Qualitative understanding of partition preferences

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- Selftest
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    - Answer
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    - Answer
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14) Henry's Law constant

The Henry´s Law constant, K_H, describes the partition equilibrium of a chemical between water and air[1]. For compounds with a low water solubility the Henry´s Law constant is often derived from the saturation vapour pressure and the water solubility of the compound.

[1]Note that in physical chemistry the term "Henry´s law constant" is in fact used differently than in environmental chemistry: in physical chemistry it stands for any partition constant between the gas phase and a condensed phase in the **linear** range of the partition isotherm.

Questions:

1) Can this procedure also be used for compounds...

a)...with relatively high, but still limited, water solubility?

b)...that are completely miscible with water?

2) If the compound is a solid at room temperature which data do you use?

a) K_H = solubility of the subcooled liquid / saturation vapour pressure of the subcooled liquid

b) K_H = solubility of the solid / saturation vapour pressure of the subcooled liquid

c) K_H = solubility of the subcooled liquid / saturation vapour pressure of the solid

d) K_H = solubility of the solid / saturation vapour pressure of the solid

Answer:

1a) In this case, the resulting K_H would be valid for high concentrations and might differ from the one that is valid at low concentrations because the partition isotherm can become non-linear for compounds with a rather high water solubility.

1b) It should be obvious that this cannot work because you would have to divide by infinity. But of course these compounds still possess a Henry´s Law constant. It is just that you have to determine it in a different way.

2) a and d are both correct. It is important that the same reference state is used .