Supplementary material

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Evaluating different strategies to minimize cold-start emissions from gasoline engines in steady-state and transient regimes

Shreya Nandi[a], Christophe Chaillou[b], Christophe Dujardin[a], Pascal Granger[a], Emmanuel Laigle[b], André Nicolle[b], Caroline Norsic[c], Melissandre Richard[a*]

[a] *Univ. Lille, CNRS, Centrale Lille, Univ. Artois, UMR 8181 – UCCS – Unité de Catalyse et Chimie du Solide, F-59000, Lille, France*

[b] *Aramco Fuel Research Center, 232 Avenue Napoleon Bonaparte, 92852, Rueil-Malmaison, France*

[c] *EMC France, 4 Allee de la rhubarbe, Acheres, 78260, France*

*Corresponding author: melissandre.richard@centralelille.fr

Content of this document:

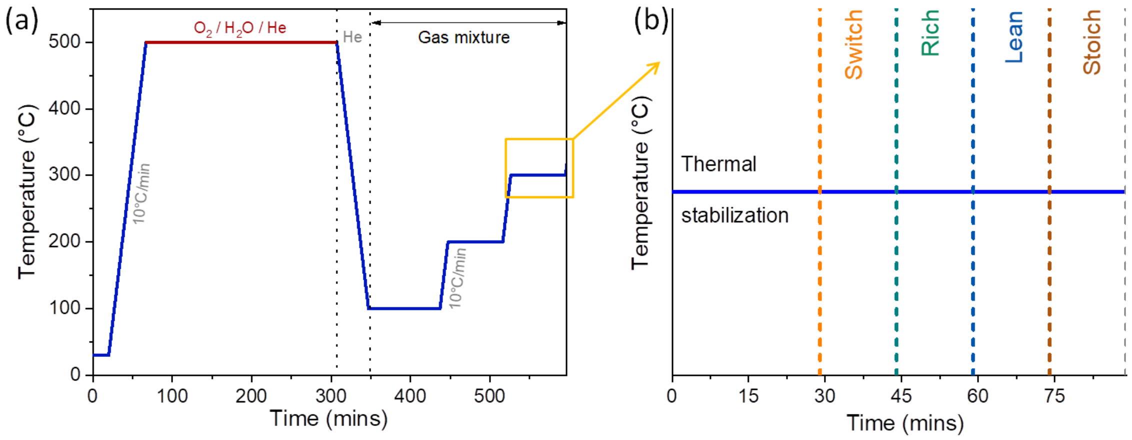
Figures

Fig. S1 Temperature-programmed experimental protocol for (a) degreening followed by catalytic performance testing and (b) variation of the regimes under isothermal condition after thermal stabilization

Fig. S2 Outlet concentration profiles of (a) C_2H_2, (b) i-C_5H_{12} (c), n-C_5H_{12}, (d) CO_2, (e) NO_2, (f) H_2, and (g) O_2 during temperature-programmed catalytic testing in a complex mixture composition with Monolith-A-full (red crosses), Monolith-A-front (blue circles), Monolith-A-back (green triangles) under switch (1s lean/rich), rich, lean and stoichiometric conditions. The deep black lines represent the initial concentration of each gaseous reactant

Fig. S3 Left axis: Nitrogen balance accounting from NOx and N_2O (orange squares) and N_2 (orange diamonds) **& Right axis:** NH_3 raw IR signal (blue circles) - during temperature-programmed catalytic testing in a complex mixture composition with Monolith-A-full under switch (1s lean/rich), rich, lean and stoichiometric conditions. The deep black lines represent the initial concentration of nitrogen.

Fig. S4 Temperature profiles of outlet gases during blank test (bare cordierite - blackline) and catalytic tests on Monolith-A-full (red), Monolith-A-front (blue) and Monolith-A-back (green).



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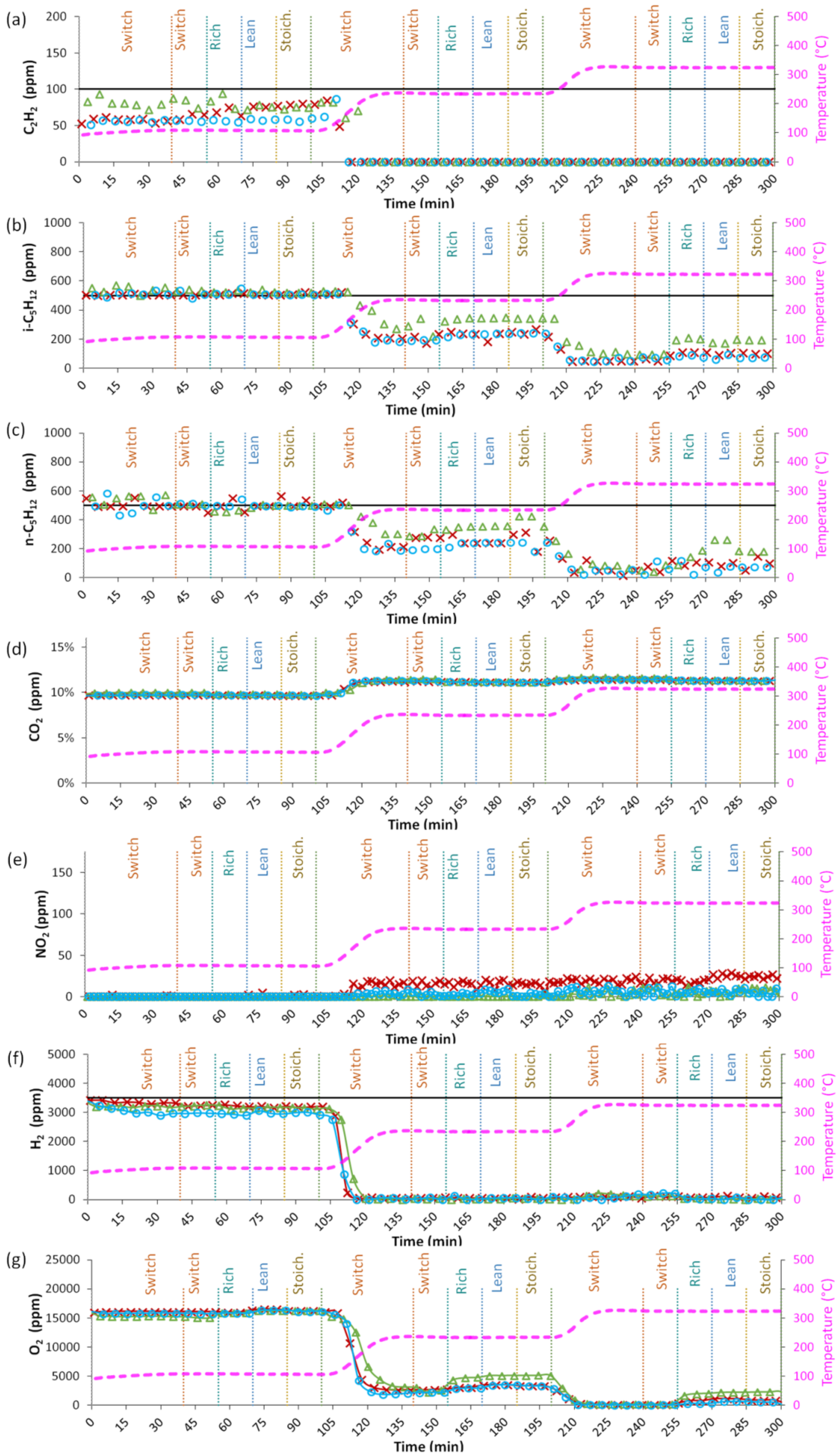

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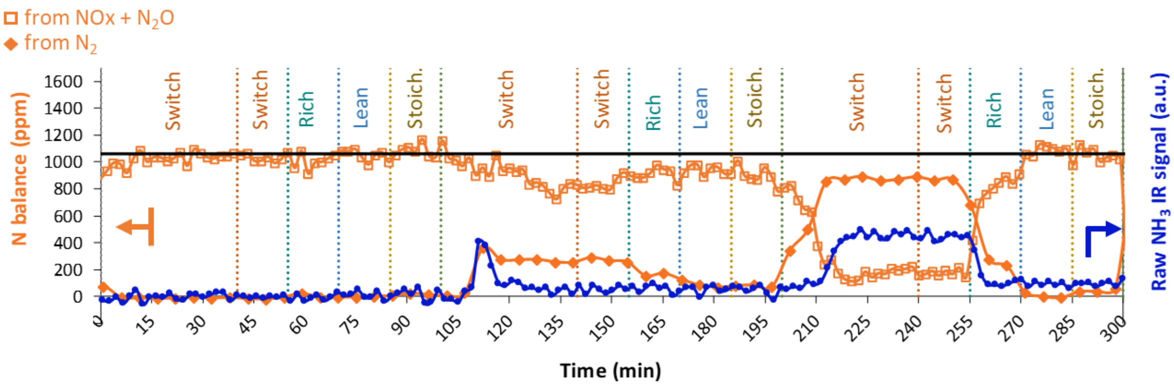

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The presence of ammonia was detected using IR analysis during switch regimes at 200 and 300 °C but not quantified. However, the estimated sum of nitrogen mass balance does not show any significant deviation from initial value indicating that the observed signal corresponds to a negligible amount of ammonia as expected in the absence of water in the gas feed (no reforming).

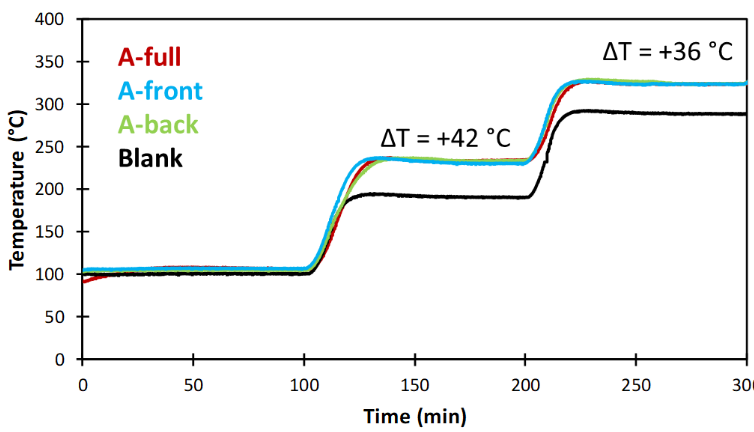

Fig. S4 Temperature profiles of outlet gases during blank test (bare cordierite - blackline) and catalytic tests on Monolith-A-full (red), Monolith-A-front (blue) and Monolith-A-back (green).

Significant deviation of +42 °C and +36 °C of the temperature was observed during catalytic tests on Monolith-A at 200 °C and 300 °C respectively compared to blank test (bare cordierite). This difference is attributed to exothermic HC oxidation reaction taking place in this temperature range. Please note that the temperature was recorded at the back side of the monolith (outlet gases).