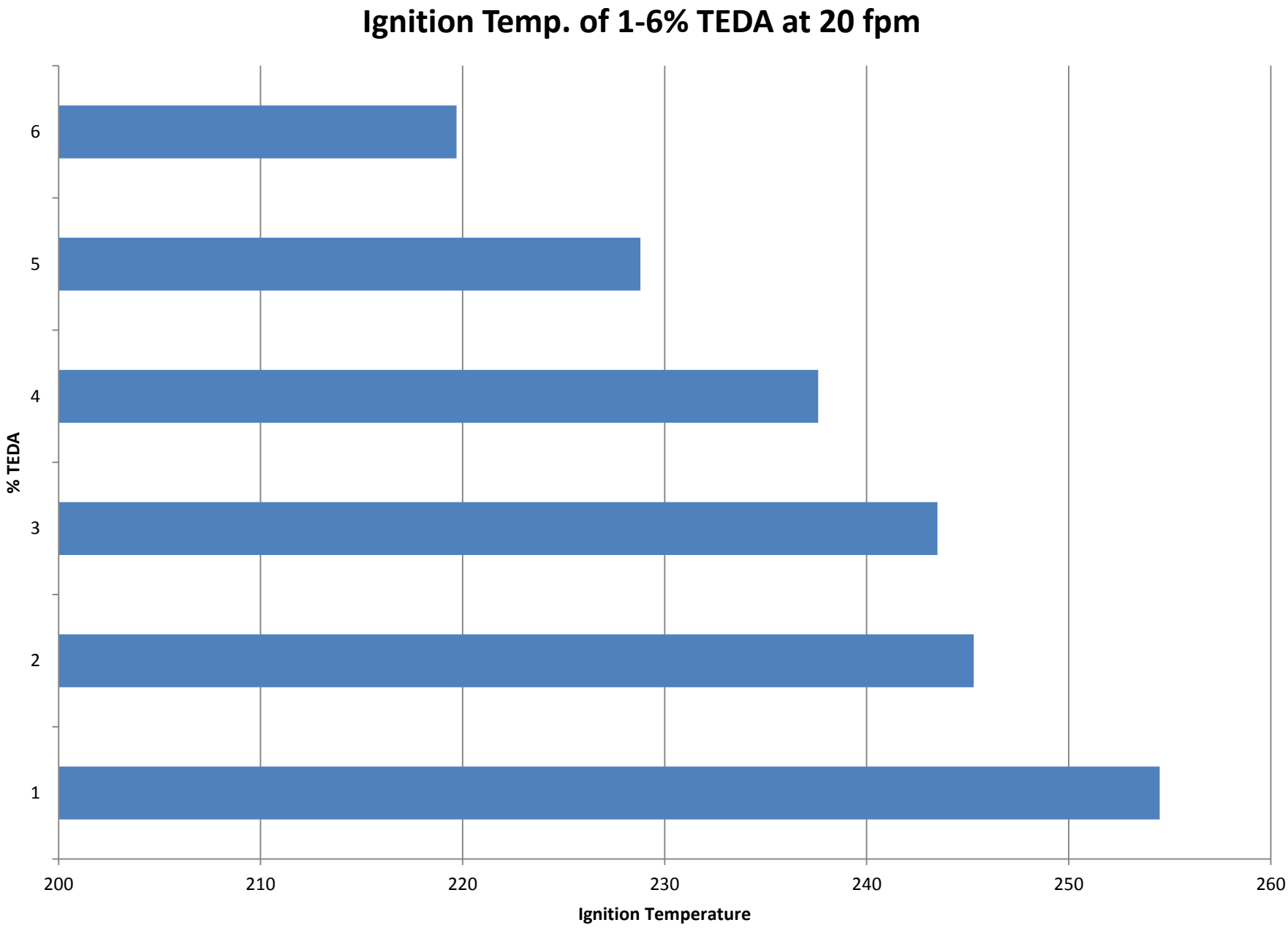
- Detectable levels desorbed at 90° C
- Thermal degradation starting at 120° C
- Melting Point 155 – 160° C
- Boiling Point 174° C
- Flash Point 62° C

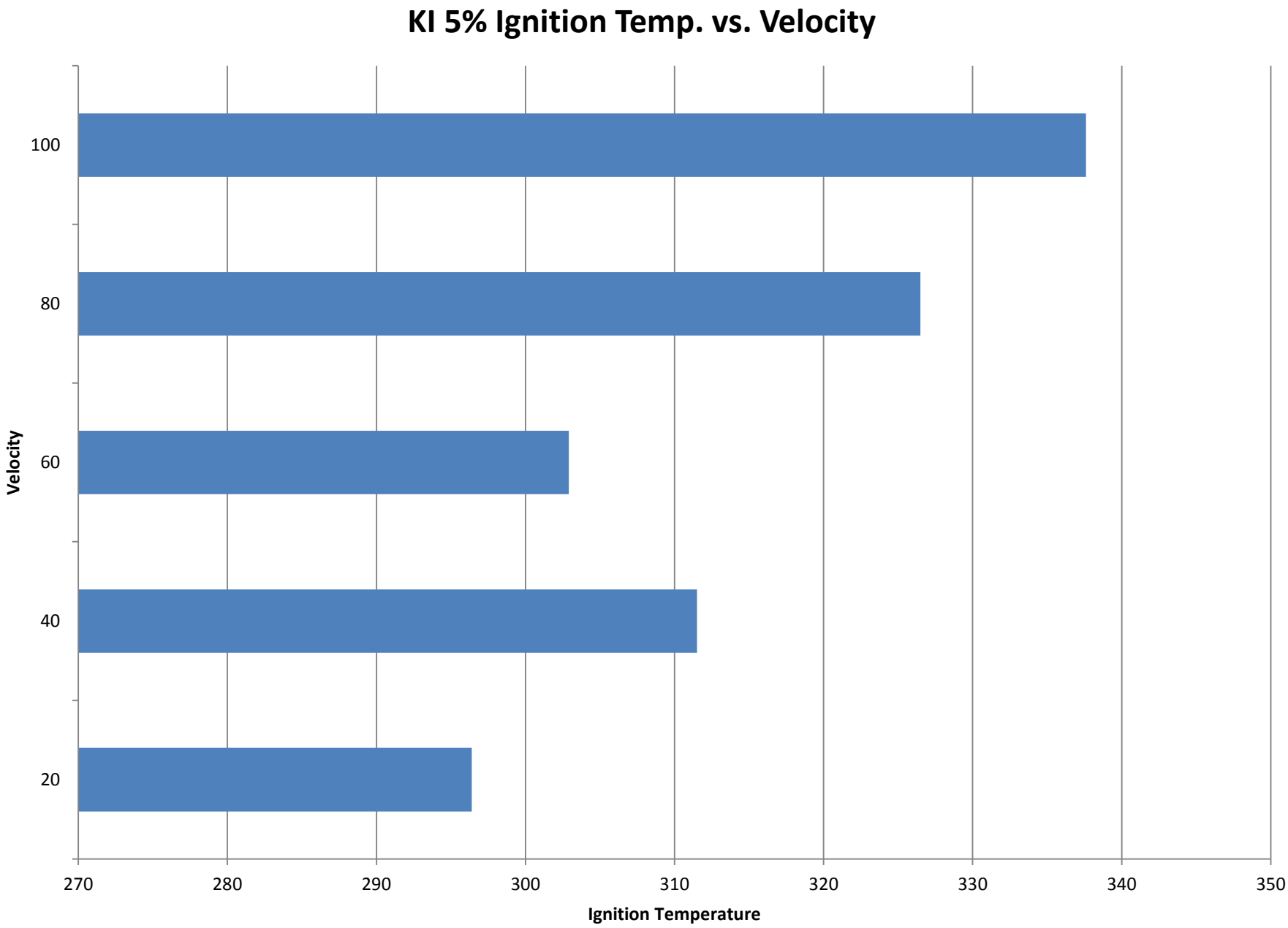

Feedstock Ignition Temp. vs. Velocity
Velocity
100
80
60
40
20
270
280
290
300
310
320
330
340
Ignition Temperature

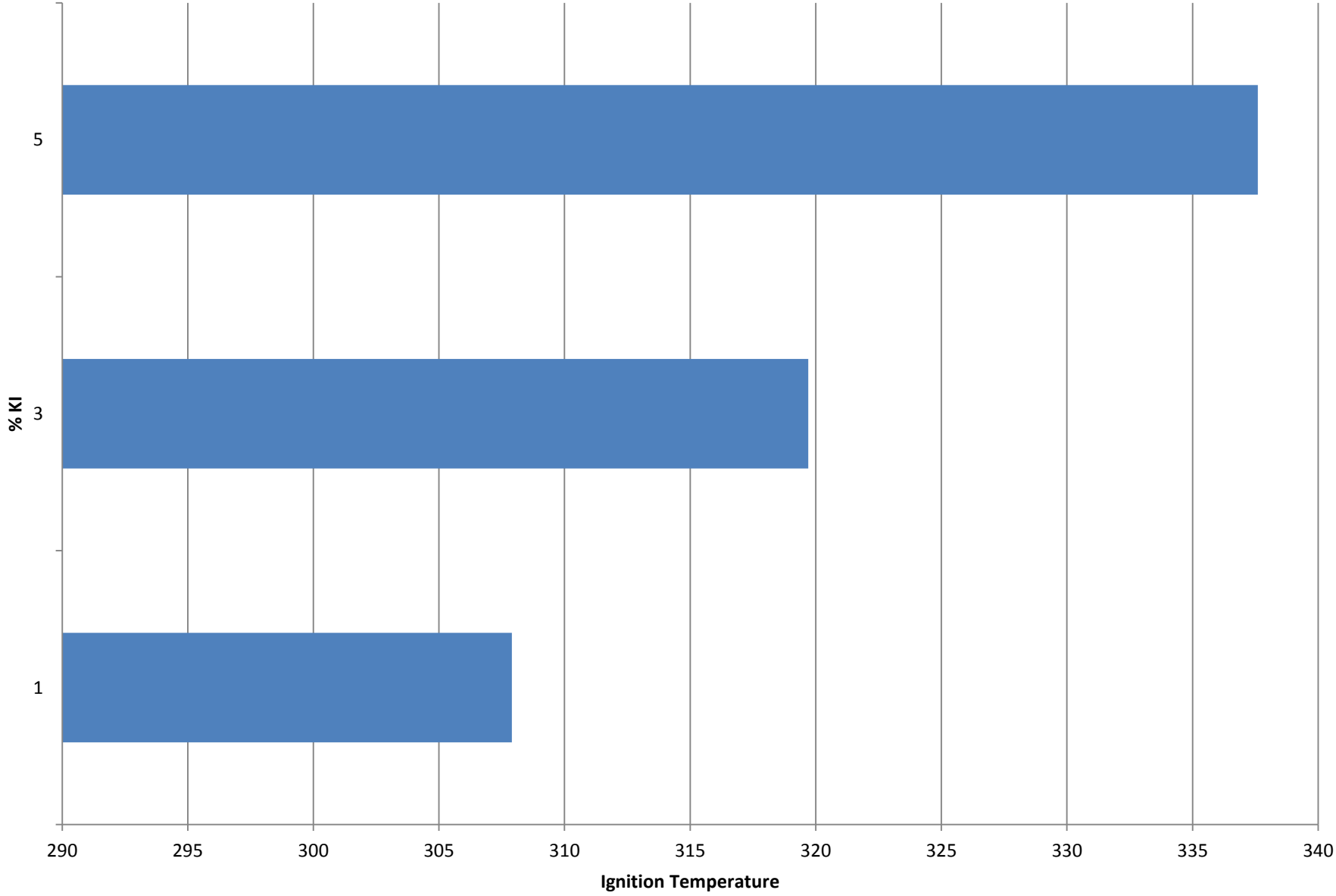

TEDA 5% Ignition Temp. vs. Velocity
Velocity
100
80
60
40
20
200
210
220
230
240
250
260
270
280
Ignition Temperature

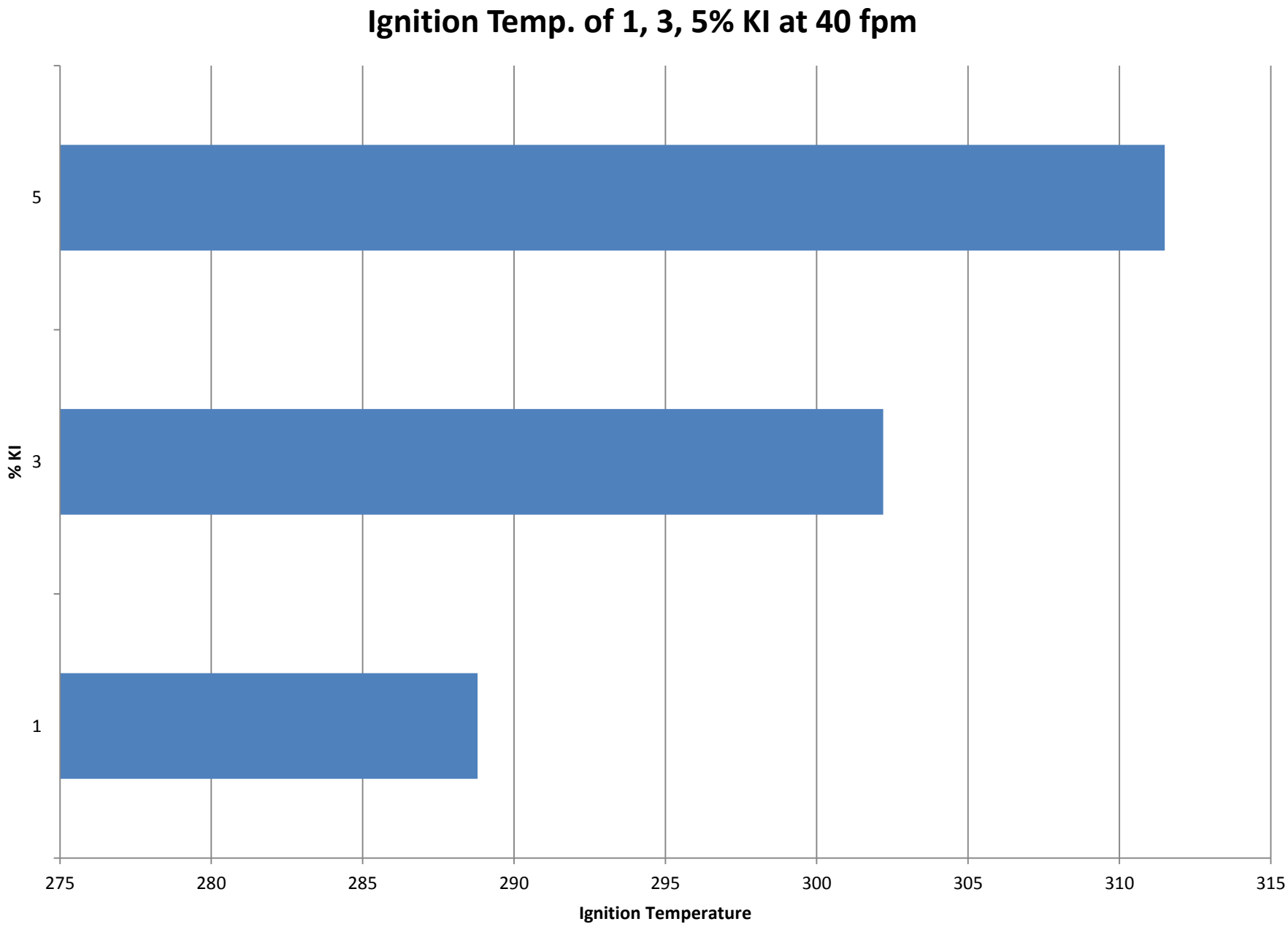

Ignition Temp. of 1-6% TEDA at 100 fpm
% TEDA
6
5
4
3
2
1
0
50
100
150
200
250
300
350
400
Ignition Temperature


Ignition Temp. of 1-6% TEDA at 40 fpm
% TEDA
6
5
4
3
2
1
200
210
220
230
240
250
260
270
Ignition Temperature


Ignition Temp. of 1-6% TEDA at 20 fpm
% TEDA
6
5
4
3
2
1
200
210
220
230
240
250
260
Ignition Temperature


KI 5% Ignition Temp. vs. Velocity
Velocity
100
80
60
40
20
270
280
290
300
310
320
330
340
350
Ignition Temperature


Ignition Temp. of 1, 3, 5% KI at 100 fpm
% KI
5
3
1
290
295
300
305
310
315
320
325
330
335
340
Ignition Temperature


Ignition Temp. of 1, 3, 5% KI at 40 fpm
% KI
5
3
1
275
280
285
290
295
300
305
310
315
Ignition Temperature

Variability

5% TEDA

Trial	20 fpm	40 fpm	60 fpm	80 fpm	100 fpm
1	249.2	266.2	285.5	283.7	366.8
2	246.7	277.3	304	313.6	367.7
3	248.2	275.2	285.5	306.4	350.6
Avg	248.0	272.9	291.7	301.2	361.7
Std Dev	1.3	5.9	10.7	15.6	9.6

The physical and chemical properties of heterogeneous materials are often….

Heterogeneous