

ENVIRONMENTAL PROTECTION AGENCY

[EN-FRL 1821-4]

Fuels and Fuel Additives;  
Revised Definition of "Substantially Similar"

AGENCY: Environmental Protection Agency (EPA)

ACTION: Interpretive Rule - Final Action

SUMMARY: This notice broadens EPA's interpretation of the term "substantially similar" as it is used in section 211(f)(1) of the Clean Air Act (Act). This interpretation will enable fuel and fuel additive manufacturers to determine whether their fuels or fuel additives are covered by or excluded from the prohibitions of section 211(f)(1) and (3) of the Act, and will reduce the burdens on those manufacturers and EPA for processing waivers for fuels and additives which would otherwise be required. This interpretation applies only to unleaded gasoline. Leaded gasolines are not covered by the section 211(f) prohibitions and diesel fuels are not addressed in this interpretive rule. The interpretation supersedes an earlier interpretation issued by EPA. 45 FR 67443 (October 10, 1980).

DATES: This interpretive rule is effective 30 days after publication.

PUBLIC DOCKET: Copies of information relevant to this rule are available for public inspection at the Central Docket Section of the Environmental Protection Agency, West Tower, Gallery I, 401 M Street, S.W., Washington, D.C. 20460 and are available for review between the hours of 8:00 a.m. and 4:00 p.m. As provided in 40 CFR Part 2, a reasonable fee may be charged for copying services.

FOR FURTHER INFORMATION CONTACT: James W. Caldwell, Chief, Fuels Section, Field Operations and Support Division (EN-397), Environmental Protection Agency, Washington, D.C. 20460 at (202) 472-9367.

SUPPLEMENTARY INFORMATION: Section 211(f)(1) of the Clean Air Act (42 U.S.C. 7545 (f)(1)) prohibits, after March 31, 1977, any fuel or fuel additive manufacturer from first introducing into commerce, or increasing the concentration in use of, any fuel or fuel additive for general use in light-duty motor vehicles manufactured after model-year 1974 which is not substantially similar to any fuel or fuel additive utilized in the certification of any model-year 1975, or subsequent model-year vehicle or engine under section 206 of the Act.

Section 211(f)(á) requires any manufacturer to cease to distribute in commerce certain fuels and fuel additives not later than September 15, 1978. These fuels and fuel additives are any which were first introduced into commerce or increased in concentration in use prior to March 31, 1977, and after January 1, 1974, and which would otherwise have been prohibited under section 211(f)(1).

Fuels or fuel additives which are "substantially similar" to those used during a 1975, or subsequent model year certification are thus excluded from the section 211(f)(1) and (3) prohibitions. For those fuels or fuel additives which are not "substantially similar," the fuel or fuel additive manufacturer may apply for a waiver of the section 211(f)(1) and (3) prohibitions, as provided in section 211(f)(4). The term "substantially similar" is not defined in the Act.

On March 16, 1979 (44 FR 16033), EPA proposed an interpretation of the term "substantially similar" in terms of the additive's elemental content, molecular structure, and total concentration in the fuel. EPA received comments on the proposal from 12 fuel and fuel additive manufacturers, two automobile manufacturers, the American Petroleum Institute (API), and the Department of Energy. A final interpretive rule incorporating these comments was published on October 10, 1980. For a summary of and response to these comments, the reader is referred to the Federal Register of October 10, 1980, (45 FR 67443-67448).

Although the previous definition (hereafter, 1980 Definition) was effective upon publication, EPA indicated that it would accept comments for 90 days thereafter and would consider revising its interpretation if necessary. EPA received comments from 11 fuel and fuel additive manufacturers, the American Petroleum Institute (API), and the American Society for Testing and Materials (ASTM).

Some commenters questioned the advisability of using the ASTM "Standard Specifications for Automotive Gasoline" (D 439-79) as a criterion for determining whether a fuel is substantially similar to a certification fuel. Others stated that the 2.0 percent oxygen limit was too conservative, that a 3.5 percent limit (near to the oxygen content of gasohol) would be more appropriate. The exclusion of methanol as part of a "substantially similar" fuel or additive was questioned from a number of perspectives. The formula by which an additive may be determined to be "substantially similar" was criticized by some, and alternatives were suggested. In response to these comments, a number of changes have been made to the 1980 Definition. The comments received and the Agency's response are discussed in more detail below.

#### Summary of Comments Received and Agency Response

The following is a summary and discussion of the significant issues raised in the comments on the October 10, 1980 publication:

##### Comment - Methanol at high levels:

The 1980 Definition excluded any fuel which contained methanol (other than as an impurity at trace levels) from consideration as being a "substantially similar" fuel. The rationale for this was the existence of questions concerning the effects of methanol-gasoline mixtures upon fuel system components as well as the water separation and evaporative emission

characteristics of such fuels. For these reasons, EPA excluded the use of methanol at high levels from the 1980 definition of "substantially similar."

One commenter concurred with EPA's judgment stating that methanol alone in gasoline (i.e., without co-solvent or higher molecular weight alcohols) may present problems in current vehicles, but argued that methanol with appropriate co-solvents should be included. This commenter stated that the definition should be expanded to include the 2.75 percent methanol/2.75 percent t-butanol (TBA) mixture as well as isopropyl alcohol, n-butyl alcohol, and other oxygenate mixtures with 2.75 percent methanol. Some argued that because a section 211(f)(4) waiver had been granted to a mixture of 2.75 percent methanol and 2.75 percent TBA in unleaded gasoline, EPA was not justified in excluding methanol from the definition.

Still another commenter stated that methanol should be included at 7 percent or less (this fuel would contain as much oxygen as one containing about 10 percent ethanol) and that the ASTM standards as well as market place pressures should maintain the quality of the fuel.

Agency Response:

In response to these comments, a general clarification is in order. As used in section 211(f)(1) of the Act, a "substantially similar" fuel is one which is substantially similar to a fuel or fuel additive utilized in the certification process, It does not mean substantially similar to a fuel or fuel additive that has received a section 211(f)(4) waiver. EPA believes that the presence of the section 211(f)(4) waiver provision clearly indicates that Congress intended only to include as "substantially similar" those fuels chemically and physically similar to fuels used in certification, recognizing that other fuels could potentially be shown not to cause vehicles to fail to meet emission standards. Thus, in general, the fact that EPA has granted a waiver for a fuel does not by itself bring that substance within the definition of "substantially similar."

Conversely, any fuel or fuel additive not substantially similar to one used in the certification process is nonetheless eligible for a waiver, if the statutory prerequisites are met.

In selecting the "non-methanol aliphatic alcohols, and/or aliphatic ethers" portion of the fuel criteria, EPA's intent was to expand in a reasonable fashion the scope of fuels with properties which were characteristic of certification fuels. The certification process employs two fuels: a standardized testing fuel which must have properties that meet specifications promulgated under the Act and a mileage-accumulation fuel which must be representative of commercially available fuels. EPA has ascertained that at least one mileage-accumulation fuel contained propanol at a level equivalent to about 0.5 percent oxygen. From this, and using information regarding other oxygenated fuels which are known to possess emission characteristics similar to mileage-accumulation fuel, EPA has attempted to expand from the known certification specifications and oxygen content. EPA acknowledges that the definition is thereby somewhat expansive in that it includes constituents in greater concentrations than have previously been used in certification fuel. However, based on considerable information, including data submitted as comments on this rulemaking, EPA believes that it is reasonable to permit this expansion because of confidence that these fuels are chemically and physically similar, and have been shown to have emission properties similar to certification fuels.

In particular, EPA has looked at information on three oxygenated fuels, including an unleaded gasoline blended with 7 percent tertiary-butanol (TBA), one blended with 7 percent methyl tertiary-butyl ether (MTBE), as well as a fuel containing 2.75 percent methanol, 2.75 percent TBA, and unleaded gasoline. These fuels have been shown to have emission characteristics similar to certification fuel. In addition, other information indicates that these

fuels are not so dissimilar from certification fuels in other properties so as to be excluded from the ambit of this definition.

Initially EPA had substantial questions as to the compatibility of methanol (absent co-solvent alcohols like TBA) with gasoline and with the materials of construction used in current vehicles. Commenters pointed out that the use of a co-solvent alcohol with methanol could offset this adverse effect. EPA agrees that fuels containing an intermediate level of methanol (up to 2.75 percent) will possess good emission characteristics and should not pose materials-compatibility problems, if an equal volume of TBA is included in the fuel. Further, EPA agrees with commenters that TBA is not the only co-solvent alcohol that will offset the adverse effects of methanol. Thus, the use of aliphatic alcohols which have a molecular weight equal to or greater than TBA will be allowed as co-solvents for methanol. The use of a co-solvent alcohol which has a lower molecular weight than TBA will not be included in this interpretation because it is unclear whether equal volumes of propanol or ethanol added with methanol to a gasoline would ameliorate sufficiently the negative volatility and materials-compatibility effects of methanol.

Summarizing, EPA will consider as "substantially similar" any fuel which contains up to 2.75 percent methanol with an equal volume of butanol, or higher molecular weight alcohol, and which complies with the remaining criteria of this interpretation.

Comment - Methanol at low levels:

A few commenters noted that methanol has historically been used at low levels as a solvent in additive packages and at concentrations up to 0.3 percent (3000 ppm) as a fuel de-icer which aids in the removal of water from the fuel tank. They argue that this concentration has not caused noticeable adverse effects and that the continued exclusion of all methanol from

gasolines would require the costly reformulation of additive packages and loss of performance with no discernible benefit.

Agency Response:

EPA agrees with the commenters and has corroborated independently that at least one manufacturer has used methanol as a de-icer commercially at levels approaching 0.3 percent (3000 ppm). EPA's decision not to include methanol within the 1980 Definition was not intended to preclude its use at these levels. Therefore, EPA has incorporated this change into the revised definition. This level of methanol use would not be subject to the previously discussed requirement of blending an equal volume of butanol, or higher molecular weight alcohol.

Comment - Oxygen content:

Half of the commenters suggested that the 2.0 percent oxygen limit is too restrictive and that an oxygen limit of 3.5 percent would be more reasonable. They argued that EPA granted a waiver for gasohol, a 10 percent ethanol/90 percent gasoline fuel which contains approximately 3.5 percent oxygen (in fact, after adjusting for liquid density differences, it contains roughly 3.7 percent oxygen) and that gasohol has not been shown to cause driveability problems at this elevated oxygen level. One commenter stated that EPA is without support in selecting a 2.0 percent oxygen figure.

Agency Response:

EPA agrees that vehicles using gasohol have experienced few driveability problems and that other alcohol-gasoline blends containing 3.7 percent oxygen would probably not experience enrichment-related driveability problems. However, the use of gasohol was shown to result in a slight increase in NO<sub>x</sub> emissions and a larger increase in evaporative emissions.

The 2.0 percent oxygen limit was chosen because EPA's experience with oxygenated fuels indicated that at least three fuels with 2.0 percent oxygen or less were shown to be characteristically similar to certification gasoline. Although EPA believes that a lower percentage of oxygen requirement would be justifiable, on the basis of actual fuel constituency and based on experience and comments, EPA is confident that setting the limit at 2.0 percent oxygen is not inconsistent with the statutory intent.

The selection of 2.0 percent as the maximum level of oxygen had two primary purposes: to limit the stoichiometric enrichment of the fuel, which could lead to increases in NO<sub>x</sub> emissions in some cars; and to provide a means of limiting the concentration of alcohols of various oxygen contents. This method limits those alcohols that contain a greater percentage of oxygen (and, because of their greater polarity, are more likely to cause evaporative emissions or materials-compatibility problems) to a lower level in the fuel.

Although the effects of alcohols which have a higher molecular weight than ethanol would probably be smaller at 3.7 percent oxygen than those of the ethanol fuel, there is no way to gauge without some testing whether these fuels would raise NO<sub>x</sub> and evaporative emissions to the point of noncompliance with emission standards. These uncertainties concerning emissions, materials compatibility, and driveability have led EPA to conclude that, consistent with Congress' intent, oxygen levels over 2.0 percent are best addressed in the section 211(f)(4) waiver process.<sup>1</sup> Therefore, the 2.0 percent oxygen limit has been retained in this interpretive rule.

Comment - Additives Formulation:

---

<sup>1</sup> In fact, EPA recently received an application for a waiver from Atlantic Richfield Company for a fuel containing methanol and TBA which contains oxygen up to 3.5 percent by weight.

A few commenters argued that EPA was too restrictive in setting the limits on low-level additives as to type and quantity. They agreed with EPA's statement that additives composed of carbon, hydrogen, oxygen, nitrogen, and/or sulfur should combust to form materials which are already present in automobile exhaust and, at the levels which are typical of current additive use, should not cause any harmful effects. EPA had stated this as its justification for including any nitrogen, oxygen, or sulfur-containing additive with limits based on the heterogeneous element content. The commenters suggested that EPA simplify the 1980 Definition by including within it any additives which contain carbon, hydrogen, oxygen, nitrogen, and/or sulfur, regardless of structure, at an overall non-hydrocarbon content which differed among commenters. The range of suggestions was from 0.1 percent (1000 ppm) to 0.25 percent (2500 ppm). The latter figure is that which was proposed in the Notice of Proposed Rulemaking 44 FR 16033 (March 16, 1979).

Agency Response:

The intent of including the heterogeneous element criterion within the 1980 Definition was to attempt to place differently structured additives on a comparable basis. If an additive contained only a small percentage of oxygen, nitrogen, or sulfur, it would be considered "substantially similar" at a higher level in the fuel than would another additive which contained a large percentage of the element. In either fuel, the amount of oxygen, nitrogen, or sulfur contributed by the additive would be the same. The complications added to the definition by the use of such a formula may, however, bring about no actual benefit. EPA continues to believe that small quantities of additives containing oxygen and nitrogen should not affect the control of emissions, so, to simplify the definition, this formula has been revised. The 2500 ppm non-

hydrocarbon additive maximum has been reinstated based on the general acceptance of that level in comments on the 1979 proposal.

EPA has decided to treat sulfur-containing additives somewhat differently than those containing oxygen and nitrogen. As stated in the preamble of the 1980 Definition, small quantities of sulfur (approximately 15 ppm) should not be expected to cause a measurable effect on emissions. Somewhat larger quantities, however, may cause a measurable decrease in the efficiency of a catalytic converter.<sup>2</sup> Therefore, the restriction of 15 ppm sulfur added to a fuel by an additive package has been retained in this revised Definition.

For these reasons EPA has revised the 1980 Definition. An additive will be included within the definition of a "substantially similar" fuel if the additive contains carbon, hydrogen, and any or all of the following elements: oxygen, nitrogen, and sulfur, such that the total additive content other than hydrocarbon: aliphatic alcohols and aliphatic ethers comprises no more than 0.25 percent (2500 ppm) of the fuel, and that the additive contributes no more than 15 ppm sulfur to the fuel.

Comment - Use of the ASTM Standards:

Some commenters suggested that EPA substitute the Motor Vehicle Manufacturers Association (MVMA) National Gasoline Survey and/or the Department of Energy (DOE) Survey of Motor Gasolines for the ASTM standards in the 1980 Definition, stating that these reflect the actual commercial variations in gasoline properties.

These and other commenters pointed out that the ASTM standards are voluntary ones, and that the use of the ASTM standards as a formal requirement for a fuel to be considered

---

<sup>2</sup> Based on comments presented to the California Air Resources Board by General Motors Corporation and the Ford Motor Company on October 23, 1978, on the subject of Reconsideration of the Air Resources Board Regulation Limiting the Sulfur Content of Unleaded Gasoline Sold in California.

"substantially similar" by EPA would result in lower gasoline yields and could cause hardships for refiners. Gasoline yields would suffer in those instances where a manufacturer normally produces gasoline which is more volatile than the ASTM specifications for the particular area and time of year in which the gasoline is to be sold. Requiring the gasoline volatility to be lowered would dictate withholding some of the volatile blend components, thereby reducing the volume of gasoline by that volume of volatiles withheld. The reduction, in gasoline yield would vary among companies and among refineries within a company because of differences in product specifications, blending practices, and geographic temperature conditions.

At EPA's request, the API attempted to quantify this effect. API stated that the typical impact on a large company's volume might be a loss of 0.5 percent or 0.6 percent, noting that some companies would experience no reduction, while others could experience reductions of as much as 3.2 percent during the winter months. API added that small companies and small refineries would experience larger reductions and more severe hardships than the large companies.

Additionally, several commenters noted that a refinery which produces gasoline for sale in several states and at all times of the year may be unable to satisfy each of the ASTM D 439 specifications for each state and season. This would decrease refining flexibility and could reduce gasoline yields further.

Finally, some commenters supported the use of the ATSM standards but noted that the 1980 Definition did not provide for changes in the ASTM Standards or the institution of Emergency Standards (implemented in cases of a gasoline shortage to attempt to increase gasoline supplies).

Agency Response:

As previously stated, the Clean Air Act vehicle emission certification process employs two fuels: a standardized testing fuel used for measurements that meets certain specifications promulgated under section 206 (40 CFR 86.177-5), and a mileage-accumulation fuel which must be representative of commercially available fuels. All of the properties which are specified both by the certification regulations and by ASTM are of equal or less stringency in the ASTM standards, thereby allowing flexibility which would not be available if a more strict interpretation were followed. (One property that is not specified in common is that of maximum aromatics. The certification regulations include a specification for this property whereas ASTM does not. EPA feels that this specification may not be among those routinely measured at the refinery and as such could represent a hardship to manufacturers.)

EPA continues to believe that the properties associated with ASTM standard D 439 are those which are relevant to gasoline quality. Commenters on the March 1979 proposal stated that the properties surveyed in the MVMA and DOE surveys are not routinely measured in the refinery and could cause hardships to refiners. These commenters suggested that the properties specified in the ASTM standards are those which are characteristic of a fuel's quality.

The MVMA and DOE Surveys, while reflecting the variability of commercially available gasolines, do not necessarily correlate with any measures of driving or emissions performance. For example the MVMA survey of July 15, 1980 reports that an unleaded gasoline sold by one marketer in Miami had a lead content of 2.140 grams per gallon; EPA would certainly not consider this fuel as substantially similar to unleaded certification fuel. The use of the DOE survey as a criterion for "substantially similar" would be subject to similar flaws. Therefore the ASTM standards have been retained.

The ASTM standards are compromises between the views of representatives of the auto and refining industries. They are designed to maximize gasoline production, minimize production costs, and maintain sufficient gasoline quality to operate in vehicles satisfactorily. EPA believes that ASTM has established and will maintain standard specifications for gasoline which are now and will continue to be consistent with all components of vehicle operations, including emission control devices or systems, as well as maximizing gasoline producibility. EPA will, however, review changes to the ASTM specifications to determine if the continued use of the standards as part of the "substantially similar" definition is appropriate, and amend the interpretive rule if necessary. Further, EPA will entertain petitions from any party as to why a particular change in the ASTM standards should not be included within the definition of "substantially similar."

Lastly, EPA feels that the fuel should meet ASTM standards in general, that is, not necessarily for every geographic location and time of year. Compliance with the detailed requirements of the ASTM volatility specifications is not the intent of this interpretation; rather it is EPA's intent to ensure that gasolines resemble certification fuels in general. Therefore, EPA has removed from the interpretive rule the requirement that all fuels must meet ASTM specifications for all areas and times of year. This will eliminate the requirement that each refiner must assure that every gallon of gasoline sold in an area meets the ASTM standards for the area and time of year. Such a requirement would have reduced manufacturing and distribution flexibility. Note: Because this interpretive rule is a nationally applicable regulation, under section 307(b)(1) of the Clean Air Act, judicial review of this action is available only by the filing of a petition for review in the United States Court of Appeals for the District of Columbia Circuit within 60 days of (date of publication in the Federal Register). Under section

307(b)(2) of the Clean Air Act, the requirements which are the subject of today's notice may not be challenged later in judicial proceedings brought by EPA to enforce these requirements.

Under Executive Order 12291, EPA must judge whether an action is "major" and therefore subject to the requirement of a Regulatory Impact Analysis. This action is not major because it is not likely to result in:

- (1) An annual effect on the economy of \$100 million or more;
- (2) A major increase in costs or prices for consumers, individual industries, Federal, State, or local government agencies, or geographic regions; or
- (3) Significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of United States-based enterprises to compete with foreign-based enterprises in domestic or export markets.

The API indicated that the major cost of using the ASTM standards as part of the interpretation would be that fuel manufacturers may experience a 0.5 to 0.6 percent reduction in gasoline-producibility in response to the use of the volatility specifications. These revisions remove this potential reduction in volatility and yield from all but about 10 percent of unleaded gasoline production.<sup>3</sup> The potential loss in revenue could be assessed at approximately \$40 million.<sup>4</sup> Any other cost associated with this interpretation should be, on balance, insignificant.

This action was submitted to the Office of Management and Budget (OMB) for review as required by Executive Order 12291. Any comments from OMB to EPA and any EPA response to those comments are available for public inspection at Public Docket EN-79-5

---

<sup>3</sup> This figure is based on the total sales of unleaded gasoline in 1979 in areas for which ASTM recommends fuels of the highest volatility class. (Sales figures from "Yearly Report of Gasoline Sales By States, 1979," The Ethyl Corporation.)

<sup>4</sup> Figure based on a 0.6 percent loss in gasoline-producibility at a national rate of 6.5 million barrels of gasoline per day. About 50 percent of this is projected to be unleaded gasoline and only 10 percent of the unleaded should conform to ASTM's most volatile class. Loss in gallonage is valued at \$1.40/gallon with no credit taken for diverted blendstocks.

located in EPA's Central Docket Section (A-139), 401 M Street, S.W., Washington, D.C.  
20460.

Finally, under the Regulatory Flexibility Act, 5 U.S.C. §601 et seq., EPA is required to determine whether a regulation will have a significant economic impact on a substantial number of small entities so as to require a regulatory analysis. This interpretation should not have a significant adverse impact on any of the smaller gasoline manufacturers, and the larger gasoline manufacturers and fuel additive suppliers are not "small entities" under the Regulatory Flexibility Act. Therefore, pursuant to 5 U.S.C. section 605(b), I hereby certify that this rule will not have a significant impact on a substantial number of small entities.

---

Anne M. Gorsuch  
Administrator

---

JUL 21, 1981  
Date

## Definition - Substantially Similar

EPA will treat a fuel or fuel additive for general use in light-duty vehicles manufactured after model year 1974 as substantially similar to any fuel or fuel additive utilized in the certification of any model year 1975, or subsequent model year vehicle or engine under section 206 of the Act, i.e., "substantially similar," if the following criteria are met:

- (1) The fuel must contain carbon, hydrogen, and oxygen, nitrogen and/or sulfur, exclusively,<sup>5</sup> in the form of some combination of the following:
  - (a) hydrocarbons;
  - (b) aliphatic ethers;
  - (c) aliphatic alcohols other than methanol;
  - (d)
    - (i) up to 0.3 percent methanol by volume;
    - (ii) up to 2.75 percent methanol by volume with an equal volume of butanol, or higher molecular weight alcohol;
  - (e) a fuel additive<sup>6</sup> at a concentration of no more than 0.25 percent by weight which contributes no more than 15 ppm sulfur by weight to the fuel.
- (2) The fuel must contain no more than 2.0 percent oxygen by weight.
- (3) The fuel must possess, at the time of manufacture, all of the physical and chemical characteristics of an unleaded gasoline as specified by ASTM Standard D 439 (or applicable Emergency Standard if one has been instituted) for at least one of the Seasonal and Geographical Volatility Classes specified in the standard.
- (4) The fuel additive must contain only carbon, hydrogen, and any or all of the following elements: oxygen, nitrogen, and/or sulfur.<sup>7</sup>

---

<sup>5</sup> Impurities which produce gaseous combustion products (i.e., products which exist as a gas at Standard Temperature and Pressure) may be present in the fuel at trace levels. An impurity is that substance which is present through contamination, or remains naturally, after processing of the fuel is completed.

<sup>6</sup> For the purposes of this interpretive rule, the term "fuel additive" refers only to that part of the additive package which is not hydrocarbon.

<sup>7</sup> Impurities which produce gaseous combustion products may be present in the fuel additive at trace levels.