

• Advanced Critical Reading - Ethanol

Ethanol ($\text{CH}_3\text{CH}_2\text{OH}$; which is also called ethyl alcohol, grain alcohol, and EtOH) is a clear, colorless liquid. It is a renewable biofuel made from starch and sugar-based crops like corn grain and sugar cane or from cellulosic feedstocks like grass, wood, or recycled newspapers. Ethanol is a high-octane biofuel which performs so splendidly in internal combustion engines that early automakers presumed it would be the world's chief fuel.

American proponents of ethanol fuel highlight two principal advantages: its environmental impact and its energy security benefits.

The adoption of ethanol reduces noxious emissions such as carbon monoxide (CO) and pollutants from internal combustion engines; hence, it is appreciably less deleterious to the environment than gasoline. Ethanol made from corn has been shown to reduce harmful emissions by up to 13%, whereas ethanol made from cellulosic materials reduces dangerous emissions by as much as 88%.

Ethanol is a renewable biofuel; in only six months a new crop can be grown, harvested, and converted to fuel, so it is profitable for rural crop-producing economies. In addition, it keeps engines clean and can be used in gasoline engines with no modifications when combining gas with up to 10% ethanol. It can be used in specially modified vehicles called "flexible-fuel" or "flex-fuel" vehicles in concentrations of up to 85%. Gasoline combined with 85% ethanol is generally referred to as "E85." Higher ratios of ethanol in the fuel mixture result in less reliance on fossil fuels, so there is less dependence on imports.

American opponents of ethanol fuel point to three disadvantages: its price fluctuations, its energy level, and its availability.

The price of ethanol fluctuates on a different cycle than gasoline; therefore, at times ethanol is more expensive than gasoline, and at times it is cheaper. Another drawback of ethanol is that it contains less energy per gallon than gasoline; even when it is cheaper per gallon than conventional fuel, it does not take the vehicle as far as a gallon of gas. A car's fuel economy with ethanol can be expected to be 20–30% less than a vehicle which burns gasoline. So the occasional cheaper price is offset by the lower energy yields. In addition, ethanol is not as widely distributed as gasoline. It is readily available only in the Midwest; other areas have limited ethanol infrastructure.

The Obama administration is working on expanding the ethanol infrastructure. In a recent interview with 15 newspaper editors, President Obama characterized the U.S. position on biofuels in this way: "Our challenge, I think, is to see our current ethanol technology as a bridge to the biofuels technologies of the future. And that's what we want to invest in, and that's what I'll be directing my Department of Agriculture to focus on."

Questions

1. It can be inferred from the passage that which of these statements about ethanol is/are true?
 - I) Burning ethanol made from wood produces less CO than burning ethanol made from corn.
 - II) Burning ethanol made from grain produces less CO than burning gasoline.
 - III) Burning ethanol made from newspapers produces less CO than burning ethanol made from grass.
 - A) I only
 - B) II only
 - C) III only
 - D) I and II only
 - E) II and III only

2. The author's primary purpose is to
 - A) describe and define ethanol.
 - B) compare 2 types of ethanol.
 - C) support the adoption of ethanol.
 - D) explain advantages and disadvantages of gasoline.
 - E) explain advantages and disadvantages of ethanol.

3. In line 9, *deleterious* most closely means
 - A) dangerous, because it harms the environment less than gas.
 - B) beneficial, because it helps the environment less than gas.
 - C) splendid, because it performs less splendidly than gas.
 - D) unreliable, because it is less unreliable than gas.
 - E) expensive, because it is less expensive than gas.

Answers and Explanations

1. The correct answer is **D**.

- D)** Correct. Corn is a sugar-based crop, and wood is a cellulosic feedstock, according to line 4. According to lines 10–12, ethanol made from corn reduces harmful emissions by up to 13%, and ethanol made from cellulosic materials reduces harmful emissions by as much as 88%. According to line 8, one of the noxious (harmful) emissions is carbon monoxide (CO.) Therefore, burning ethanol made from wood produces less CO than burning ethanol made from corn.
- II)** Correct. According to lines 8–10, ethanol reduces noxious emissions such as carbon monoxide (CO) and pollutants from internal combustion engines; hence, it is appreciably less deleterious to the environment than gasoline. According to lines 11–13, ethanol made from corn reduces harmful emissions by up to 13%.
- III)** Incorrect. According to lines 3–4, grass, wood, and recycled newspapers are cellulosic materials. And while, according to lines 11–12, using ethanol made from cellulosic materials reduces harmful emissions by up to 88%, there is no comparison made among the various cellulosic materials.

2. The correct answer is **E**.

- A)** Incorrect. While the author describes and defines ethanol in lines 1–6, she goes on to explain the advantages and disadvantages of using it.
- B)** Incorrect. While the author makes several comparisons between sugar-based ethanol and cellulosic ethanol, in lines 2–4, lines 10–12 she goes on to explain the advantages and disadvantages of using it.
- C)** Incorrect. While the author explains the advantages of adopting ethanol in lines 8–19, she goes on to explain the disadvantages of using it.
- D)** Incorrect. While the author explains that ethanol is less harmful to the environment than gasoline in lines 8–10 and that gas works better and is more widely available than ethanol in lines 24–28, she does so only insofar as she is comparing the advantages and disadvantages of ethanol.
- E)** Correct. The structure of the passage is revealed in lines 6–7, which explain what the proponents of ethanol highlight as advantages, and in lines 20–21, which explain what the opponents of ethanol point to as disadvantages.

3. The correct answer is **A**.

- A)** Correct. According to line 8, ethanol reduces noxious (harmful) emissions; according to lines 10–12, ethanol made from corn reduces harmful emissions by up to 13%, and ethanol made from cellulosic materials reduces harmful emissions by as much as 88%. So ethanol is less harmful, or less dangerous, than gasoline.
- B)** Incorrect. According to line 8, ethanol reduces noxious (harmful) emissions; according to lines 10–12, ethanol made from corn reduces harmful emissions by up to 13%, and ethanol made from cellulosic materials reduces harmful emissions by as much as 88%. So ethanol is more beneficial, not less beneficial, than gasoline.
- C)** Incorrect. According to lines 4–5, ethanol performs so splendidly in internal combustion machines that carmakers thought it would be the chief fuel. According to line 15, it keeps engines clean. And while lines 25–26 point out that a car's fuel economy can be less with

ethanol than with gasoline, there is no mention that ethanol performs less splendidly than gas.

- D) Incorrect. According to lines 4–5, ethanol performs so splendidly in internal combustion machines that carmakers thought it would be the chief fuel. According to line 25, ethanol does not take the vehicle as far as a gallon of gas. But there is no mention that it is more or less unreliable than gas.
- E) Incorrect. According to lines 9–10, ethanol is appreciably less deleterious to the environment than gasoline. The expense of gasoline would not cause the environment to change. According to lines 22–23, the price of ethanol fluctuates on a different cycle than gasoline; therefore, at ethanol is more expensive than gasoline, and at times it is cheaper. So, ethanol is not less expensive than gas.