Final test lecture series C8621 “Trends and advances in atmospheric and total environmental chemistry” MU, fall semester 2011, (G. Lammel), 15.12.2011
number of credit points allocated: 2

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(name)

1. Chemical reactions: Give the time laws for the formation of products B and C formed from one educt, A, i.e. A $\rightarrow$ B + C,
a) What is the unit of the reaction rate coefficient, k ? What is the unit of the formation rate, $dc_B/dt$ ?
b) In case the reaction would be a photolysis: How is the photolysis rate coefficient defined / which parameters go into the photolysis rate coefficient ? (mathematical terms or words)

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2. Aldehydes are formed in the atmospheric chemistry of hydrocarbons.
a) Formulate the reactions leading to an aldehyde, starting from ethane ($C_2H_6$) !
b) What is the oxidation state of the 2 C atoms in the aldehyde ?
c) What is a hydrate of an aldehyde and how does it influence the phase equilibrium between gas and aqueous phase (for example in clouds) ? (chemical formulae or words)

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3. Hydrocarbons contribute ca. $10^{-6}$ to tropospheric air.

a) In the presence of nitric oxide (NO) nitrogen dioxide ($NO_2$) is formed in hydrocarbons' atmospheric chemistry. What is the significance of $NO_2$ for tropospheric ozone ($O_3$) ? (formulate reaction(s) or explain by words)
b) What is happening in the absence of nitrogen oxides (NO and $NO_2$) in the hydrocarbons' atmospheric chemistry ? (formulate reactions or explain by words)

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4) Formation of acidity in the atmosphere

a) What is the definition of pH ?

b) Give two examples for formation of acidity in the atmosphere (reactions or short sentences explaining the chemistry)

c) Describe the dissociation of $SO_2$ in cloudwater (chemical reactions / equilibria)!

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