The Living World

Exercises

1. Calculate the toxic dose in mg/kg.

a. 0.15 g of acetaminophen has toxic effects on a 1 kg rat.

0.15g = 150 mg

150mg/1kg = 150mg/kg

b. A minimum of 1 gram of lincomycin (antibacterial drug) has toxic effects a 400 gram mouse.

1g = 1000 mg
400g = 0.40 kg

1000mg/0.40kg = 2500 mg/kg

2. What is the difference between a lethal dose and a toxic dose?

A lethal dose kills. A toxic dose harms the body but does not usually lead to death.

3. What is an LD_{50}?

LD_{50}: a dose which kills 50% of the organisms receiving that amount.

4. Calculate the LD_{50} for THC, marijuana's active ingredient, if 127 g of THC will kill 50% of men weighing 100 kg

127g = 127 000 mg

127 000 mg /100 kg = 1270 mg/kg

5. Rabbits feeding on lettuce growing above a cadmium dump have become ill. The LD_{50} for cadmium is 75 mg/kg. On average, the rabbits weigh 2 kg. If the lettuce contains 0.01 % cadmium, and each rabbit ate about 125 g of the contaminated lettuce, how close did they come to LD_{50}?

0.01% = 0.0001
0.0001(125 g) = 0.0125 g of Cd = 12.5 mg of Cd
12.5 mg/2kg = 6.25 mg/kg, short of LD_{50}

6. Secured bottle caps and locked medicine cabinets in the home can prevent tragic accidents. How many 500mg Advil tablets can be come toxic for a 12 kg toddler? Ibuprofen(Advil) toxic dose = 400mg/kg

400mg/kg(12 kg) = 4800 mg is toxic for a 12 kg toddler

4800 mg/500mg/tablet = 9.6 tablets

7. Do some research and find three water contaminants not mentioned in class.

PCB's, chlordane, dioxin, thallium

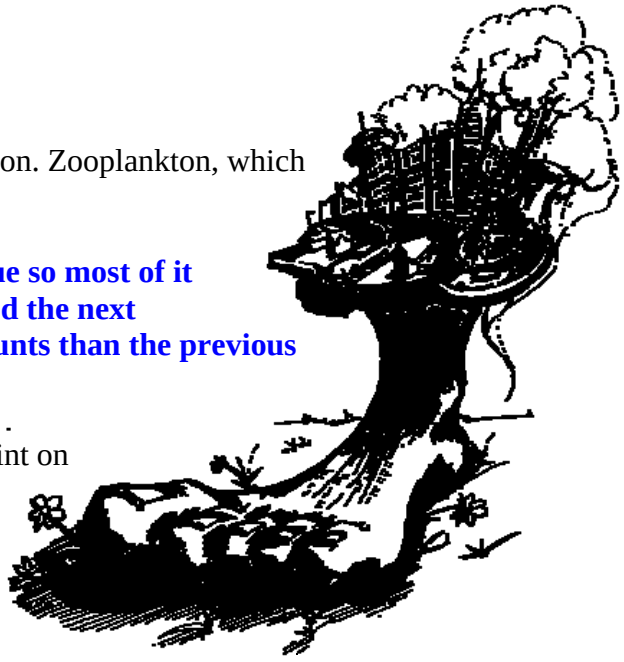
8. A herring has a concentration of 0.01 mg of mercury per kg of body mass. The water it swims in has a concentration of only 0.0002 mg/kg.

a) Compared to sea water, how much more concentrated is the mercury in the herring? (In other words, what is the BCF factor)?

BCF = 0.01/0.0002 = 50

b) How did it bioaccumulate in the food chain?
(Herrings eat small fish and zooplankton. Zooplankton, which are eaten by small fish, eat algae.)

Methyl mercury is stored in fat tissue so most of it cannot be excreted. It accumulates in the body, and the next organism in the food chain will ingest higher amounts than the previous organism.



9. How can you create a smaller ecological footprint on a daily basis?

Hint: think of the food you eat, your means of transportation, how you consume energy in your home, how you vacation etc.

(1) Eat less meat or no meat. Meat requires more energy to produce than vegetable material.
(2) Use public transit. Buses and trains consume less energy per passenger than private vehicles.
(3) Turn off unnecessary lights and unused gadgets. Insulate home. Use solar power.
(4) Fly less. Vacation closer to your home. This lowers energy demands.