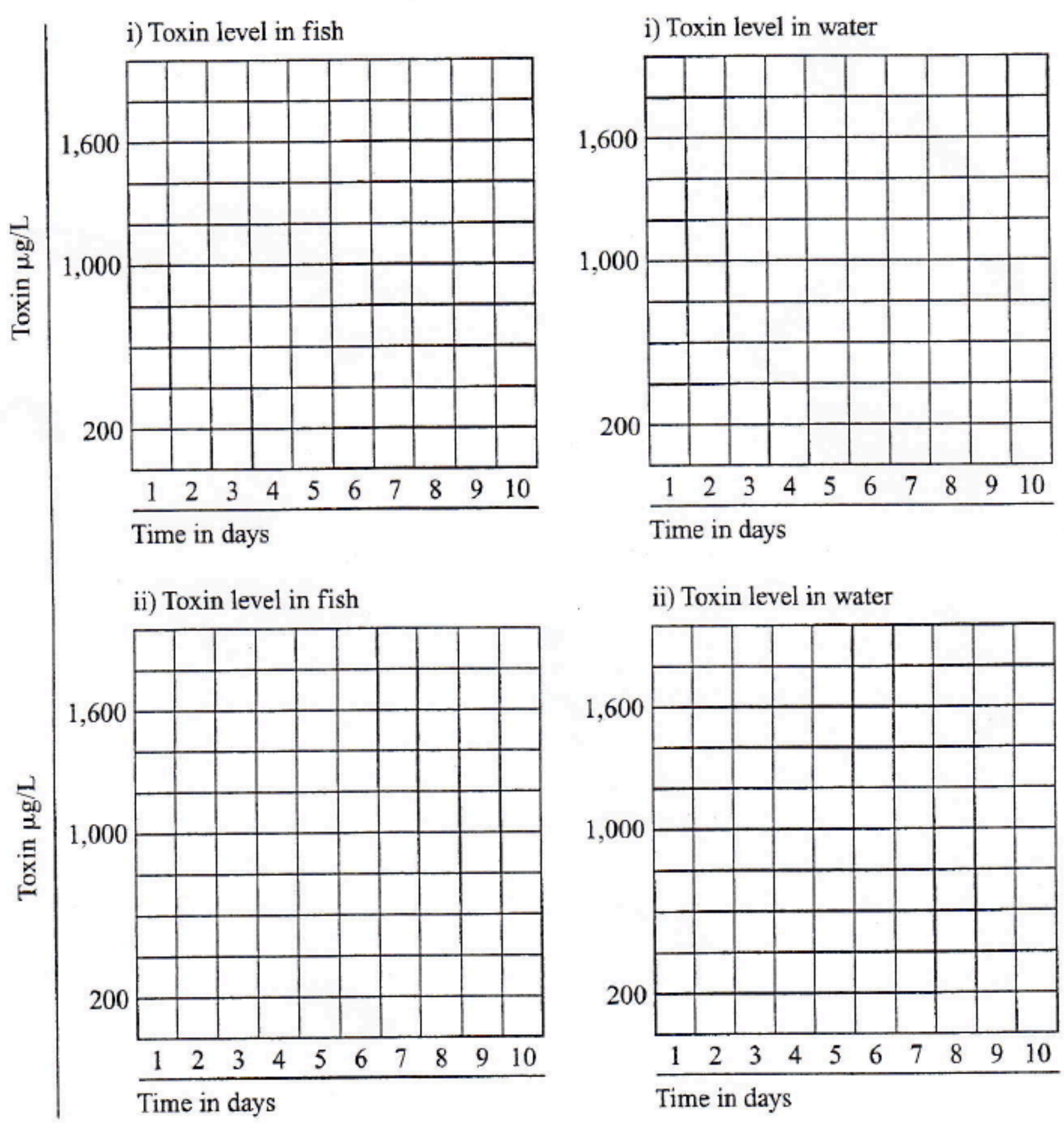
A fish is removed from a contaminated lake. You determine that a particular toxin (X) is present in its cells at concentration X=1,500 µg/L you place the fish in a tank full of clean water (X=0 µg/L), and measure the toxin concentration in the fish cells each day for the next 10 days.

a. On the graphs below, predict how the toxin concentrations in the fish and in the water will change over time if:

   i. The toxin is water soluble

   ii. The toxin is fat soluble



b. After making your hypothesis, you test it by measuring the toxin levels in the fish at various times during its 10 days in the tank. You observe that the level of toxin in the fish drops from 1,500**μg**/L to 750**μg**/L and then stabilizes at 750**μg**/L. You test the water in the tank and find that after it stabilizes, toxin is present in the water at concentration 750**μg**/L also.

- Which of you predictions fits these data?
- Which of the following processes is most likely eliminating the toxin from the fish?
    1. Passive transport
    2. First active, then passive transport
    3. First passive, then active transport
    4. Active transport.

c. Given the situation in part b, what should you do, in the short term, to continue to reduce the toxin level in the fish below 750**μg**/L

5. A particular amino acid is transported from the extracellular medium against its concentration gradient. The integral membrane protein that transports the amino acid also binds and transports Na+. Using your model of the cell membrane, develop a transport mechanism that will permit the amino acid uptake to be couples to the Na+ transport so that the amino acid's entry is linked only indirectly to the ATP hydrolysis