

Chemicals & Human Health
Toxicology Problem Set: Student Sheet

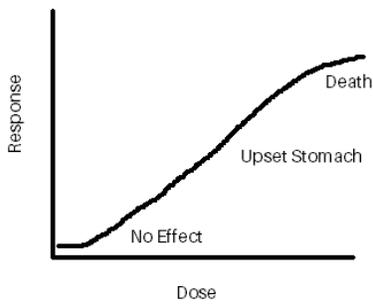
Directions

1. Answer the pre-questions (circle the answer in the Pre-Questions column).
2. Go to the website www.biology.arizona.edu/chh and click on the link to the Toxicology Problem Set.
3. Write the correct answer in the column labeled Correct Answer. All of the answers can be found in the Toxicology Problem Set.
4. Explain the correct answer.

Pre-Questions (circle the answer you think is correct)	Correct Answer (write the letter of the correct answer from the website)	Explain (explain the correct answer)
<p>Which statement is the most correct?</p> <p>A. Chemicals manufactured by humans are more dangerous to human health than naturally occurring chemicals.</p> <p>B. Both natural and human-made chemicals are potentially toxic to humans.</p> <p>C. Naturally occurring chemicals are more poisonous to humans than synthetic chemicals.</p>	B	<p>Give an example of each</p> <p>Natural toxic substance: Carbon Dioxide</p> <p>Man-made toxic substance: DDT</p>
<p>One of the items below is a hazardous substance. Four are sources of a hazardous substances. Which one is a hazardous substance?</p> <p>A. clogged furnace</p> <p>B. cigarette</p> <p>C. a dog</p> <p>D. paint applied before 1978</p> <p>E. dust mite parts</p>	E	<p>What is a common health effect of this hazard?</p> <p>Allergic reactions</p> <p>What is the source for this hazard? Dust Mites</p> <p>List 2 additional examples of a hazard and its source: Tobacco smoke and cigarettes, Lead and paint</p>
<p>Which of the following is NOT a possible route of entry for a hazard?</p> <p>A. ingestion</p> <p>B. absorption</p> <p>C. exposure</p> <p>D. inhalation</p>	C	<p>Describe the primary ways a hazard can enter the body: Through the skin, gut, and lungs</p> <p>Which route of entry may result in more of the toxicant in the blood and why? Through the lungs</p>

<p>When DDT, a pesticide, enters the human body, it is _____ .</p> <p>A. water soluble and is easily excreted in urine.</p> <p>B. stored in the bones.</p> <p>C. not toxic, but is processed by enzymes and becomes a different compound which is toxic.</p> <p>D. fat soluble and can be stored in fat tissue.</p>	<p>D</p>	<p>Define solubility: A property that allows a solute to be dissolved in water or fat</p> <p>What type of chemical is more easily eliminated from the body, water-soluble or fat-soluble?</p> <p>Water Soluble</p> <p>Based on your answer above, is DDT easily eliminated from our bodies? Why?</p> <p>No, because it is fat soluble</p>
<p>Who took the largest dosage of aspirin?</p> <p>A. an adult woman who weighs 125 lbs. and took 300 mg of aspirin</p> <p>B. a teenage boy who weighs 135 lbs. and took 600 mg of aspirin</p> <p>C. a baby who weighs 20 lbs. and took 100 mg of aspirin</p> <p>D. a chihuahua who weighs 5 lbs. and took 50 mg of aspirin</p>	<p>D</p>	<p>Define dose: Specific amount of a chemical that enters the body</p> <p>Calculate the dose for each person/animal in the question (show your calculations and include units):</p> <p>300mg/125lbs=2.2mg/lbs</p> <p>600mg/135lbs=4.4mg/lbs</p> <p>100mg/20lbs=5mg/lbs</p> <p>50mg/5lbs=10mg/lbs</p>

<p>Which will NOT help you determine the dose of a hazardous gas received by a person?</p> <p>A. their respiration rate</p> <p>B. their length of exposure to the gas</p> <p>C. the source of the gas</p> <p>D. their frequency of exposure to the gas</p> <p>E. the concentration of the gas</p> <p>F. the gas's chemical and biological properties</p>	<p>C</p>	<p>Will the dose be higher or lower if:</p> <p>a person breathes more rapidly?</p> <p>Higher</p> <p>a person is exposed once?</p> <p>Lower</p> <p>a person is exposed over years? the gas is easily absorbed?</p> <p>Higher</p>
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<p>Most hazardous substances exhibit a "dose-response relationship." What does this mean?</p> <p>A. The harm caused by the hazard increases as the amount of hazard entering the body (dose) increases.</p> <p>B. It does not matter how big a dose you receive, you will always have same amount of harm/sickness.</p> <p>C. Exposure to the hazard always results in harm.</p> <p>D. Fifty percent of the people will die when exposed to 0.1 mg/kg.</p>	<p>A</p>	<p>Draw a dose-response curve:</p> 
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<p>A family home has a clogged furnace that is producing carbon monoxide, a hazardous gas. Which family member is likely to be harmed the most?</p> <p>A. Billy, the son who is in 1stgrade</p> <p>B. Baby Shea, who is going to be in preschool next year</p> <p>C. Karla, the nanny who cares for the toddler every weekday morning</p> <p>D. Ms. Nguyen, the mother who works at home.</p> <p>E. Mr. Nguyen, the father who works at the University</p>	<p>B</p>	<p>Give 2 reasons for your answer: Baby Shea is the youngest, therefore she will be affected the most. She also stays home a majority of the time, which heightens her exposure to the carbon monoxide gas.</p>
<p>All of the people listed below live in the same house. Who is most likely to experience toxic effects from the second-hand smoke?</p> <p>A. the grandmother, who is very fit</p> <p>B. the mother, who smokes</p> <p>C. the father, who smokes</p> <p>D. the teenage daughter, who has asthma</p> <p>E. the son, who is in 5th grade</p>	<p>D</p>	<p>Explain your answer: The daughter's asthma heightens her risk of life-threatening episodes from the gas.</p>

<p>There are several ways to control or reduce your exposure to a hazard. Opening a window in a room full of people who are smoking is an example of controlling your exposure to environmental tobacco smoke by _____.</p> <p>A. treating the symptoms of the hazard</p> <p>B. diluting the hazard</p> <p>C. distancing yourself from the hazard</p> <p>D. removing the hazard</p>	<p>B</p>	<p>Explain your answer:</p> <p>Fresh air from the window will dilute the tobacco smoke.</p> <p>Give 2 additional examples of how to control or reduce exposure to a hazard:</p> <p>Wearing protective gear and distancing yourself from the source</p>
<p>Which environmental health scientist would determine ways to prevent and reduce exposure to second hand smoke?</p> <p>A. a toxicologist</p> <p>B. an epidemiologist</p> <p>C. an industrial hygienist</p> <p>D. an occupational and environmental medicine physician</p> <p>E. a pharmacologist</p>	<p>C</p>	<p>Do any of the careers described in this question interest you? Why or why not?</p> <p>Being a pharmacologist would interest me because I find that testing chemicals to find their benefits would be interesting.</p>