

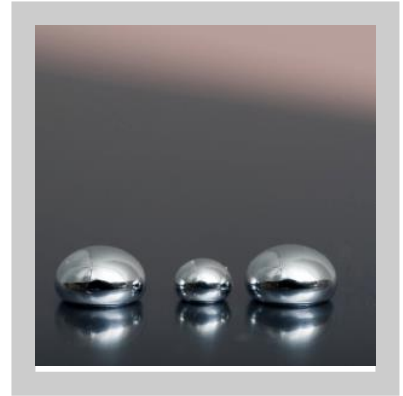
Name _____

Date _____

Mercury in Fish

Mercury is a highly toxic metal found in neon signs, fluorescent lights, older thermometers, and certain kinds of telescopes. Although scientists today understand that mercury is extremely poisonous, and so it is found in only a small number of products, in the past mercury were used in many common household objects. Mirrors, hats, photography equipment, and even several kinds of medicines used to contain various levels of mercury.

Prolonged contact with mercury can be very dangerous for human beings. Because we now know how toxic mercury is, chemists and other people who work with mercury are careful to limit their exposure to it. However, while most household objects no longer contain mercury, and most people are not exposed to it at their jobs, there is still a significant amount of mercury in something that many people eat on a regular basis: fish.



The mercury we might find in a can of tuna is most likely an indirect result of the coal industry. Mercury, which is naturally found in coal, is released into the air when coal is burned. As coal is transformed into energy, mercury vapor enters the atmosphere, becomes trapped in the clouds, and then returns to the lakes, rivers, and oceans in the form of rain. This mercury-laced rain can be carried great distances from the original coal plant. Scientists have found mercury in fish from nearly 300 streams across the country, even in bodies of water that are located hundreds of miles from coal plants.

Mercury accumulates in certain kinds of fish through a process called biomagnification. To understand bio magnification, one must first understand the food chain. The ocean's food chain starts with algae, sea plants that get their nutrients from the sun. The algae are then eaten by small sea creatures, such as shrimp. Small fish, like herring, then eat these shrimp. Larger fish, like trout, eat the herring. Even larger fish, like albacore tuna, then eat the trout. A human being might then eat the albacore tuna. Biomagnification occurs when a substance enters the food chain in small amounts at the very bottom and then increases in concentration in animals higher up on the food chain. In this example, algae absorb mercury in the seawater. Shrimp eat the mercury-filled algae, and then the shrimp are eaten by herring, which are eaten by trout, which are eaten by albacore tuna.

Once a fish eats another creature containing mercury, the mercury does not leave that fish's body, but instead it is stored in fat. Therefore, the mercury continually accumulates as more mercury-contaminated fish are eaten. There may not be very much mercury in any one of the creatures at the lower levels of the food chain, like the shrimp or the herring, for example. Yet because the tuna eats so many of the mercury-contaminated fish, the mercury concentration in the tuna's body is much higher than it is in the herring's body.

Despite the toxicity of mercury and the widespread nature of fish contamination, there is no need for the public to be overly apprehensive. Many popular fish, such as salmon, catfish, shrimp, or tilapia, are generally safe to eat. Other fish, especially tuna and grouper, should only be eaten in

moderation. Young children and pregnant women should be especially cautious about how many servings of mercury-contaminated fish they have per week. It is recommended that people in these groups not eat more than 2 servings of mercury-contaminated fish per week. Fish with the highest levels of mercury include shark, swordfish, and king mackerel. All people should avoid eating large amounts of these kinds of fish, and no one should eat these fish more frequently than once a month.

- 1) The primary purpose of the passage is to
 - A. warn people who work at coal plants about the dangers of mercury
 - B. inform people about the presence of mercury in edible fish
 - C. familiarize people with the history of mercury in industrial products
 - D. instruct people about the process of biomagnification

- 2) Based on information in paragraph 1, it can be inferred that only older thermometers contain mercury because
 - A. older thermometers do not work as well as newer models
 - B. newer thermometers were made using coal power; older thermometers were made before coal power was in widespread use
 - C. thermometers with mercury were made before people understood how dangerous mercury is
 - D. thermometers made in earlier times used older technology

- 3) According to the passage, the coal industry contributes to mercury contamination in fish because
 - A. coal plants often dump mercury directly into local rivers and streams that carry it to the ocean
 - B. fish eat coal particles that float on the ocean's surface; because coal contains mercury, the fish are therefore eating mercury
 - C. when coal is burned, the mercury naturally contained in coal is released into the atmosphere, and then returns to the earth in the form of rain
 - D. toxic waste runoff from coal plants flows into rivers and streams that carry it to the ocean

- 4) In paragraph 2, the author notes that "scientists have found mercury in fish from nearly 300 streams across the country, even in bodies of water that are located hundreds of miles from coal plants." What conclusion(s) does the author draw from this information?
 - I. Mercury contamination from the coal plant vapors is widespread.
 - II. Because mercury is found in fish located a significant distance from coal plants, it is unlikely that coal plants are responsible for the mercury contamination.
 - III. Rain is likely not the only cause of mercury poisoning in fish.
 - A. I only
 - B. I and II only
 - C. II and III only
 - D. I, II, and III

5) According to the explanation given in paragraph 3, which of the following is an example of biomagnification?

A. DDT is a pesticide sprayed on crops. Mice eat the sprayed crops. Owls eat the mice. There is a higher concentration of DDT in the owls than in the mice. Fertilizers from farms run into oceans. The fertilizers increase the amount of algae in the ocean. The increased mass of algae changes the amount of carbon dioxide in the ocean's ecosystem.

B. Grass requires soil, water, and sun to grow. Cows eat grass. People eat cows. Therefore, people also need soil, water, and sun to grow.

C. Radiation from a nearby nuclear power plant can cause abnormal fin development in albacore tuna.

6) In the final paragraph, the author argues that

- A. it is not safe to eat any seafood
- B. only children and pregnant women must be cautious about the fish they consume
- C. people must think carefully about what kinds and amounts of fish they are eating
- D. it is only safe to eat the most popular varieties of fish

7) Using your own words, explain the concept of biomagnification.

Answers and Explanations

1) B

Core Standard: **Integration of Knowledge**

An author's purpose is related to the content of the passage. The last sentence of paragraph 1 provides a good clue to the author's purpose: "However, while most household objects no longer contain mercury, and most people are not exposed to mercury at their jobs, there is still a significant amount of mercury in something that many people eat on a regular basis: fish." Paragraph 2 identifies coal as the source of mercury in fish. Paragraph 3 describes the process by which mercury accumulates in fish. Paragraph 4 explains why fish at the higher levels of the food chain are more contaminated with mercury than creatures at the lower levels of the food chain. Paragraph 5 provides recommendations about eating fish. Based on the content of the passage, we can determine that the primary purpose is to inform people about the presence of mercury in edible fish. Therefore **(B)** is correct.

While the author does warn that mercury is dangerous, the audience is not people who work at coal plants but people who eat fish. This means **(A)** is incorrect.

Although the author does discuss some historical uses of mercury, this is only a small part of the passage, so familiarizing people with this history is not the primary purpose. This means **(C)** is incorrect.

Although the author does discuss the process of biomagnification, this is only a small part of the passage, so instructing people about this process is not the primary purpose. This means **(D)** is incorrect.

2) C

Core Standard: **Integration of Knowledge**

In paragraph 1, the author writes, "Mercury is a highly toxic metal found in...older thermometers." Later in the paragraph, the author adds, "Although scientists today understand that mercury is extremely poisonous, and so it is found in only a small number of objects, in the past mercury was used in a wide variety of objects." The author also claims that "we now know how toxic mercury is." From this information we can infer that in the past people did not understand how dangerous mercury is, but now we do understand. This means that thermometers with mercury, meaning older thermometers, were made before people understood how dangerous mercury is.

Therefore **(C)** is correct.

The passage does not provide information to support choices **(A)**, **(B)**, and **(D)**. Therefore they are incorrect.

3) C

Core Standard: **Key Ideas and Details**

In paragraph 2, the author writes: “Mercury, which is naturally found in coal, is released into the air when coal is burned. As coal is transformed into energy, mercury vapor enters the atmosphere” before eventually returning to the earth “in the form of rain.” This means that when coal is burned, the mercury naturally contained in coal is released into the atmosphere, and then returns to the earth in the form of rain.

Therefore **(C)** is correct.

The passage does not provide information to support choices **(A)**, **(B)**, and **(D)**. Therefore they are incorrect.

4) A

Core Standard: **Integration of Knowledge**

The author provides evidence of mercury being found in fish living in streams far from a coal plant. This evidence supports the claim, stated in the previous sentence in paragraph 2, that “Mercury-laced rain can be carried great distances from the original coal plant.” This claim tells us that the author concludes from the evidence that mercury contamination from the coal plant vapors is widespread. This supports **option (I)**.

In paragraph 2, the author writes that the “mercury-laced rain can be carried great distances from the original coal plant.” Based on this information, the author concludes that coal plants are responsible for contamination even “great distances” away, not that it is unlikely that coal plants are responsible. This eliminates **option (II)**.

Since the author writes in paragraph 2 that “mercury-laced rain can be carried great distances from the original coal plant,” we know that he or she concludes that rain is one cause of mercury poisoning in fish. The author does not conclude that rain is likely not the only cause of mercury poisoning in fish. This eliminates **option (III)**.

Therefore **(A)** is correct.

5) A

Core Standard: **Integration of Knowledge**

In paragraph 3, the author defines biomagnification as the natural process that occurs when “a substance enters the food chain in small amounts at the very bottom and then increases in concentration in animals higher up on the food chain.” Mice are an example of an animal lower on the food chain. They have a lower concentration of DDT than the owls, which are an animal higher on the food chain. Therefore **(A)** is correct.

The examples given in choices **(B)**, **(C)**, and **(D)** do not show a substance entering the food chain in small amounts and then increasing in concentration in animals higher up on the food chain. Therefore they are incorrect.

6) C

Core Standard: **Key Ideas and Details**

In the last paragraph, the author gives several examples of different kinds of fish that have different levels of mercury contamination. He or she states that many popular varieties of fish are safe for everyone, that pregnant women and young children should be cautious about sushi and tuna, and that all people should be careful not to eat large amounts of certain kinds of fish. Therefore, he or she argues that all people should be careful about what kinds of fish they eat and how much fish they eat. This means **(C)** is correct.

It is too extreme to claim the author argues that it is not safe to eat any seafood. Therefore **(A)** is incorrect.

The author states that all people, not just children and pregnant women, must be cautious about the fish they consume. This means **(B)** is incorrect.

Although the author claims, “Many popular fish, such as salmon, catfish, shrimp, or tilapia, are generally safe to eat,” he or she does not suggest that it is only safe to eat the most popular varieties of fish. This makes **(D)** incorrect.