Letters

Mixing and Flammability

I would like to raise some questions regarding the article "Minimize the Risks of Flammable Materials," which appeared in the April 2012 issue (pp. 28–33). The discussions relating to the triangle diagrams, Figures 7–9, assume that when gas is added to the tanks involved, the contents are completely backmixed to give uniform composition throughout. This will be true only if the addition of gas is accompanied by intensive mixing. In the absence of intensive mixing, compositions will vary and dangerous flammable mixture zones may be present.

Pat Hegarty
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The Author Replies: The figures and procedures in the article do assume perfect mixing of all of the contents. Mixing is indeed a very interesting problem. However, including mixing would make the problem very difficult to solve. So, how can this be handled in industrial practice?

The procedures for taking a vessel out of service and then putting it back into service are based on the limiting concentrations of either oxygen (limiting oxygen concentration, LOC) or fuel (lower flammability limit, LFL). Below these limiting concentrations, no combustion is possible. Thus, even if higher concentrations of fuel or oxygen are obtained momentarily due to imperfect mixing, the concentration of the other component is always below the limiting concentration of either oxygen or fuel. This may not be true for other operations where the concentrations exceed the limiting concentrations.

Standard procedure is also to use a safety margin on these limiting concentrations to help ensure that mixing concentrations do not enter the flammable zone.

National Fire Protection Association Codes and Standards

Thank you for the excellent article "Navigating NFPA Codes and Standards," in the May issue (pp. 18–24). I am performing consulting in the area, and I found the article extremely useful and well written. It is exactly at the right level for the practitioner trying to learn about the NFPA and understanding designs with flammables and dusts. I even joined the NFPA and purchased NFPA 70 — it is one heavy volume.

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We look forward to receiving your letters. Write to us at cepedit@aiche.org, or connect with us on AIChE's blog, http://chenected.aiche.org

More Resources from NFPA

The article "Navigating NFPA Codes and Standards," in the May 2012 issue (pp. 18–24) "explores … the key NFPA documents that apply to chemical processing facilities." Several additional documents from the National Fire Protection Association are also important.

In my experience investigating hundreds of chemical-related incidents, including fires and explosions, I have found that many could have been prevented or would have caused less serious injuries and/or property damage if relevant NFPA codes and standards had been followed.

For example, a chemical plant manager's insistence on complying with the NFPA 2112, Standard on Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fires, allowed a worker to walk away from a flash-fire incident with only first-degree burns. Workers in plants that did not follow this standard have suffered serious third-degree burns and permanent injuries in flash fires.

Another key NFPA document is NFPA 400, Hazardous Materials Code. First published in 2010, NFPA 400 incorporates four earlier NFPA documents that deal with solid and liquid oxidizers, organic peroxide formulations, pesticides, and ammonium nitrate (*NFPA Journal,* Nov. 2009, pp. 80–83). A revision, with additional materials, is underway.

NFPA codes and standards are accepted engineering practice. An engineer may devise a better way of providing equivalent safety; rarely does a lesser way prove to be adequate, whether the requirement is a "shall" or a "should." And, many of these codes and standards are legally adopted by a local jurisdiction — compliance with them is mandatory.

Chemical engineers who become members of NFPA (I am one) can read all of the NFPA codes and standards at no charge, and buy electronic or print copies at a discount.

Chemical engineers should learn and use NFPA codes and standards as they design, operate, and maintain facilities that use, process, handle, or store chemicals, so that people, plant, and property can have adequate protection from these hazards.

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IP Article Hit the Spot

Thanks for the article "A ChE's Guide to Intellectual Property" in the May issue (pp. 65–70). It provided the type of overview I've been wanting.

Roy Johnson
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