LNT Catalyst Test Methods: Round Robin Testing at Six Labs

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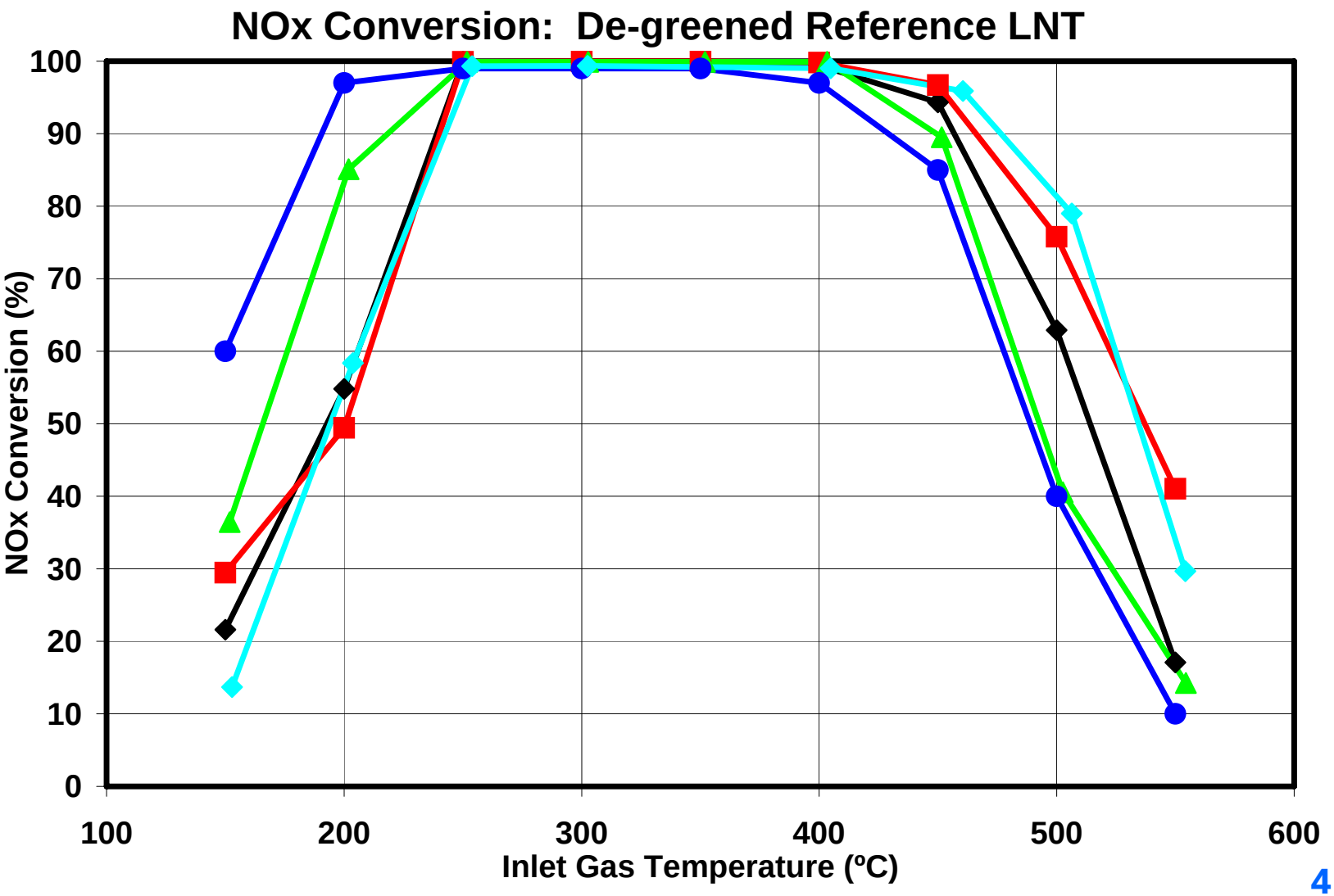
LNT Test

- Measure conversion versus temperature
- Lab gas mixture: O_2, C_3H_6, CO, H_2, NO, CO_2, H_2O
- 60 seconds Lean, 5 seconds Rich
- 30K hr^{-1} space velocity
- Temperature stabilized at each level
- Age 1 hour at 850C, 5% H_2O and repeat

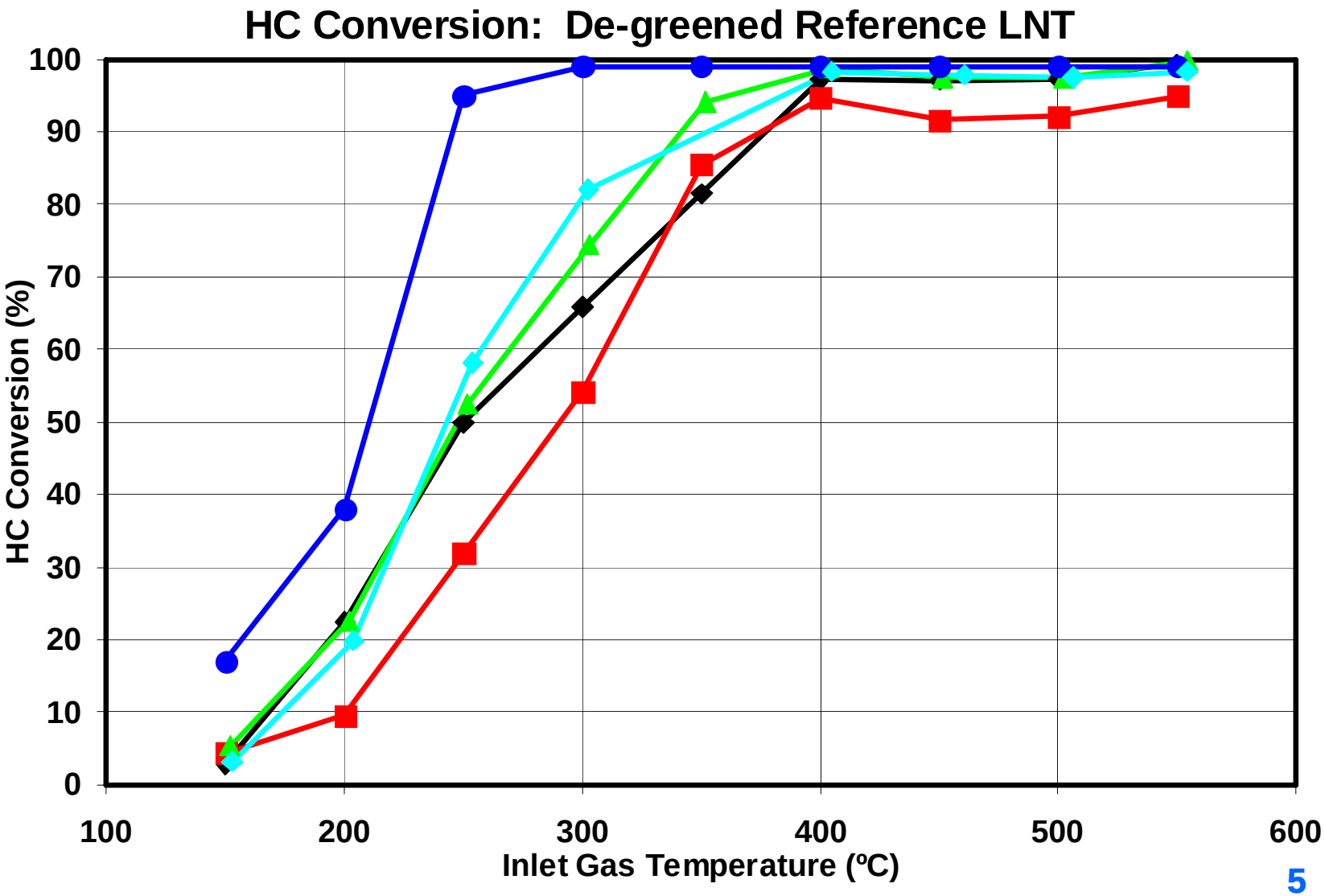
Round Robin

- GDI NOx Trap catalyst provided by one supplier, as used in a current production application
- Bricks cut and supplied to five catalyst supplier labs plus Ford Research Lab

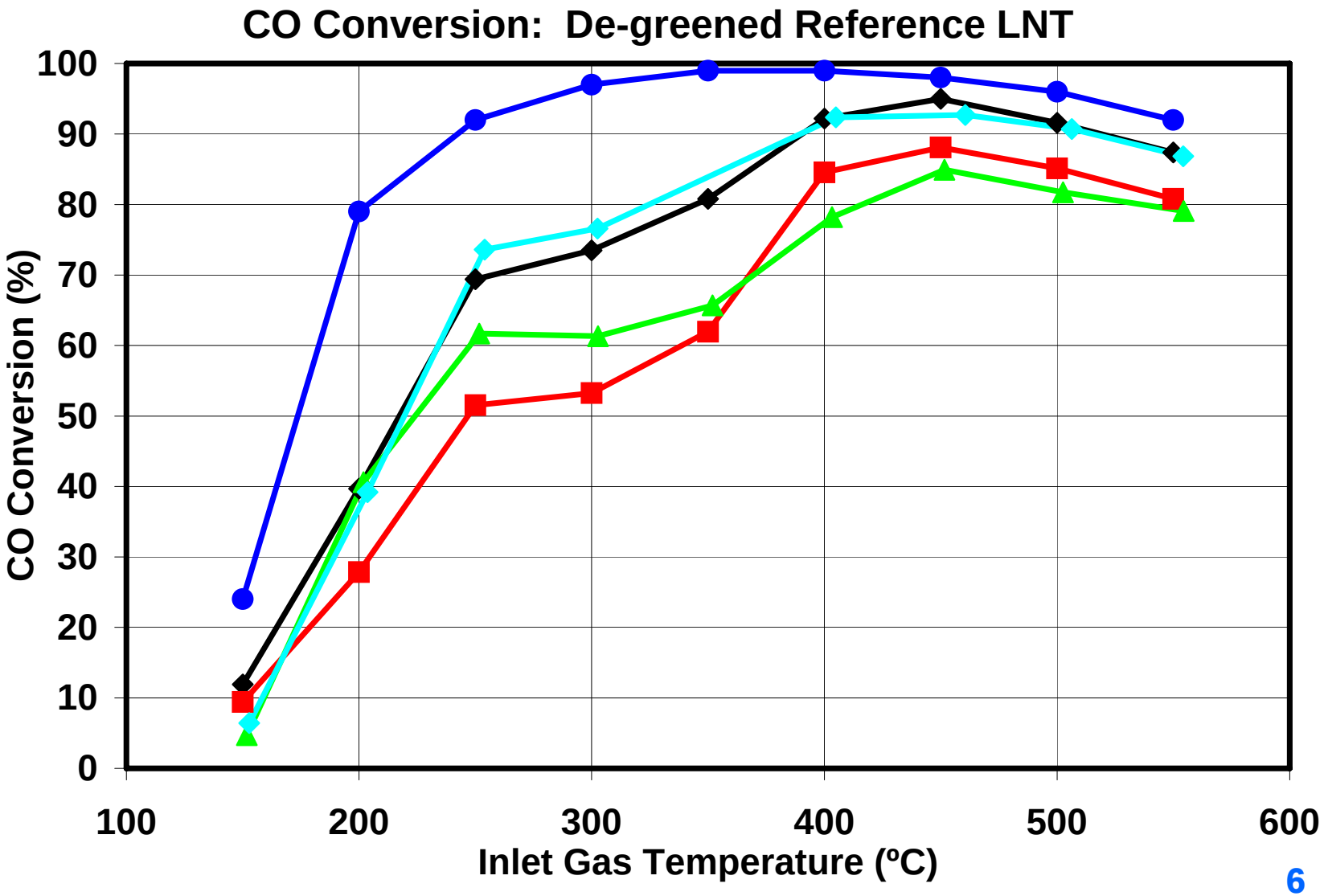
NOx Conversion



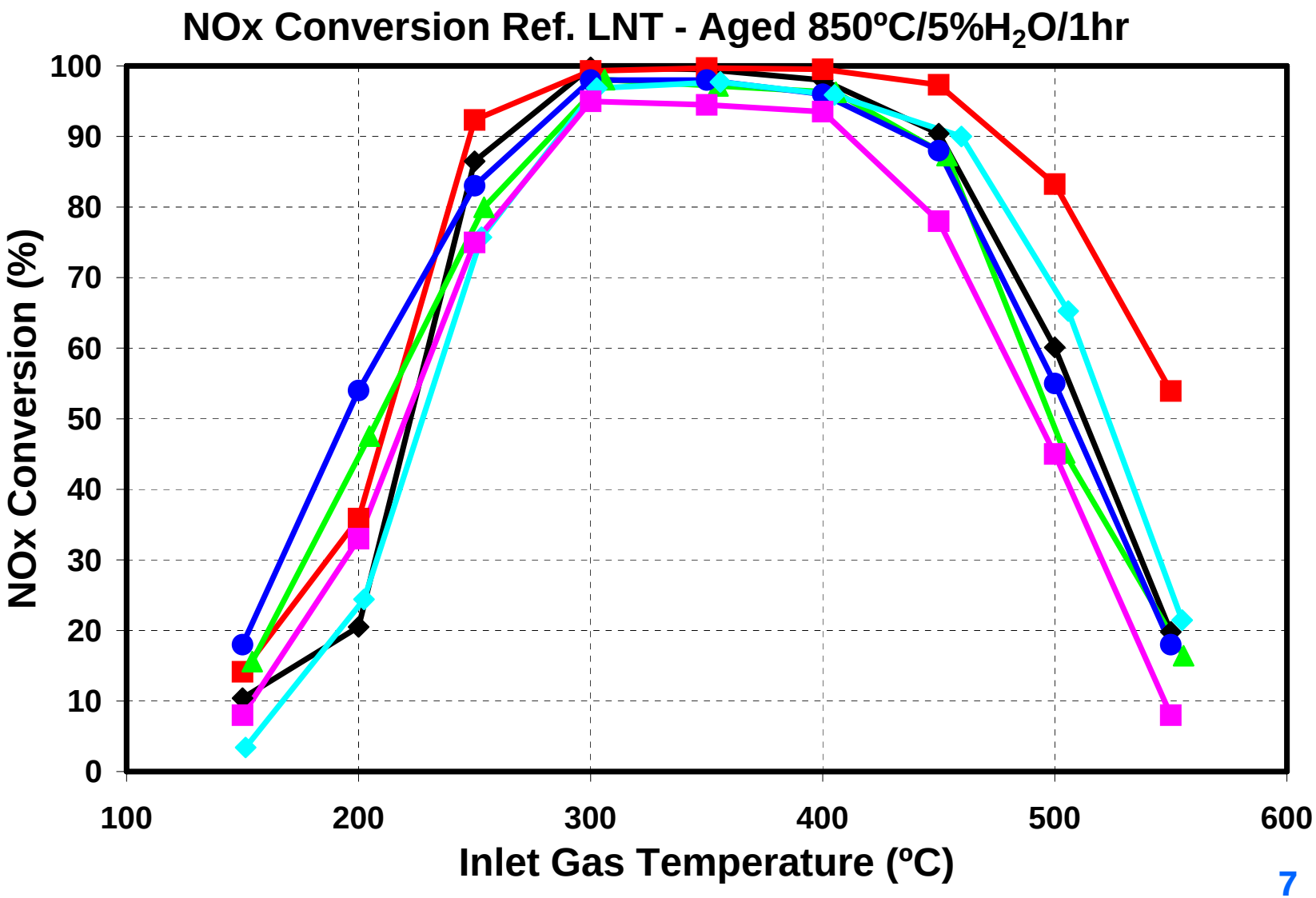
HC Conversion



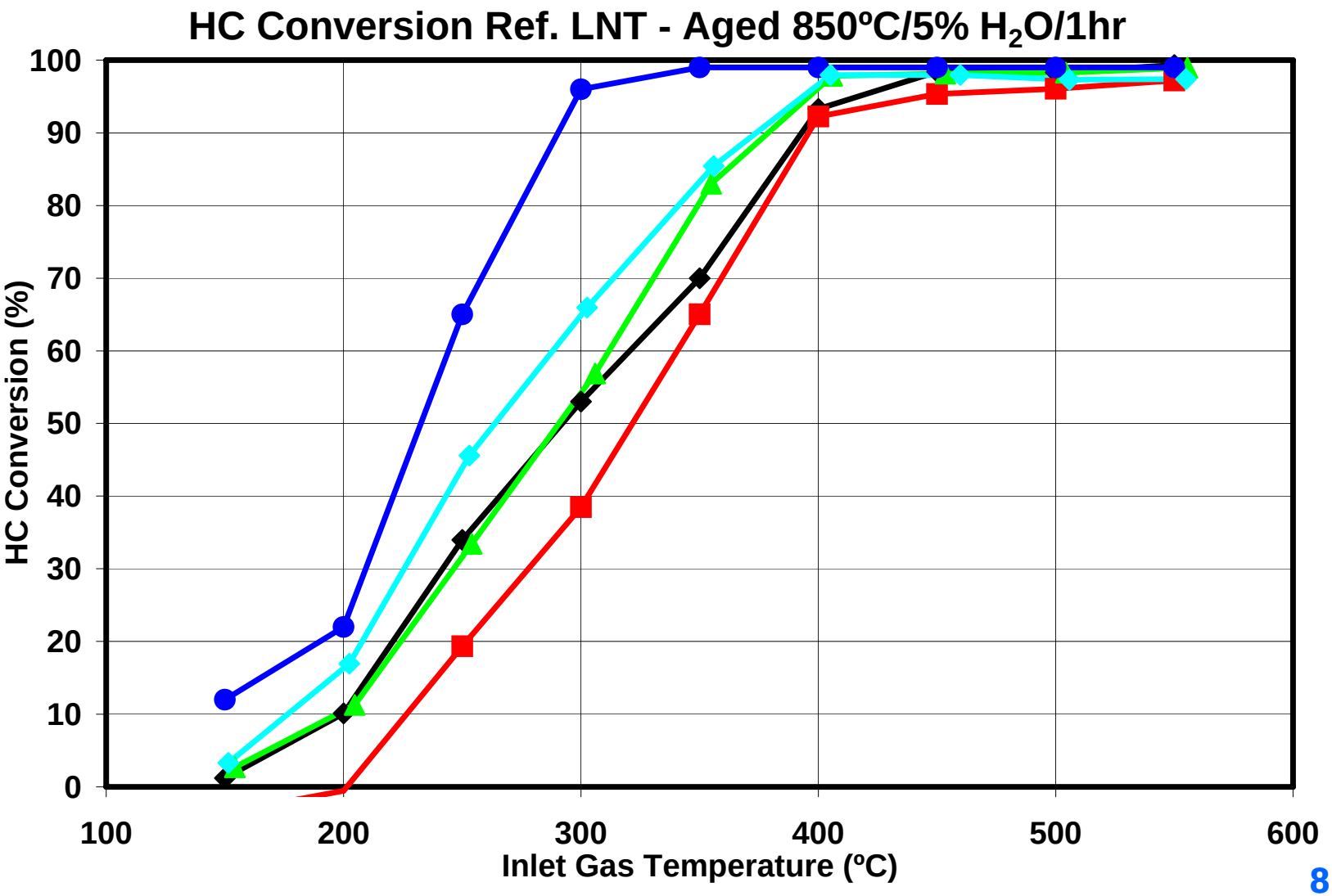
CO Conversion



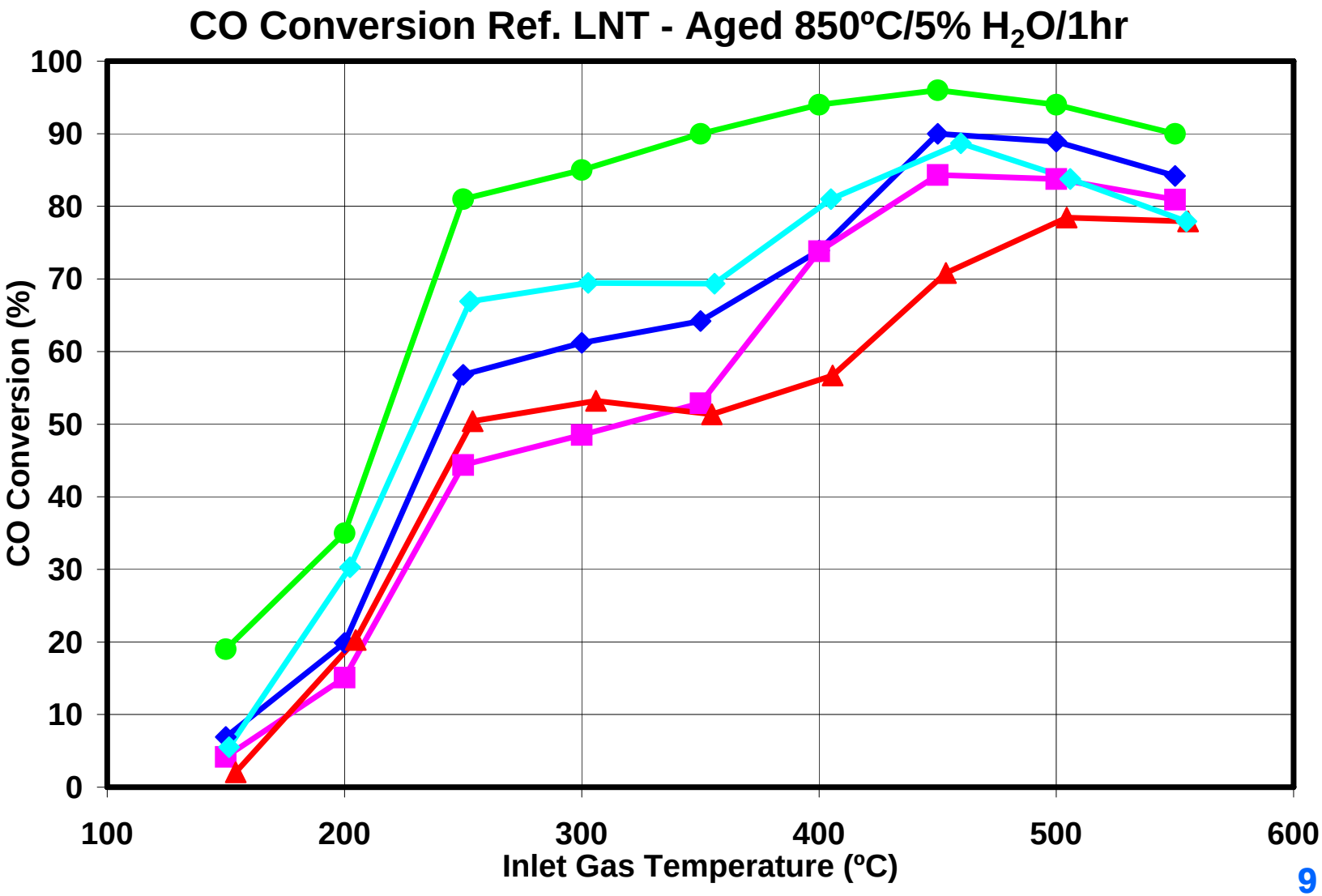
NOx After 850C



HC After 850C



CO After 850C



Observations

- +/- ~20% NOx conversion range at 200C!
- Large range of different core sizes tested
  - 0.75” L x 1” dia to 6” L x 0.75” dia
  - Effects on temperature distribution?
- Some measure Tin, some Tbed, some Tout
  - No uniform measurement method
- Differences in instrumentation
  - Chemiluminescent ($NH_{3\ error?}$)
  - FTIR
  - Mass spectrometer
- Differences in even simple HT Aging

Summary

- For now
  - Cannot compare results between labs reliably
  - Published data can't be compared!
- Future
  - Need repeatable tests with adequate precision
  - Avoid duplication of efforts
  - Enable analysis based on published data