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Interactive comment on “Evaluated kinetic and photochemical data for atmospheric chemistry: Volume V – heterogeneous reactions on solid substrates” by J. N. Crowley et al.

Anonymous Referee #1

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This manuscript presents the IUPAC Kinetics Subcommittee’s most recent review and evaluation of gaseous species uptake and selected surface reaction kinetics on solid atmospheric particle surfaces, specifically water ice, sulfuric and nitric acid hydrates, and mineral surfaces. It consists of a valuable introductory review of the chemical and physical processes pertinent to the heterogeneous processes of interest, a discussion of condensed phase atmospheric particle and droplet surfaces, a large number of data sheets for specific trace gas uptake/surface reaction processes and summary tables of recommended parameters for the processes reviewed. This material was posted on the IUPAC web site in 2009.

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I did not review every data sheet, but I did read enough to ascertain that they are generally well-organized, clearly written, suitably referenced and present reasonable “preferred values.” To some significant extent data missed or misinterpreted in this type of review are partially self-corrective because the authors of the original literature cited, as well as authors of studies that might have been missed often check the relevant evaluations and notify the authors about any problems they perceive. This community review feature occurs for the web posted evaluations and is also obvious in the comments posted about this ACPD manuscript.

This manuscript represents an enormous amount of effort spent on accumulating and organizing previously published data, followed by insightful evaluation and systematic presentation. It provides information that will be very helpful to scientists interested in modeling atmospheric composition and its impact on meteorological, climate and radiation transport properties, as well as, human health and ecosystem vitality effects, scientists who design and perform, atmospheric measurements and scientists who investigate fundamental heterogeneous processes involving atmospherically relevant surfaces and gaseous species. It should be formally published in an accessible format, like ACP, as well as presented on the IUPAC subcommittee’s web site. I recommend publication after the authors have considered and dealt with the technical, organizational and copy-editing issues listed below.

1) As presented the manuscript presents Appendix A1 Summary Sheets right after a one page Introduction. This means that the parameter symbols have not yet been defined, which is not acceptable. I suggest that these Summary Sheets be moved to the end of report narrative, past Table 1, where they are defined. 2) The Summary sheets presented (as well as the data sheets) are designated Appendix A1, Appendix A2, AppendixA4 and Appendix A5. I suspect Appedix A3 was supposed to be about soot uptake, but it was deleted, apparently without bothering to renumber. This is likely to be pretty confusing to readers. 3) Section 2 Guide to the data sheets: 1st paragraph, 1st sentence – “heterogeneous” not “Heterogeneous”; 2nd paragraph, 2nd line – delete

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“soot”, since the soot data sheets are not included; 3rd paragraph, 5th line – “liquid droplet” not “liquid aerosol” (an aerosol is an ensemble of gas and suspended liquid drops and/or solid particles – it is increasingly incorrectly used to mean “aerosol particle”, “aerosol droplet” or “aerosol particulate matter (PM).” There are other instances of this common misuse, e.g. twice in section 4.2.3. 4) Section 3 Description of Heterogeneous Kinetics: Equations (1), (5) and (7) – the symbol “=c” used to delineate the mean gas thermal velocity is unwieldy and confusing. The heterogeneous kinetics community almost solely uses c ; this manuscript should too. 5) Section 4 Surface Types Considered: The descriptions of soot (4.1.4), solid inorganic salt particle (4.1.5), and the three types of liquid surfaces presented in Subsection 4.2 are not really pertinent to this manuscript and probably should be reserved for presentation in subsequent evaluations that actually present data for gaseous uptake by these surfaces. 6) Table 1 (page 5264) the symbol for the surface accommodation coefficient is shown as α_{rms} , however, it is shown as α_s in subsection 3.5.1 and Equations 18 and 19. 7) Introduction References – Abbatt, J.P.D.; Interactions..., not “INteractions” also capitalize “gases”; Jedolovszky, P.,Determination of..., not “Determination od.” This is just from quick inspection – the references need to be carefully proofed. 8) Data Table Comments – I appreciate the “Reliability” estimates for the “Preferred values, but I wonder about what they mean when the Preferred value is listed as a limit, particularly an upper limit. This needs some thought, and probably an explanation if you want to quantify the reliability of a limit with an absolute value.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 5233, 2010.

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