

STE

Extra Toxicology Problems

1. What is the toxic dose of a pill in mg/kg if a 100 kg patient begins to get sick after ingesting only 2 pills each 0.010 g in mass?

$$20\text{mg}/100\text{kg} = 0.20 \text{ mg/kg}$$

2. The LD₅₀ for grain alcohol is 7060 mg/kg. An 85 kg man was found dead with an empty jug of vodka next to him. If the density of grain alcohol is 0.80g/ml, and the vodka is 40% alcohol, what is the least amount of vodka* that was in the jug?

**I had typed alcohol on your stencil*

$$7060\text{mg/kg} * 85 \text{ kg} = 600100 \text{ mg} = 600.1 \text{ g of alcohol}$$

$$600.1 \text{ g of alcohol (ml/0.80 g)} = 750.125 \text{ ml of pure alcohol}$$

$$0.40x = 750.125 \text{ ml of pure alcohol}$$

$$X = 1.875 \text{ L of vodka}$$

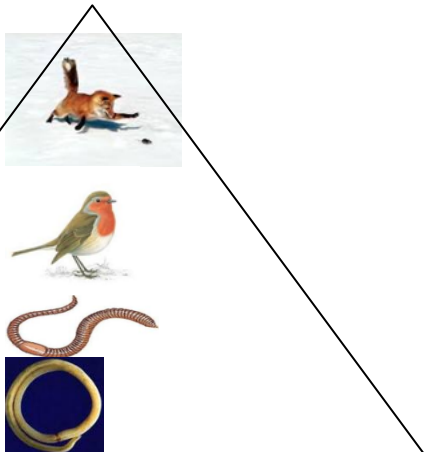
3. If the bioconcentration factor is 120, and if we find 120 ppm of methyl mercury in a fish, what is the concentration of the toxin in the water?

$$120 \text{ ppm}/120 = 1 \text{ ppm}$$

4. a) Place the following organisms in a food pyramid. The ppm are the parts per million of cadmium ion found in various organisms.

earthworm 0.30 ppm fox 2.5 ppm robin 1.0 ppm

roundworms 0.01 ppm



b) How is bioaccumulation related to how you obtained your answer in a) ?

It's the reason concentration keeps increasing as you go up the food chain. Each organism on the higher step of the pyramid acts as a filter, and less toxin is excreted than is ingested.

5. Briefly explain what each of the following are, and then explain why they would reduce our ecological footprint.

a) using NaOH to remove carbon dioxide from the air.

Prevents global warming because carbon dioxide acts as an invisible blanket.

b) solar shingles

can generate enough electricity to power a hot water tank, so it produces energy with no pollution

c) wind turbines

they are free of emissions (no pollution)

d) hybrid cars

burn less gasoline because brakes help recharge batteries

e) hydroelectricity

uses running water to generate electricity instead of generating steam by burning fossil fuels or using radioactivity