APPENDIX A

FEDERAL REGISTER ANNOUNCEMENT OF USEPA EXEMPTING
DIMETHYL CARBONATE AND PROPYLENE CARBONATE

November 18, 2010
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SUPPLEMENTARY INFORMATION:

I. General Information

A. Does this action apply to me?

You may be an entity affected by this policy change if you use or emit propylene carbonate or dimethyl carbonate. States which have programs to control VOC emissions will also be affected by this change.

<table>
<thead>
<tr>
<th>Category</th>
<th>Examples of affected entities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry ..</td>
<td>Industries that make and use coatings, adhesives, inks or which perform paint stripping or pesticide application.</td>
</tr>
<tr>
<td>States ....</td>
<td>States that control VOC.</td>
</tr>
</tbody>
</table>

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be affected by this action. This table lists the types of entities that EPA is now aware of that could potentially be affected by this action. Other types of entities not listed in the table could also be affected. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding FOR FURTHER INFORMATION CONTACT section. This action has no substantial direct effects on industry because it does not impose any new mandates on these entities, but, to the contrary, removes two chemical compounds from the regulatory definition of VOC, and therefore from regulation for federal purposes.

B. How is this preamble organized?

The information presented in this preamble is organized as follows:

Outline

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B. Dimethyl Carbonate

III. Response to Comments

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B. Paperwork Reduction Act
C. Regulatory Flexibility Act
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E. Executive Order 13132: Federalism
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H. Executive Order 12311: Actions That Significantly Affect Energy Supply, Distribution, or Use
I. National Technology Transfer Advancement Act

J. Executive Order 12848: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations

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II. Background

Tropospheric ozone, commonly known as smog, occurs when VOCs and nitrogen oxides (NOx) react in the atmosphere. Because of the harmful health effects of ozone, EPA and state governments limit the amount of VOCs and NOx that can be released into the atmosphere. The VOCs are those organic compounds of carbon which form ozone through atmospheric photochemical reactions. Different VOCs have different levels of reactivity—that is, they do not react to form ozone at the same speed or do not form ozone to the same extent. Some VOCs react slowly, and changes in their emissions have limited effects on local or regional ozone pollution episodes. It has been EPA’s policy that organic compounds with a negligible level of reactivity should be excluded from the regulatory definition of VOC, so as to focus VOC control efforts on compounds that do significantly increase ozone concentrations. The EPA also believes that exempting such compounds creates an incentive for industry to use negligibly reactive compounds in place of more highly reactive compounds that are regulated as VOCs. The EPA lists these negligibly reactive compounds in its regulations (at 40 CFR 51.100(s)) and excludes them from the definition of VOCs.

Since 1977, EPA has used the reactivity of ethane as the threshold for determining negligible reactivity. Compounds that are less reactive than, or equally reactive to, ethane under the assumed conditions may be deemed negligibly reactive. Compounds that are more reactive than ethane continue to be considered reactive VOCs and therefore subject to control requirements. The selection of ethane as the threshold compound was based on a series of smog chamber experiments that underlay the 1977 policy.

In the past, EPA has considered three different metrics to compare the reactivity of a specific compound to that of ethane: (i) The reaction rate constant with the hydroxyl radical (known as kOH), (ii) maximum incremental reactivities (MIR) expressed on a reactivity per gram basis, and (iii) MIR expressed on a reactivity per mole basis. Table 1 presents these three reactivity metrics for ethane and for the two compounds discussed in this rule. Differences between these three metrics are discussed below.
Notes:

4. All maximum incremental reactivities or MIR (g O\(^3\)/g VOC) values are from: W. P. L. Carter, “Development of Chemical Mechanism and Updated Ozone Reaction Scales,” Appendix B, July 7, 2008. This may be found at http://www.engr.ucr.edu/~carter/SAPRC/saprc07.pdf. These values have been revised slightly from those given in the proposal notice (72 FR 55177).
5. MIR (g O\(^3\)/mole VOC) values were calculated from the MIR (g O\(^3\)/g VOC) values by determining the number of moles per gram of the organic compound.

The \( k_{OH} \) is the reaction rate constant of the compound with the OH radical in the air. This reaction is typically the first step in a series of chemical reactions by which a compound breaks down in the air and participates in the ozone forming process. If this step is slow, the compound will likely not form ozone at a very fast rate. The \( k_{OH} \) values have long been used by EPA as a measure of photochemical reactivity and ozone forming activity, and they have been the basis for most of EPA’s previous exclusions of negligibly reactive compounds. The \( k_{OH} \) metric is inherently molar, i.e., it measures the rate at which molecules react.

The MIR values, both by mole and by mass, are more recently developed measures of photochemical reactivity derived from a computer-based photochemical model. These measures consider the complete ozone forming activity of a compound, not merely the first reaction step. Further explanation of the MIR metric can be found in: W. P. L. Carter, “Development of Ozone Reactivity Scales for Volatile Organic Compounds.” Journal of the Air & Waste Management Association, Vol 44, 881–899, July 1994.

The MIR values are usually expressed either as grams of ozone formed per mole of VOC (molar basis) or as grams of ozone formed per gram of VOC (mass basis). For comparing the reactivities of two compounds, using the molar MIR values considers an equal number of molecules of the two compounds. Alternatively, using the mass MIR values compares an equal mass of the two compounds, which will involve different numbers of molecules, depending on the relative molecular weights. The molar MIR comparison is consistent with the original smog chamber experiments, which compared equal molar concentrations of individual VOCs, that underlie the original selection of ethane as the threshold compound. It is also consistent with previous reactivity determinations based on inherently molar \( k_{OH} \) values. The mass MIR comparison is consistent with how MIR values and other reactivity metrics are applied in reactivity-based emission limits, specifically the California Air Resources Board rule for aerosol coatings (see http://www.arb.ca.gov/consprod/regs/apf.pdf).

Given the relatively low molecular weight of ethane, use of the mass basis tends to result in more VOCs falling into the “negligibly reactive” class versus the molar basis. This means that, in some cases, a compound might be considered less reactive than ethane and eligible for VOC exemption under the mass basis but not under the molar basis. One of the compounds considered in this action falls into this situation, where the molar MIR value is greater than that of ethane, but the mass MIR value is less than or equal to that of ethane. This compound is propylene carbonate.

The EPA has considered the choice between a molar or mass basis for the comparison to ethane in past rulemakings and guidance. The design of the ozone VOC exemption policy, including the choice between a mass and mole basis, has been critiqued in the published literature. Most recently, in “Interim Guidance on Control of Volatile Organic Compounds in Ozone State Implementation Plans” published on September 13, 2005 (70 FR 54046), EPA stated:

>>> * * * a comparison to ethane on a mass basis strikes the right balance between a threshold that is low enough to capture compounds that significantly affect ozone concentrations and a threshold that is high enough to exempt some compounds that may usefully substitute for more highly reactive compounds. * * * When reviewing compounds that have been suggested for VOC exempt status, EPA will continue to compare them to ethane using \( k_{OH} \) expressed on a molar basis and MIR values expressed on a mass basis.<<<

Relying on a comparison of mass MIR values consistent with this guidance, EPA proposed to revise its definition of VOC at 40 CFR 51.100(s) to add propylene carbonate and dimethyl carbonate to the list of compounds that are exempt because they are negligibly reactive since they are equal to or less reactive than ethane on a mass basis. For propylene carbonate, EPA invited comment on the alternative use of a molar basis for the comparison of these compounds to ethane.

The technical rationale for recommending an exemption for each of the individual compounds is given below:

A. Propylene Carbonate

Huntsman Corporation submitted a petition to EPA on July 27, 1999, requesting that propylene carbonate be exempted from VOC control based on its low reactivity relative to ethane.

Propylene carbonate (CAS registry number 108–32–7) is an odorless non-viscous clear liquid with a low vapor pressure (0.023 mm Hg at 20( C)) and low evaporation rate compared to many other commonly used organic solvents. It has been used in cosmetics, as an adhesive component in food packaging, as a solvent for plasticizers and synthetic fibers and polymers, and as a solvent for aerial pesticide application.
Huntsman submitted several pieces of information to support its petition, all of which have been added to the docket for this action. One of these pieces of information was “Investigation of the Atmospheric Ozone Formation Potential of t-butyl Alcohol, N-Methyl Pyrrolidinone and Propylene Carbonate” by William P. L. Carter, Dongmin Luo, Irina L. Malkina, Ernesto C. Tuazon, Sara M. Aschmann, and Roger Atkinson, University of California at Riverside, July 8, 1996. Table 8 of that reference lists the MIR for propylene carbonate (on a gram basis) as 1.43 times higher than that of ethane. However, in Table 1 above, EPA has shown a 2007 MIR value that was taken from more recent 2007 data from Dr. Carter’s Web site. This 2007 MIR value is lower than that of ethane on a mass basis.

From the data in Table 1, it can be seen that propylene carbonate has a higher \( k_{OH} \) value than ethane, meaning that it initially reacts more quickly in the atmosphere than ethane. A molecule of propylene carbonate is also more reactive than a molecule of ethane, as shown by the molar MIR (g O\(_3\)/mole VOC) values, since equal numbers of moles have equal numbers of molecules. However, a gram of propylene carbonate is less reactive, or creates less ozone on the day of its emission to the atmosphere, than a gram of ethane. This is because propylene carbonate has a molecular weight (102), which is over three times that of ethane (30), thus requiring less than a third the number of molecules of propylene carbonate to weigh a gram than the number of molecules of ethane needed to weigh a gram.

Based on the mass MIR (g O\(_3\)/g VOC) value for propylene carbonate being equal to or less than that of ethane, EPA finds that propylene carbonate is “negligibly reactive” and therefore exempt for the regulatory definition of VOC at 40 CFR 51.100(s). EPA took comments on whether the comparison of propylene carbonate to ethane should instead be made on the basis of the molar MIR (g O\(_3\)/mole VOC) value. None of the comments received during the public comment period opposed using the g O\(_3\)/g VOC basis. In fact, the comments which addressed that issue supported the use of the MIR on a g O\(_3\)/g VOC basis for granting exemptions.

B. Dimethyl Carbonate

The EPA received a petition from Kowa America Corporation on July 29, 2004 seeking an exemption from the regulatory definition of VOC for dimethyl carbonate. This petition asserted that dimethyl carbonate (DMC) is less photochemically reactive than ethane and asked for the exemption on that basis.

Dimethyl carbonate (CAS registry number 616–38–6) may be used as a solvent in paints and coatings. The petitioner anticipated that it might be used in waterborne paints and adhesives because it is partially water soluble. It is also used as a methylation and carbonylation agent in organic synthesis. It can be used as a fuel additive.

In support of its petition, the petitioner presented articles which give \( k_{OH} \) and MIR values for the compound. These articles have been placed in the docket.

As shown in Table 1, DMC has a greater \( k_{OH} \) value than ethane, which indicates that DMC will likely initially react more quickly in the atmosphere. However, the MIR values for DMC calculated on either a mass or mole basis are less than that of ethane, which indicates lower reactivity overall. Based on these data, EPA finds that DMC is “negligibly reactive” and therefore exempt from the regulatory definition of VOC at 40 CFR 51.100(s). Because both the mass and molar MIR values of DMC are less than those of ethane, this chemical meets EPA’s exemption criteria under either MIR metric.

III. Response to Comments

EPA proposed these actions on October 1, 2007 (72 FR 55717) and took public comment on the proposal. Here is a summary of the comments received during the public comment period and EPA’s response. There was no request for a public hearing on the proposal and none was held.

There were four comment letters submitted to the docket during the public comment period. One comment letter was from an individual. Two were from chemical companies. One comment letter was from a trade association. The comments are summarized below.

Comment: The Web site reference for the latest MIR values contained an error. The site which was listed as http://pah.cert.ucr.edu/carter/SAPRC/scal07.xls should have been http://pah.cert.ucr.edu/~carter/SAPRC/scal07.xls.

Response: We left out the ~ sign in the Web address which made it incorrect. The latest MIR data which is used in this final rule may be found in Appendix B of the July 7, 2008 report by William P. L. Carter “Development of the SAPRC–07 Chemical Mechanism and Updated Ozone Reactivity Scales." This report may be found at http://www.engr.ucr.edu/~carter/SAPRC/saprc07.pdf.

Comment: One commenter corrected certain technical information about the evaporation rate of dimethyl carbonate which was listed in the docket.

Response: This correction is noted, but this minor change did not impact whether or not EPA should finalize the exemption petition.

Comment: One commenter supported the use of the latest MIR values for making VOC exemption determinations. There were no comments opposing the use of the latest MIR values.

Response: EPA acknowledged recent MIR values which were made public shortly before the proposal to grant VOC exemption to propylene carbonate and dimethyl carbonate, but based the proposal on older MIR values which had been previously published. EPA is using the latest MIR values for this final rule. The use of the newer MIR values does not change the conclusion about the VOC exemption of propylene carbonate and dimethyl carbonate.

Comment: The two industry commenters, and the trade association comment letter each expressed support for the VOC exemption of propylene carbonate and dimethyl carbonate.

Response: EPA acknowledges this support and notes that there were no comments opposing these exemptions.

Comment: Three commenters opposed separate tracking and reporting for propylene carbonate and dimethyl carbonate. Two of these commenters also expressed opposition for separate tracking for any VOC exempt compounds.

Response: Although the rule preamble encourages record keeping for propylene carbonate and dimethyl carbonate, there is no requirement for this in the rule itself. Record keeping for other exempt compounds is not the subject of this rulemaking, so comments about that are not relevant to this action.

Comment: Three of the commenters support the use of the mass-based MIR approach versus the mole-based approach. One of the commenters submitted as part of his comments a November 15, 1999 letter written by William P.L. Carter, which is a summary of the Carter letter which made it incorrect. The Carter letter had previously been submitted to EPA as part of the tertiary butyl acetate VOC exemption rule making (69 FR 69298).

2 The MIR values used for this rule may be found in Appendix B of the July 7, 2008 report by William P. L. Carter “Development of the SAPRC–07 Chemical Mechanism and Updated Ozone Reactivity Scales.” This report may be found at http://www.engr.ucr.edu/~carter/SAPRC/saprc07.pdf or in the docket for this rule.
There were no comments opposing the use of the mass-based MIR approach.  

Response: EPA specifically requested comment on this subject for propylene carbonate since the mole based MIR value for that compound is higher than that of ethane and using the mole based MIR value would not allow the exemption for propylene carbonate. Because there were no comments opposed to the use of the mass based approach, EPA is proceeding to grant these exemptions on a mass based MIR basis in keeping with the September 13, 2005 interim guidance on control of volatile organic compounds in ozone state implementation plans which says “EPA will continue to compare them [i.e., compounds] to ethane using $\text{no}_8$ expressed on a molar basis and MIR values expressed on a mass basis.”  

Comment: One commenter, who was the petitioner for dimethyl carbonate, said that the company recommended exposure limit of 200 ppm time weighted average 8 hour for dimethyl carbonate is identical to that of methyl acetate, an existing VOC exempt solvent. This commenter also said that methyl acetate like DMC has the potential for hydrolyzing to form methanol in the body and therefore they would be similar in their toxicity profiles and safety handling requirements. The commenter also denied a statement in Havley's Condensed Chemical Dictionary that DMC is both toxic by inhalation and a strong irritant.  

Response: In the proposal, EPA said “While EPA does not have information to suggest that the proposed exemptions could increase health risks due to possible toxicity of the exempted compounds, we invite the public to submit comments and additional information relevant to this issue.” The comments here are the only comments EPA received regarding health effects of these compounds. These comments have not led EPA to identify unusual health risks from the compounds.  

IV. Final Action  

This action is based on EPA’s review of the material in Docket ID No. EPA–HQ–OAR–2006–0948. The EPA hereby amends its definition of VOC at 40 CFR 51.100(s) to exclude propylene carbonate and dimethyl carbonate from the regulatory definition of VOC for use in ozone SIPs and ozone controls for purposes of attaining the ozone national ambient air quality standard.  

The revised definition will also apply for purposes of any federal implementation plan for ozone nonattainment areas (see e.g., 40 CFR 52.741(a)(3)). States are not obligated to exclude from control as a VOC those compounds that EPA has found to be negligibly reactive. However, if this action is made final, states should not include these compounds in their VOC emissions inventories for determining reasonable further progress under the Act (e.g., section 182(b)(1)) and may not take credit for controlling these compounds in their ozone control strategy.  

Excluding a compound from the regulatory definition of VOC may lead to changes in the amount of the exempt compound used and the types of applications in which the exempt compound is used. Although the final rule has no mandatory reporting requirements, EPA urges states to continue to inventory the emissions of these compounds for use in photochemical modeling.  

V. Statutory and Executive Order Reviews  

A. Executive Order 12866: Regulatory Planning and Review  

This action is not a “significant regulatory action” under the terms of Executive Order 12866 (58 FR 51735, October 4, 1993) and is therefore not subject to review under the Executive Order.  

B. Paperwork Reduction Act  

This action does not impose any new information collection burden under the provisions of the Paperwork Reduction Act, 44 U.S.C. 3501 et seg. Burden is defined at 5 CFR 1320.3(b). This action is deregulatory in nature and removes requirements rather than adds requirements. The regulation is a rule change that revises a definition of volatile organic compound and imposes no record keeping or reporting requirements.  

C. Regulatory Flexibility Act  

The Regulatory Flexibility Act (RFA) requires an agency to prepare a regulatory analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.  

For purposes of assessing the impacts of this action on small entities, small entity is defined as: (1) A small business as defined by the Small Business Administration’s (SBA) regulations at 13 CFR 121.201; (2) a small governmental jurisdiction that is a government of a city, county, town, school district, or special district with a population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.  

After considering the economic impacts of this final action on small entities, I certify that this rule will not have a significant economic impact on a substantial number of small entities. This rule will not impose any requirements on small entities. This rule concerns only the definition of VOC and does not directly regulate any entities. The RFA analysis does not consider impacts on entities which the action in question does not regulate. See Motor & Equipment Manufacturers Ass’n v. Nichols, 142 F. 3d 449, 467 (D.C. Cir. 1998); United Distribution Cos. v. FERC, 88 F. 3d 1105, 1170 (D.C. Cir. 1996), cert. denied, 520 U.S. 1224 (1997). Pursuant to the provision of 5 U.S.C. 605(b), I hereby certify that the rule will not have an impact on small entities.  

D. Unfunded Mandates Reform Act  

This action contains no federal mandates under the provisions of Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), 2 U.S.C. 1531–1538 for state, local, and tribal governments and the private sector. Since this rule is deregulatory in nature and does not impose a mandate upon any source, this rule is not estimated to result in the expenditure by state, local and tribal governments or the private sector of $100 million in any 1 year. Therefore, the Agency has not prepared a budgetary impact statement or specifically addressed the selection of the least costly, most cost-effective, or least burdensome alternative. Because small governments will not be significantly or uniquely affected by this rule, the Agency is not required to develop a plan with regard to small governments. This action is also not subject to the requirements of section 203 of the UMRA because it contains no regulatory requirements that might significantly or uniquely affect small governments. As discussed above, this final rule does not impose any new requirements on small governments.  

E. Executive Order 13132: Federalism  

Executive Order 13132, entitled “Federalism” (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure “meaningful and timely input by state and local officials in the development of regulatory policies that have federalism implications.” “Policies that have federalism implications” is defined in
Draft Staff Report with Appendices for Draft Amendments to Rule 1020

I. National Technology Transfer Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (“NTTAA”), Public Law 104–113, section 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

This action does not involved technical standards. Therefore, EPA did not consider the use of any voluntary consensus standards.

J. Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations

Executive Order 12898 (59 FR 7629 (Feb. 16, 1994)) establishes federal executive policy on environmental justice. Its main provision directs federal agencies, to the greatest extent practicable and permitted by law, to make environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations in the United States.

EPA has determined that this final rule will not have disproportionately high and adverse human health or environmental effects on minority or low-income populations because it does not affect the level of protection provided to human health or the environment. The final rule amendment is deregulatory and does allow relaxation of the control measures on sources. However, this is not expected to lead to increased ozone formation since the compounds being exempted have been determined to have negligible photochemical reactivity.

K. Congressional Review Act

The Congressional Review Act, 5 U.S.C. 801 et seq., as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of Congress and to the Comptroller General of the United States. Section 804 exempts form section 801 the following types of rules: (1) Rules of particular application; (2) rules relating to agency management or personnel; and (3) rules of agency organization, procedure, or practice that do not substantially affect the rights or obligations of non-agency parties. 5 U.S.C. 804(3). The EPA is not required to submit a rule report regarding this action under section 801 because this is a rule of particular applicability to manufacturers and users of these specific exempt chemical compounds. This action is not a “major rule” as defined by 5 U.S.C. 804(2).

Therefore, this rule will be effective on February 20, 2009.

List of Subjects in 40 CFR Part 51

Environmental protection. Administrative practice and procedure. Air pollution control, Ozone, Reporting and recordkeeping requirements, Volatile organic compounds.


Stephen L. Johnson,
Administrator.

For reasons set forth in the preamble, part 51 of chapter I of title 40 of the Code of Federal Regulations is amended as follows:

PART 51—REQUIREMENTS FOR PREPARATION, ADOPTION, AND SUBMITTAL OF IMPLEMENTATION PLANS

1. The authority citation for Part 51, Subpart F, continues to read as follows:

Authority: 42 U.S.C. 7401, 7411, 7412, 7413, 7414, 7470–7479, 7501–7508, 7601, and 7602.

§ 51.100 [Amended]

2. Section 51.100 is amended at the end of paragraph (s)(1) introductory text by removing the words “and perfluorocarbon compounds which fall into these classes:” and adding in their place a semi-colon and the words “propylene carbonate; dimethyl carbonate; and perfluorocarbon compounds which fall into these classes:”.

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