**S90 Topic 4 Pollution Risks**

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| A **pollutant**  is any material, form of energy, or alteration of the environment that will cause harm to a living organism. |

**What are 3 materials that are pollutants?**

**What 3 forms of energy can be pollutants? (Think of Mrs. Chen)**

**What are 3 alterations of the environment that are pollutants?**

**Can living things be pollutants? Defend your answer.**

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| **PARTS PER MILLION (ppm)** |

The amount (dose) of a chemical determines its toxicity. How do we determine how much of a chemical is in our water, air, soil or food? We use **parts per million (ppm).** ppm tells us the #mg of toxin per 1 kg of material, or #mL per 1 000 000 mL of water.

**1 ppm = 1mg/1kg or 1 ml/1 000 000 mL of water**

**so 10 ppm means 10mg/kg or 10 ml/1 000 000 mL of water**

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| **How do we calculate ppm?** |

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| **Practice Problem 1:** A nutrition label specifies that a 125 g serving of yogurt contains 7 mg of cholesterol. What is the concentration of cholesterol in a serving of yogurt in ppm?**Step 1: state your information as a ratio**  7 mg cholesterol = 0.056 mg/g if your answer is not in mg/kg you need Step 2 125 g yogurt**Step 2: express the ratio in mg/kg by multiplying by a conversion factor such as 1000 g/kg or 1 mL/1g (for water).** 0.056 mg/g x 1000 g/kg = 56 mg/kg = **56 ppm** |

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| **Practice Problem 2:** Scientists sampled a lake and found that it contained 20 ppm of a dissolved toxin. What was the concentration of this toxin by volume in the lake?  **Ans: 20 mL in 1 000 000 mL of lake water.** |

 **Calculate the concentration in ppm of cholesterol and sodium in a burger using the nutrition label below:**



The concentration of DDT in a pond is 8 ppm by volume. This means \_\_\_\_\_ ml of DDT is in \_\_\_\_\_\_\_\_\_ ml of pond water.

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| **Toxicity: The Danger is in the Dose** |

**Toxicity:** the ability of a chemical to cause harm to an organism.

**Acute toxicity:** when serious symptoms occur after only one exposure to the chemical. Ex. methyl isocyanate <http://en.wikipedia.org/wiki/Bhopal_disaster>

<http://www.youtube.com/watch?v=Up5rbkS4CGI&feature=related>

**Chronic toxicity:** when symptoms occur only after a chemical accumulates to a specific level after many exposures over time. Ex. lead and other heavy metals

**Lethal dose 50:** the dose of a chemical that will kill 50% of the population to which it is applied.

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**Learning Check:**

**1.** Which of the following statements **best** defines the term LD50?

**A.** LD50 is the proportion of the first 50 organisms in a test population that dies when exposed
 to a particular substance.

**B.** LD50 is the proportion of the first 50 organisms in a test population that becomes sick
 when exposed to a particular substance.

**C.** LD50 is the concentration of a substance administered to a test population that kills half the
 organisms in the test population.

**D.** LD50 is the concentration of a substance administered to a test population that makes half
 the organisms in the test population sick.

**2.**

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**3.** The lower the LD50 the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (higher or lower) the toxicity.

 Read “**Thalidomide Issue”** pg. 219. Answer the question in Fig. 3.19 on the same page.

 **Risk-Benefit Analysis:** Read pg. 220. Summarize this page in a few sentences:

**Assignment:**

 **Topic 4 Review Questions 1-3 p. 221 Vocab
 Add info to your web online Sci Focus quizzes**