Lipids: Additional Practice problems:

Textbook 26(3,4,26,34,44)

1) It is commonly found that cold water wild-caught fish is richer in polyunsaturated fatty acids than the same fish species farmed in warm tropical waters. Provide a possible physiological explanation for this observation.

2) When oils or butter are left out in the air, they quickly turn rancid. IR studies of the oxidation products revealed the presence of peroxide. When the oil was mixed with $H_2{}^{16}O$ and $^{18}O_2$, it was observed that the ^{18}O isotope was present in the oxidation product.
   a. Could the oxidation of polyunsaturated fatty acid proceed by one-step transfer of a pair of electrons from lipid to oxygen? Justify your answer.
   b. Could the oxidation of polyunsaturated fatty acids proceed by one-step transfer of two electrons from oxygen to the lipid? Justify your answer.
   c. Could the oxidation of polyunsaturated fatty acids proceed by radical mechanism? Justify your answer.
   d. Why does oxygen readily react with polyunsaturated fatty acids but not with saturated fatty acids?
   e. Draw the structure of a possible fatty acid hydroperoxide that forms from linoleic acid.
   f. Butter can be preserved in room temperature for long periods of time when stored under salt water. Provide a scientific explanation.
   g. Pouring salt water over vegetable oil will not prevent oil going rancid. Why did the salt trick work with butter but not with vegetable oil?