Equilibrium partitioning of organic compounds

- Some fundamentals ...
- Summary and further information
- Self test
- Problems
  - Question 1
    - Answer
  - Question 2
    - Answer
  - Question 3
    - Answer
  - Question 4
    - Answer
  - Question 5
    - Answer
  - Question 6
    - Answer
  - Question 7
    - Answer
  - Question 8
    - Answer
  - Question 9
    - Answer
  - Question 10
    - Answer
  - Question 11
    - Answer
  - Question 12
    - Answer
  - Question 13
    - Answer
  - Question 14
    - **Answer**
  - Question 15
  - Question 16
  - Question 17

Question 14

How do aerosols grow?

Background: Aerosols in the atmosphere can grow in size by collision of smaller aerosols but also by sorption of airborne organic compounds from the surrounding gas phase. They are then called Secondary Organic Aerosol. Considerable research is conducted in atmospheric chemistry to better understand this sorption process. In the following you will find quotations from recent research papers in this field.

Statement 1: "Only when the concentration of a gaseous organic compound in the atmosphere approaches its saturation vapour pressure does partitioning begin and Secondary Organic Aerosol mass is formed." **Do you agree?**

Answer: Nonsense, there is no threshold concentration for partitioning.

Statement 2: "The extent of partitioning of any individual organic compound to the aerosol phase depends on the compound's vapour pressure, the nature of the other organic species present, and the amount of liquid water present in the particle." **Do you agree?**

Answer: The compound's saturation vapour pressure is a measure of its tendency to partition between its pure condensed phase and the gas phase. Partitioning of a compound between an organic aerosol phase and the gas phase is a different because it depends on interactions in another phase (i.e., the aerosol phase). Only if these interactions in the aerosol phase were similar to the pure condensed phase of the respective compound, then the equilibrium constants would be similar. In almost all cases, however, the interactions in the two phases are different and hence, the partition constants between these phases and air are different. In some cases one can find a correlation between the aerosol-air partition constants of compounds and their saturation vapour pressure. But this cannot be generalized and it does certainly not mean that partitioning into aerosols depends on the saturation vapour pressure of a compound. A correlation merely indicates certain similarities in the underlying interactions.

- Question 18
- Answer
- Advanced problems
- FAQ