To editor:

1. Line 14: Please change ‘values’ to ‘value’.

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 14…and the obtained k_{OH} value (in units of…

Line 26: Please change ‘previous’ to ‘previously’.

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 27: …the rate coefficients for the 24 previously studied OH + alkanes…

Line 41-42: please the text to the following: “less reactive with NO_3 and with ozone, and thus they are degraded…

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 41-42: …the alkanes are extremely less reactive with NO_3 and with ozone, and thus they are degraded and removed from the atmosphere….

Line 44: Please change ‘will form a’ to ‘can lead to’.

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 44: These oxidation processes can lead to photochemical …

Line 59: Please change “in the carbon monoxide, He and N_2 system” to “in carbon monoxide, He and N_2 systems”

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 57: …with selected alkanes in carbon monoxide, He and N_2 systems, respectively.

Line 72: Please insert the word 'and', "alkanes, and more complex …"

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 70: …alkanes, and more complex and multifunctional alkanes…

Line 76-77: Please change current text to "Perry et al found that the rate coefficients of n-butane increased by 72% as the temperature…"

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 73-74: Perry et al found that the rate coefficients of n-butane increased by 72% as the temperature…

Line 81: Please change "Finlaysonpitts" to "Finlayson-Pitts"

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 78: Finlayson-Pitts et al., 1993

Line 135-139: I suggest changing this to read as follows: "The basic principle is that the rate coefficient for reaction of a reference compound with OH needs to be well established; then, the rate coefficient for the target compound can be determined by monitoring the …"

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 137-140: The basic principle is that the rate coefficient for reaction of a reference compound with OH needs to be well established; then, the rate coefficient for the target compound can be determined by monitoring the simultaneous decay of the target and reference compound…

Line 165-166: I recommend changing the current text to the following: "In this work, three different commonly used reference compounds (n-hexane, cyclohexane and n-

octane) were used to determine the …"

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 166-168: …In this work, three different commonly used reference compounds (n-hexane, cyclohexane and n-octane) were used to determine the rate coefficients for each reaction at room temperature to check the consistency…

Line 177: Please change 'reflected' to 'presented'.

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 180: … temperatures is presented in Sec. 3.3.

Line 216-218: I suggest the following text: "new base rate coefficients for different positional groups, and also developed independent methods for rate coefficient estimation. Some examples include: …"

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 214-216: …and obtained the new base rate coefficients for different positional groups, and also developed independent methods for rate coefficient estimation. Some examples include: …

Line 244: Please change 'reflect' to 'reflecting'.

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 244: …reflecting the fact that the main way is…

Line 254: Please change 'each increase' to 'addition'.

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 253: …for cycloalkanes with addition of methyl.

Line 276: Please change ‘in the air gas’ to ‘in air’.

Reply: I'm sorry for the mistake! Modifications have been made in the revised manuscript.

Line 275: …the average rate coefficient obtained ~~in the air gas~~ is…

Line 289-290: Please change ‘Same for Nonane’ to “the same applies for Nonane…”

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 290: The same applies for Nonane, consistency with previous studies is less…

Line 306: Please change ‘Like’ to ‘For example’.

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 307: …by about 5%-16%. For example, the relative values measured by…

Line 312: Please change ‘are excellent agreement’ to ‘are in excellent agreement’.

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 313: …methylcyclohexane are in excellent agreement…

Line 351: Please change ‘2,3-dimethylbutane, the experimental’ to ‘2,3-dimethylbutane, where the experimental’.

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 352: …like 2,3-Dimethylbutane, where the experimental data was about…

Line 362: I suggest the following text: “…these compounds is still limit3d, and that further data and analysis for alkanes with this structure are needed.”

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 362: The results indicated that our understanding for the oxidation chemistry of these compounds is still limited, and that further data and analysis for alkanes with this structure are needed.

Line 370: Please change 'cycle-chain' to 'cyclic'

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 370: …activity of these cyclic alkanes estimated…

Line 387-388: I suggest the following text: "the increase in cycle size increases k by about 1.41 x 10-12 cm3 molecule-1 s-1. However for the SAR estimate of Wilson et al., the increase is about 1.12 x 10-12…"

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 387-388: …it is found that for cyclic alkanes of Kwok and Atkinson, Neeb, Jenkin et al., and McGillen et al, the increase in cycle size increases k by about1.41×10^{-12} cm^3 $molecule^{-1}$ s^{-1}. However, for the SAR estimate of Wilson et al, the increase is about 1.12×10^{-12} cm^3 $molecule^{-1}$ s^{-1}.

Line 416: Please change 'no' to 'not'.

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 419: …dependence data has been less or not studied…

Line 420: Can the authors adjust Table 2 somehow to make it more clear which data entries belong to which compound?

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 442: Please change “slightly’ to ‘reasonably’.

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 442: This result is reasonably consistent with…

Line 468-469: I do not know what is meant by ‘finger’ in this sentence. I think this word can be deleted in both places.

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 460-461: …the activation energy (Ea/R) obtained in this work is more in line with that of (148), however, the factor A obtained (4.48) is about 17% higher than that (3.84).

Line 538: Please delete the words ‘is this data’.

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 528: …from the figure that this data is significantly lower by…

Line 556: I think the words “to the saturated alkanes series’ can be deleted.

Reply: Thanks for your valuable suggestions! “to the saturated alkanes series’ have been deleted in the revised manuscript (Line 547).

Line 608: Please delete the word “positional’.

Reply: Thanks for your valuable suggestions! “positional’ have been deleted in the revised manuscript (Line 589).

Line 614: 2-methylheptane. (There is a t missing).

Reply: I'm sorry for the mistake! “2-methylheptane’ have been revised in the revised manuscript (Line 597).

To RC1:

1. Minor considerations:

Lines 20-21: in general, our understanding of alkane oxidation is good (relative to other types of compounds). I would suggest to rephrase this to something like: "… highlighting that there may be additional factors that govern the reactivity of highly branched alkanes that are not captured by current SAR techniques."

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript (Lines 21-22).

…highlighting that there may be additional factors that govern the reactivity of highly branched alkanes that are not captured by current SAR techniques…

2. General:

some of the new edits contain typographical and grammatical errors. An example of this would be lines 41-43, which is considerably worse than the sentence that it replaces. I won't concern myself any further with these small details, since I assume they will be fixed during the finalization of your manuscript. However, I would suggest to the authors that hasty edits such as this can degrade the quality of your presentation and distract your readers.

Reply: I'm sorry for the mistake! Typographical and grammatical errors have been revised in the revised manuscript. For example, the sentence in lines 41-43 has been modified as follows:

In the troposphere, the alkanes are extremely less reactive with NO_3 and with ozone, and thus they are degraded and removed from the atmosphere via gas-phase oxidation reactions with OH radicals and chlorine atoms.

3. Section 3.2, Figure 4: Firstly, why don't you include the predictions of McGillen et al. (2024) in this plot? It seems strange to put it in the SI. Secondly, it appears that there are fewer predictions of Wilson et al. (2006) (18 compared with 25 for the other methods). Is this a limitation of the method, or is this a mistake?

Reply: Thanks for your valuable suggestions! The predictions of McGillen et al. (2024)

in Figure 4 in the revised manuscript. However since the predictions of Wilson et al. include only the 18 alkanes listed in the figure, and the other 7 alkanes have not been studied, only a comparison of these 18 alkanes is included in the figure.

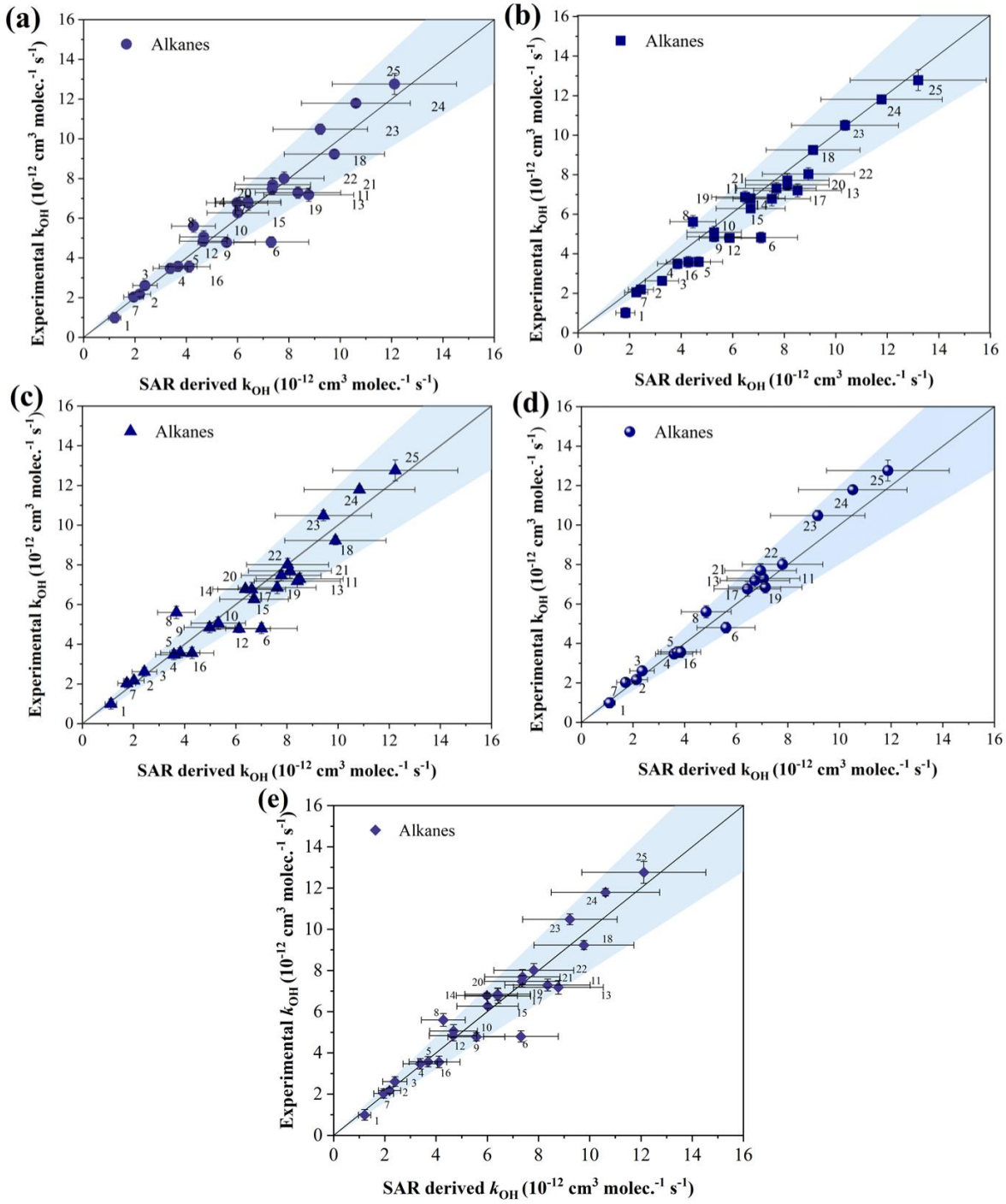

Figure 4. Measured Alkanes + OH rate coefficients plotted against SAR-derived rate coefficients for all compounds (a. (Kwok and Atkinson, 1995); b. (Neeb, 2000); c. (Jenkin et al., 2018); d. (Wilson et al., 2006); e. (McGillen et al., 2020)). The shaded

area demonstrates a 20 % uncertainty in the 1:1 black gradient line. The alkanes represented by serial number can be identified as follows: (1) Propane; (2) Isobutane; (3) n-Butane; (4) Isopentane; (5) n-pentane; (6) Cyclopentane; (7) 2,2-Dimethylbutane; (8) 2,3-Dimethylbutane; (9) 2-Methylpentane; (10) 3-Methylpentane; (11) Methylcyclopentane; (12) 2,4-Dimethylpentane; (13) Cyclohexane; (14) 2-Methylhexane; (15) 3-Methylhexane; (16) 2,2,4-Trimethylpentane; (17) n-Heptane; (18) Methylcyclohexane; (19) 2,3,4-Trimethylpentane; (20) 2-Methylheptane; (21) 3-Methylheptane; (22) n-Octane; (23) n-nonane; (24) n-Decane; (25) n-Undecane.

4. Line 468: finger activation energy? What is this?

Reply: I'm sorry for the mistake! Modifications have been made in the revised manuscript. The 'finger activation energy' has been changed to 'activation energy'.

Line 460-461: …the activation energy (Ea/R) obtained in this work is more in line…

5. Figure 7: To be consistent with the other figures, it would be useful to number the points in this graph according to the compound (e.g. (1) = propane, (2) = isobutane, etc.).

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

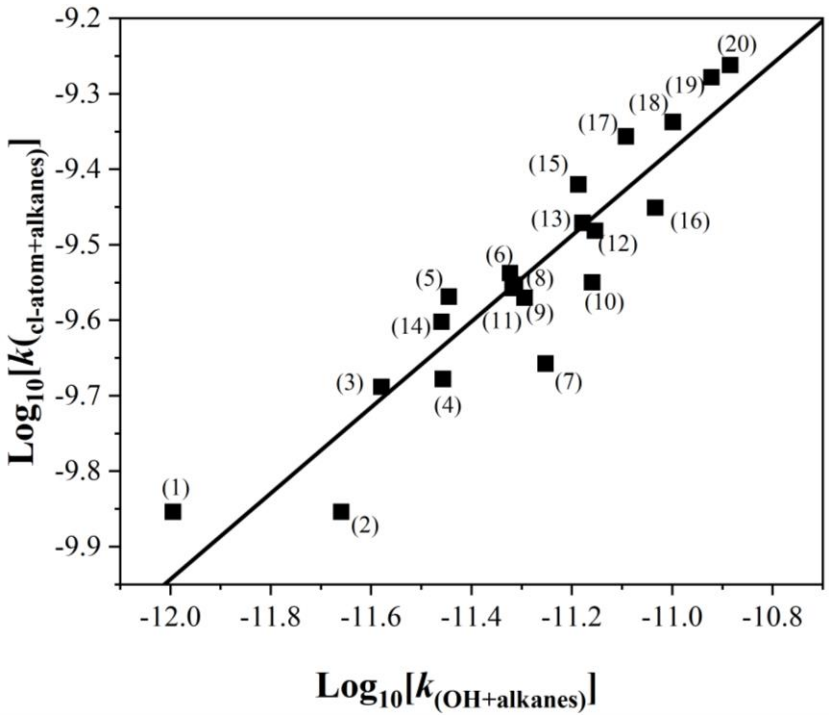

Figure 7. Log-log plot of the rate coefficients for the reaction of Cl-atoms versus the reaction of OH radicals with the saturated alkanes (C_3-C_{11} alkanes studied above). The solid line represents the unweighted least-squares fit to the data. The alkanes represented by serial number can be identified as follows: (1) Propane; (2) Isobutane; (3) n-Butane; (4) Isopentane; (5) n-pentane; (6) Cyclopentane; (7) 2,3-Dimethylbutane; (8) 2-Methylpentane; (9) 3-Methylpentane; (10) Methylcyclopentane; (11) 2,4-Dimethylpentane; (12) Cyclohexane; (13) 2-Methylhexane; (14) 2,2,4-Trimethylpentane; (15) n-Heptane; (16) Methylcyclohexane; (17) n-Octane; (18) n-nonane; (19) n-Decane; (20) n-Undecane.

To RC2:

1. The authors are advised to revise the errors for average values in Table 1 since there are used the weighted average approach and not sigma.

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

σ has been replaced with θ in Table 1.

where $w_{ref1}=1/\theta_{ref1}^{2}$, etc. The error, $\theta_{ref}=\sqrt{\frac{\sum(x_i-\bar{x})^2}{n}}$, $\theta_{av}=(1/\theta_{ref1}+1/\theta_{ref2}+\ldots)^{-0.5}$.

2. Please also expand the conclusions with more information from Figure 4,5 and add conclusions about Figure 7.

Reply: Thanks for your valuable suggestions! More information from Figure 4,5 and Figure 7 have been added in the conclusion in the revised manuscript.

Line599: expanding the existing database. And the rate coefficients do not change significantly in this temperature range, especially for 2-methylheptane. Whilst the value of preexponential factor A increases with the increase of the number of carbon atoms, which is consistent with the law of its reactivity. In addition, correlation equations for the rate coefficients of alkanes reacting with OH radicals and chlorine atoms were obtained, and the rate coefficient of 2,2,3-trimethylpentane with chlorine atoms, which has not yet been reported, was deduced.

To RC3:

1. In several places when they refer to other kinetic studies, e.g., Introduction, line 56 "…in the Ar system at 300 K using…" they should include the total pressure and not only the bath gas, e.g., "at 300 K and xxx Torr in Ar, using…". Another example is in line 70, but it also appears in several places that it is suggested the authors to change it and get rid of Ar or Air system.

   Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

   …Greiner measured the first kinetic data for the reaction of OH radicals with three alkanes at 300 K and 28-149 Pa in the Ar system using….(line 55)

   …Shaw et al. and Phan and Li obtained rate coefficients of a series of alkanes ~~in the N_2/He system~~ (Phan and Li, 2017; Shaw et al., 2018; Shaw et al., 2020). (line 66)

   …Anderson et al. obtained the k_{OH} of C_2-C_8 several n-alkanes and cyclic alkanes by the relative technique ~~in the air system~~ at 296 ± 4 K. (line 68)

   For several n-alkanes, the average rate coefficient obtained ~~in the air gas~~ are…(line 275)

2. Correct typo in line 42 "ano" and change to "are no", replace "the absolute rate constant method and the relative rate constant method" with "both absolute and relative rate methods" Change "et al." in line 53 with etc., line 72 replace "solely" with "limited to", in line 77 replace "multiplied by" with "increased by", in line 79 change "in varying degrees at 300-390 K" with "varying the temperature in the range 300 – 390 K", Reword the paragraph between lines 84 and 87, correct the use of "respectively" in several places (e.g., line 300 – 3 numbers for one compound) and these are only very few examples of editing needed and make difficult for the reader to follow the messages that the authors try to pass across.

   Reply: I'm sorry for the mistakes! Modifications have been made in the revised manuscript.

   Line 42: …the alkanes are extremely less reactive with NO_3 and with ozone, and thus they are degraded and removed from the atmosphere…

   Line 50: …using both absolute and relative rate methods.

Line 51: …flash photolysis and emission flow etc.

Line 69: …the majority of experiments were conducted limited to on C_2-C_6 alkanes…

Line 74: …rate coefficients of n-butane increased by 72%....

Line 76: …also increased varying the temperature in the range 300 - 390 K.

Line 81-84: In addition, there is another alkane (e.g., 3-methylheptane) for which only two or fewer measurements of OH radical rate coefficients have been reported in the above temperature range,…

Line 300-301: For the cycloalkanes, like cyclopentane, the average rate coefficient is 4.82±0.27,…

3. Please replace the expert-evaluated data use with evaluated data throughout the manuscript.

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line172: Here we used the recommended evaluated data of database for…

Line272: …in different bath gases (N_2, Air, O_2) with evaluated data at 298±1 K…

Line283: …and the evaluated data (2.36) of McGillen et al.'s…

…

4. Figure 1: a more comprehensive, but brief, setup description needed here, e.g., describe the acronyms.

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Figure 1. A schematic of the experimental device (MFC:Mass Flow Controlle; UV: ultraviolet lamp)

5. Lines 109-110: The way that the tests that the authors carried out are described is deceptive and confusing. N_2 does not react with NMHCs, so I guess that the authors want maybe to imply that they tried to ensure that no wall-loss (e.g., hydrolysis) of NMHC occurs under dark conditions and that NMHCs are stable when exposed at 254 nm. They should not present the tests here in reaction forms. Simply state what they

did.

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

…Initial conditions of the different species introduced into the reactor for each experiment are outlined in Table S1 in the Supplementary Material. By varying the presence of H_2O_2, turning on/off the light, a series of observations were generated such as N_2 + NMHCs + dark reaction, N_2 + NMHCs + hv (254 nm), and N_2 + NMHCs + H_2O_2 + dark reaction. to ensure no wall-loss of NMHCs under dark conditions and their stability when exposed to 254 nm light.

6. Lines 135 – 139: The whole sentence needs to be rephrased. The "basic principle" of the RR method is that the monitoring of the relative loss of two reactants when they both only react with the under study radical and one of the two rate coefficients is well established can lead to the determination of the other reaction rate coefficient (reaction of interest).

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Lines 137 – 140: The basic principle is that the rate coefficient for reaction of a reference compound with OH needs to be well established; then, the rate coefficient for the target compound can be determined by monitoring the simultaneous decay of the target and reference compounds in the presence of OH radicals due to the competitive response mechanism.

7. Lines 141 – 142: The statement here is not true in most of the cases! The product of the rate coefficient and the OH concentration needs to be substantially larger (100 times or more) compared to all the rest of the competitive reactions of the reactant with the other radicals X (kx [X]).

Reply: Thanks for your valuable suggestions! The description of this part has been removed in the revised manuscript.

Lines 144 – 145: ~~To ensure that the reactants only react with OH radicals, the OH~~

~~radicals need to be in excess in the experiment.~~

8. Lines 172 – 175: Here significant editing is needed (rate constants was used instead of rate coefficient – also in 2.2 section title), and the next sentence is not needed at all! It is well known that k depends on temperature!

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

…the *k* values (in units of cm^3 $molecule^{-1}$ s^{-1}) of the three reference compounds selected respectively are evaluated rate coefficients: $k_{OH+n\text{-}Hexane}=4.97\times10^{-12}$, $k_{OH+Cyclohexane}=6.69\times10^{-12}$, $k_{OH+n\text{-}Octane}=8.48\times10^{-12}$, which is fitted or manually entered data from multiple sources. A detailed explanation at different temperatures is presented in Sec. 3.3.(Lines 175 – 180)

9. Line 224: More important than reporting the R-squares is to present and discuss the intercepts of the linear fits, that is totally missing. This can reveal potential systematic errors and possible curvatures in their data.

Reply: Thanks for your valuable suggestions! The intercept case of the linear fits has been added in the revised manuscript.

Line 223: …As shown in Fig. 2, the decay of both target and reference compounds correlated well with eq. (7), the intercepts of the linear fits were close to 0 and high correlation coefficients (R^2) were observed for most alkanes, exceeding 0.99.

10. Figure 3: In this plot any systematic divergence from linear behavior cannot be assessed by the reader. The same applies in the range of the change in the Y-axis, so as the reader to evaluate the sensitivity of the measurements. Although it is difficult to display it in figures like those (displaced), the authors can add a comparison between dX and dY change in the text, to enable the reader to assess measurements sensitivity, pinpoint the cases that dX and dY differ significantly and refer to figure 3.

Line235: agreement, errors (dY) between 0.12 and 0.41, the units are $10^{-12}cm^3$ $molecule^{-1}$ s^{-1}….

11. Line 274 – 279: Difficult to follow, please rephrase and change "within a certain range" in line 281 with "taking into account the experimental uncertainties"

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 274 – 279: The obtained k_{OH} values for C_3-C_{11} alkanes in this work were compared with literature-reported values (Table 1). For several n-alkanes, such as n-butane, the average rate coefficient obtained is (2.63±0.23), the unit is 10^{-12} cm^3 $molecule^{-1}$ s^{-1} (all units in this paragraph are 10^{-12} cm^3 $molecule^{-1}$ s^{-1}). The result is highly consistent with the value (2.56±0.25) obtained by Greiner (Greiner, 1970a) and the value (2.72±0.27) obtained by Perry et al. (Perry et al., 1976), with a consistency of 3% or better.

Line 281: …they still exhibit consistency taking into account the experimental uncertainties.

12. Section 3.2: There is no physical interpretation for the observed discrepancies both between this work and other experimental ones (e.g., 355 - 356), as well as between this work and SAR. The extensive experimental study the authors carried out should have led them to some conclusions about the sources of the observed discrepancies in SAR approaches. This would be of a particular value and could lead to SAR improvements. However, a comprehensive explanation is totally missing which is the main weakness of the manuscript.

Reply: Thanks for your valuable suggestions! The physical interpretation for the observed discrepancies has been added in the revised manuscript.

Line 389: …It is worth considering that the presence of ring strain can influence the kinetics of H-atom abstraction in cyclic alkanes, leading to an overestimation of reaction rate coefficients when using unadjusted F(-CH2-). And hence, further data and analysis for F(-CH2-) with these cyclic alkanes are needed.

13. Line 403: This is not THE tropospheric temperature range. Please change to "temperatures relevant to the troposphere".

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 405: …were carried out in this study in the temperatures relevant to the troposphere (273-323 K),

14. In several cases, e.g. line 459, 466, 513, 516 etc. "*" was used in Arrhenius expressions instead of "x".

Reply: I'm sorry for the mistakes! Modifications have been made in the revised manuscript.

15. Figure 5: Please describe what the fits represent and change the insets since the fit are NOT linear regression! Describe in figure captions what expressions were used.

Reply: I'm sorry for the mistakes! Modifications have been made in the revised manuscript.

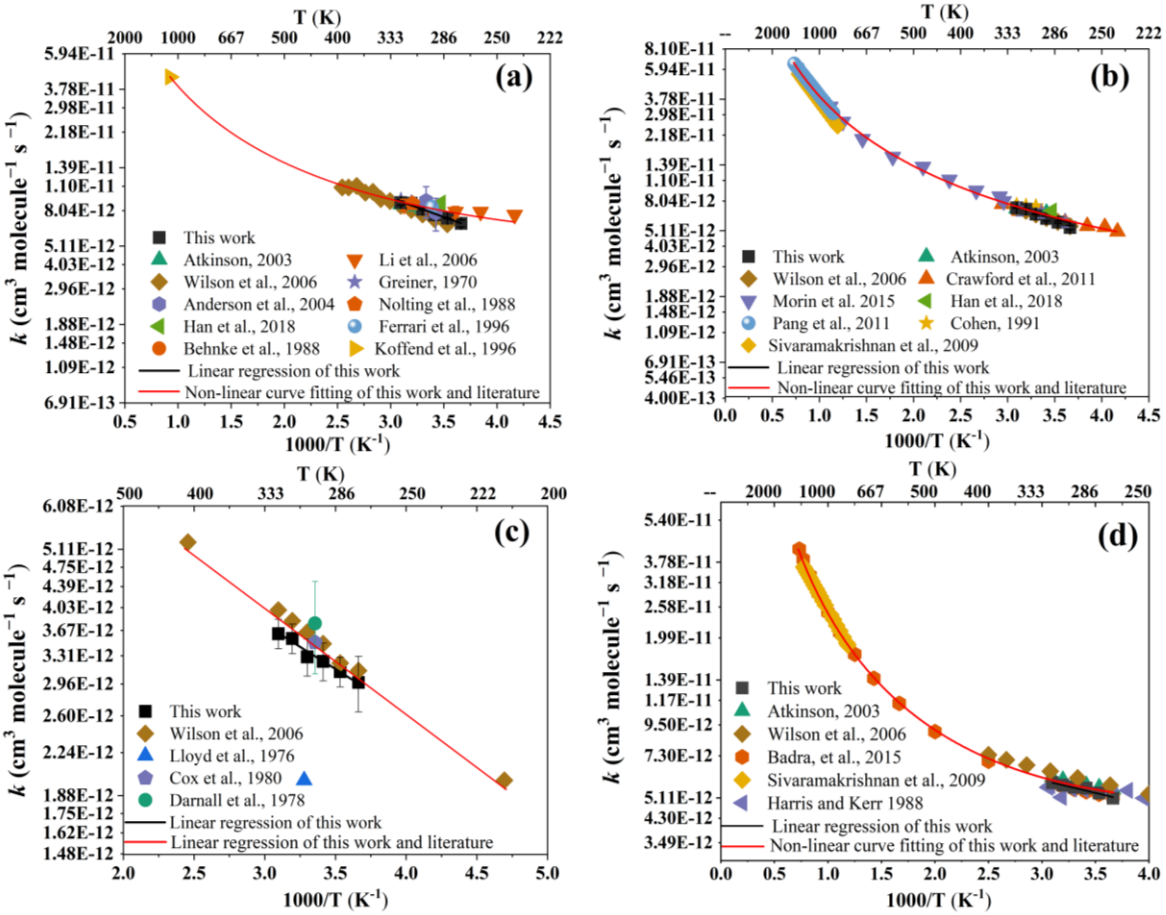

Figure 5. Arrhenius plots for the reaction of n-Octane (a), n-Heptane (b), Isopentane (c) and 2,3-Dimethylbutane (d) with OH radical in wide temperature range along with available literature data. The error bar was taken as 2σ. The expression for the non-linear curve fits takes the form $k(T) = A \times \exp(Ea/RT) \times (T/300)^n$, and the expression for linear regression takes the form $k(T) = A \times \exp(Ea/RT)$

16. Figure 6: See comment for figure 5 (15).

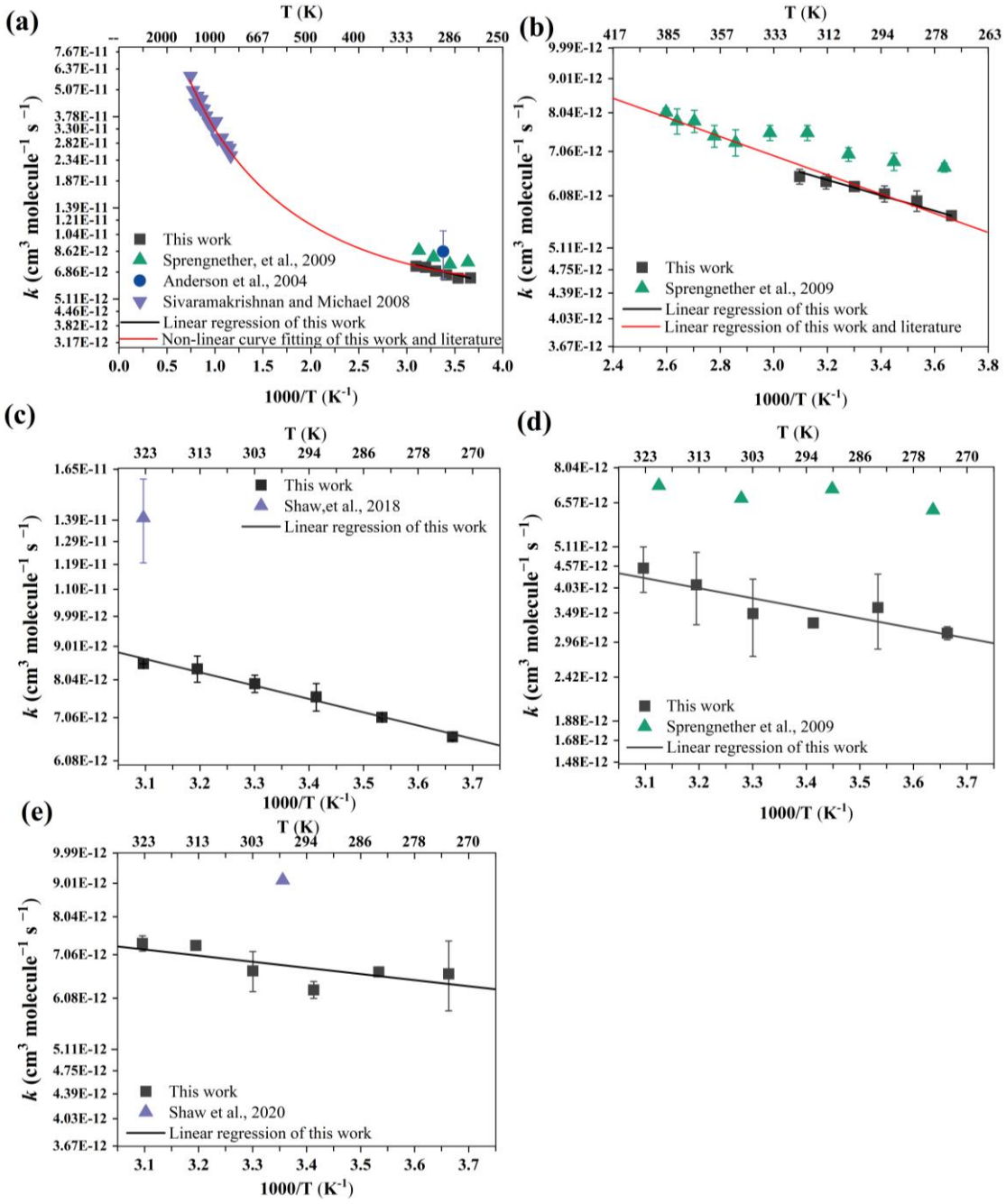

Figure 6. Arrhenius plots for the reaction of Methylcyclopentane (a), 2-Methylhexane (b), 3-Methylheptane (c), 3-Methylhexane (d) and 2-Methylheptane (e) with OH radical along with available literature data. The error bar was taken as 2σ. The expression for the non-linear curve fits takes the form $k(T) = A\times\exp(Ea/RT)\times(T/300)^n$, and the expression for linear regression takes the form $k(T) = A\times\exp(Ea/RT)$.

17. Figure 7. log-log plot instead of double log plot. However, it would have been more of value and would have made more sense to present the axes scale in log basis and not the actual values, so as the reader to directly compare Cl and OH rate coefficients as well. This way the values would represent the rate coefficients.

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

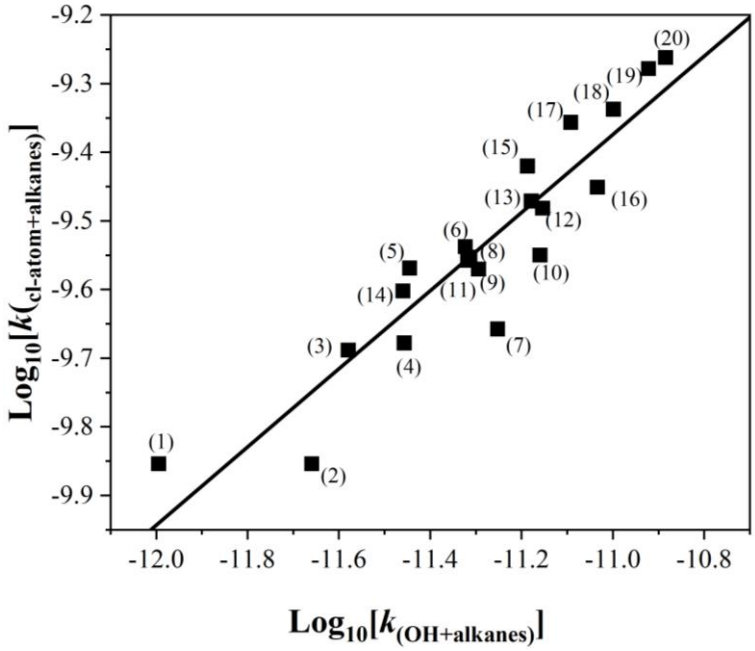

Figure 7. Log-log plot of the rate coefficients for the reaction of Cl-atoms versus the reaction of OH radicals with the saturated alkanes (C_3-C_{11} alkanes studied above). The solid line represents the unweighted least-squares fit to the data. The alkanes represented by serial number can be identified as follows: (1) Propane; (2) Isobutane; (3) n-Butane; (4) Isopentane; (5) n-pentane; (6) Cyclopentane; (7) 2,3-Dimethylbutane; (8) 2-Methylpentane; (9) 3-Methylpentane; (10) Methylcyclopentane; (11) 2,4-Dimethylpentane; (12) Cyclohexane; (13) 2-Methylhexane; (14) 2,2,4-

Trimethylpentane; (15) n-Heptane; (16) Methylcyclohexane; (17) n-Octane; (18) n-nonane; (19) n-Decane; (20) n-Undecane.

18. Line 569: Correct "The atmospheric lifetime of alkanes in the troposphere can be estimated" with "The atmospheric lifetime of alkanes in the troposphere, due to their reaction with OH radicals, can be estimated".

Reply: Thanks for your valuable suggestions! Modifications have been made in the revised manuscript.

Line 566: The atmospheric lifetime of alkanes in the troposphere, due to their reaction with OH radicals, can be estimated using the following formula…

19. Conclusions: It would be of value to include potent weaknesses of SAR methods so as to be able to evaluate them and incorporate them in the future.

Reply: Thanks for your valuable suggestions! The biggest problem in the current estimation of SAR methods is the overestimation of the rate coefficients for the reaction of cyclic alkanes with OH radicals, which is also reflected in the conclusions.

Line595: …This raises reasonable suspicion that these methods may still lack consideration of additional factors. and a more appropriate empirical ring strain factor needs to be derived based on broader range of experimental data from monocyclic hydrocarbons in the future….

20. Supporting Information: Include typical RR plots at different temperatures so as the reader to be able to evaluate the quality of the measured data.

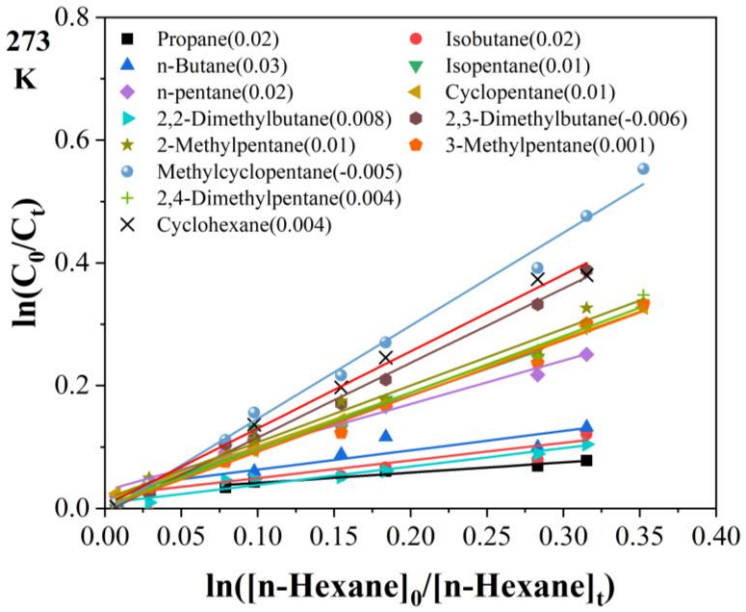

Figure S3. Typical kinetic data as acquired with the multivariate relative rate technique at 273 K for the reaction of the alkanes with the OH radical using n-hexane as reference compound. Numbers in parentheses are intercepts.

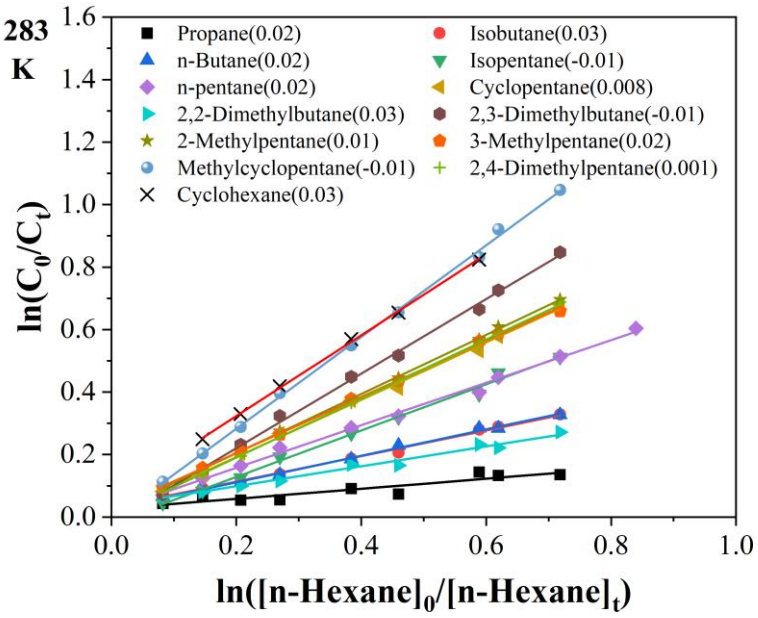

Figure S4. Typical kinetic data as acquired with the multivariate relative rate technique at 283 K for the reaction of the alkanes with the OH radical using n-hexane as reference compound. Numbers in parentheses are intercepts.

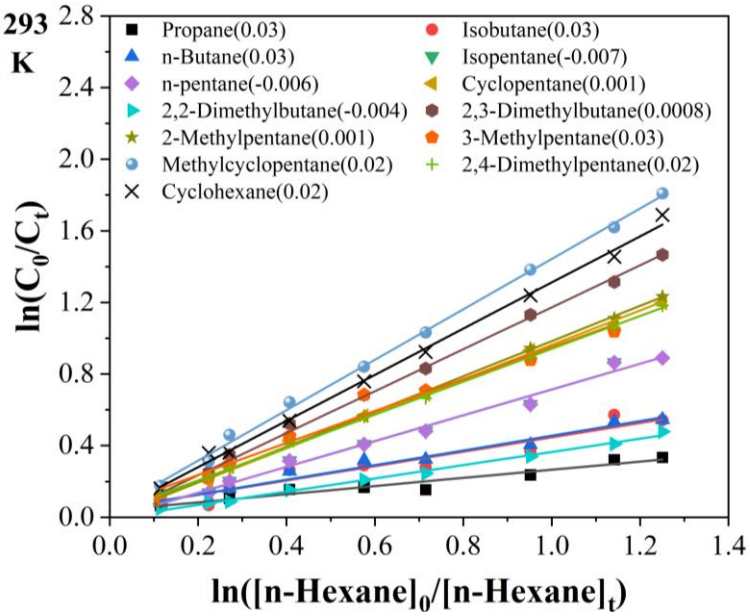

Figure S5. Typical kinetic data as acquired with the multivariate relative rate technique at 293 K for the reaction of the alkanes with the OH radical using n-hexane as reference compound. Numbers in parentheses are intercepts.

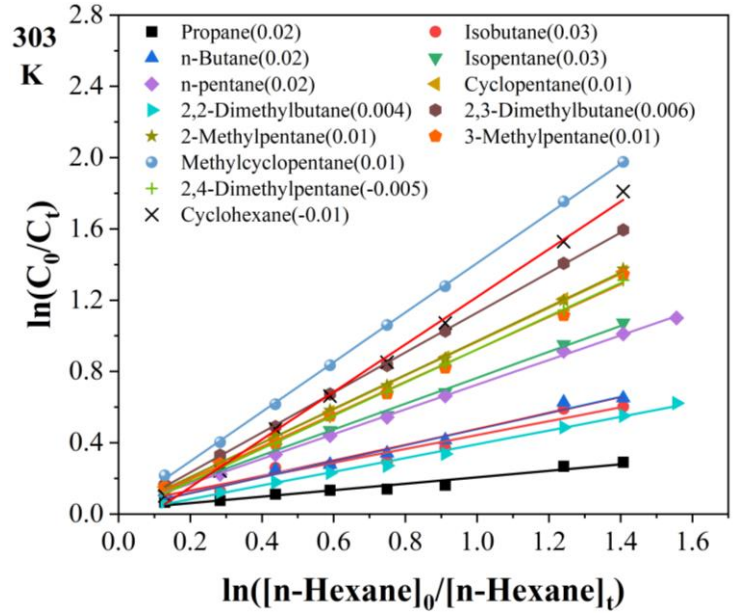

Figure S6. Typical kinetic data as acquired with the multivariate relative rate technique at 303 K for the reaction of the alkanes with the OH radical using n-hexane as reference compound. Numbers in parentheses are intercepts.

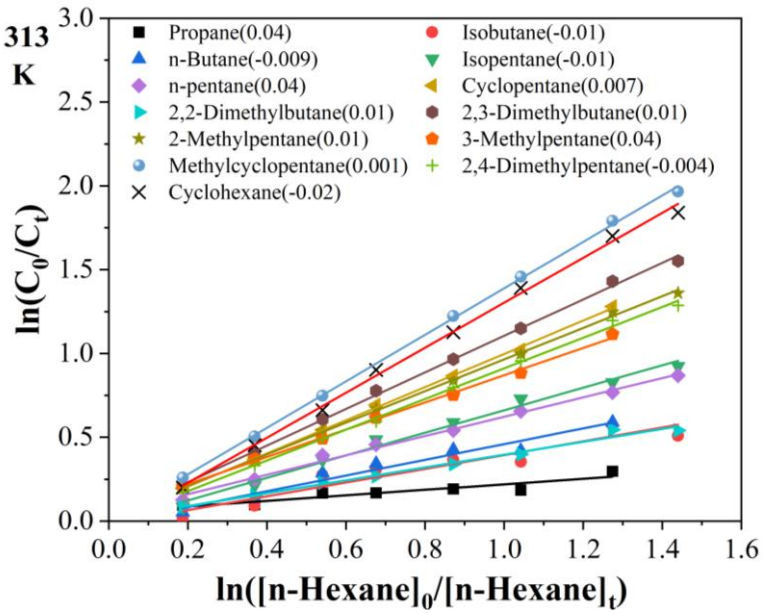

Figure S7. Typical kinetic data as acquired with the multivariate relative rate technique at 313 K for the reaction of the alkanes with the OH radical using n-hexane as reference compound. Numbers in parentheses are intercepts.

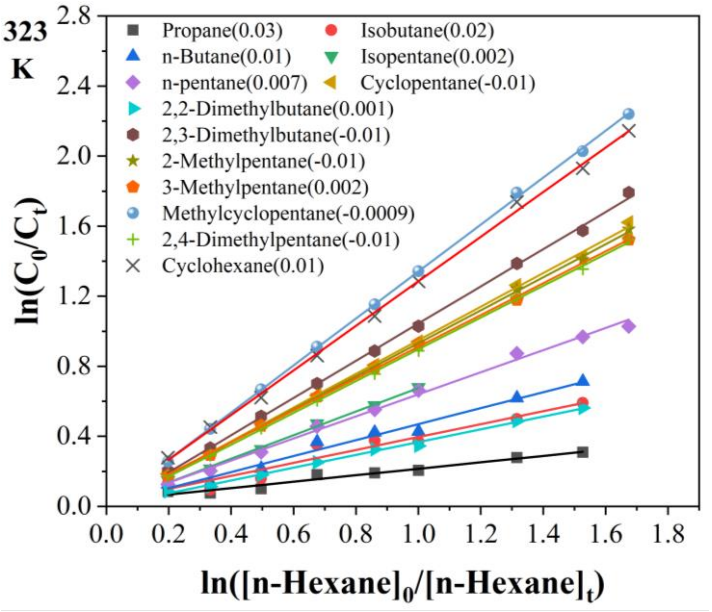

Figure S8. Typical kinetic data as acquired with the multivariate relative rate technique at 323 K for the reaction of the alkanes with the OH radical using n-hexane as reference compound. Numbers in parentheses are intercepts.