Equilibrium partitioning of organic compounds

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Question 3

Do we have nitrogen gas (N_2) in our blood?

Answer: Yes, of course. Our blood is in 'contact' with ambient air via the lungs. The purpose of this contact is to exchange oxygen and carbon dioxide. N_2 makes up ca. 78% of the ambient air. There is no mechanism that would prevent N_2 from partitioning into our blood.

When scuba diving, we inhale compressed air that has a pressure equivalent to the surrounding pressure. At 50 m depth this is equal to 5 times ambient air pressure. Hence, in equilibrium our blood takes up 5 times more N_2 than it does at normal pressure outside the water. If we return to the surface too quickly and ignore the compulsory decompression time, then our blood becomes oversaturated with N_2 . In other words, we return to quickly for the N_2 exchange kinetics to reestablish thermodynamic equilibrium of N_2 between the blood and the air we breathe. In this case N_2 starts to form bubbles in our blood which hinder our blood flow. This can be deadly.



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