Director's Corner

Hazard and ***risk***, what do they mean, and are they interchangeable terms? The answer is, "not just no, but absolutely not." The definition, understanding, and interpretation of these two words are completely different. The Merriam-Webster online dictionary defines hazard and risk as follows:

> ***Hazard****: a source of danger.*
> *Source: http://www.merriam-webster.com/dictionary/hazard*
>
> ***Risk****: the possibility that something bad or unpleasant (such as an injury or a loss) will happen.*
> *Source: http://www.merriam-webster.com/dictionary/risk*

On the other hand, when speaking about process safety, it is common to use the following definitions given by the Center for Chemical Process Safety, American Institute of Chemical Engineers:

> ***Hazard****: An inherent chemical or physical characteristic that has the potential for causing damage to people, property, or the environment.*
> *Source: http://www.aiche.org/ccps/resources/glossary/process-safety-glossary/hazard*
>
> ***Risk****: A measure of human injury, environmental damage, or economic loss in terms of both the incident likelihood and the magnitude of the loss or injury. A simplified version of this relationship expresses risk as the product of the likelihood and the consequences (i.e., Risk = Consequence x Likelihood) of an incident.*
> *Source: http://www.aiche.org/ccps/resources/glossary/process-safety-glossary/risk*

Given the above definitions, it should be very clear that *hazard* and *risk* are not interchangeable terms. Once the basic definition of these two terms is accepted, we can then talk about what and how people understand different aspects of *hazard* and *risk* in day-to-day activities. What is common is that not only do we use these terms interchangeably, but the actions we take and what is acceptable in a given situation is based on the confused understanding of these two terms. To keep matters simple, let us take the example of a kitchen knife with a six-inch blade common in day-to-day use in the kitchen. This knife is a useful article for cooking and other applications but could also be used to injure people or commit other undesirable activities. The knife is a *hazard* because it is a source of danger, but the *risk* from it may vary from minimal to extensive depending on how it is handled. The *hazard* from the knife could only be eliminated if we decide to forgo the benefits of having a knife completely. Given that we do not want to do that, our only reasonable action is to manage and reduce the *risk*, which could include proper storage and access to the knife, use of a sheath to cover the sharp edge, safety handle/lock, and other features and procedures. Inherently safer concepts call for elimination or reduction of the *hazard* and in so far as we do need a knife to get some useful things done, let us agree that at least in this example we cannot eliminate the hazard. Furthermore, reduction of the *hazard* is probably limited only to certain options, *e.g.,* we can only go below a certain size or sharpness for it to be a useful knife. Thus, a major part of preventing undesirable outcomes, such as injury or loss of property falls on *risk* management techniques.

Transposing the above discussion on knife to chemicals or hazardous materials yields some interesting observations. Any substance (*e.g.,* hydrocarbons, chemicals, materials) represents a certain *hazard* because of its inherent properties (think about the knife example). For example, chlorine is toxic and gasoline is flammable, and we cannot do anything about these inherent properties of chlo-

rine and gasoline. But these inherent *hazard* characteristics do not represent quantification of *risk* or imminent harm. At best, we could interpret the *hazard* characteristics as the *potential to cause harm*, which is quite different from *risk*. As before, we must understand that *hazard* and *risk* are not interchangeable terms and neither does the presence of *hazards* indicate any type of quantification of *risk*. In addition, because of the inherent usefulness of chemicals, *hazards* will always be present in our society. We must remember that quite often it is the same inherent property of a substance that makes it *hazardous*, is also the same property that makes it useful. For example, the flammability of gasoline is also the same property that makes gasoline useful for deriving energy to power the automobile. The more important question is how we manage the *risk* associated with the *hazard*. I sincerely believe that this subject requires a serious and sustained dialogue amongst all stakeholders, which will lead to better and improved *risk* management, while we continue to enjoy the benefits provided by the use of chemicals.

M. Sam Mannan
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Dr. Mannan Recognized as Professional Process Safety Engineer and IChemE Certifies Masters in Safety Engineering Program

Since 2014, the Mary Kay O'Connor Process Safety Center (MKOPSC), has held events and engaged in collaborative projects with the Institution of Chemical Engineers (IChemE), the lead professional engineering organization in Europe. The relationship between IChemE and MKOPSC has led to collaboration in process safety education, CPD products, and strategic leadership and direction.

Neil Atkinson, IChemE Director of Qualifications and International Development, presents Director Sam Mannan with the PPSE certification

IChemE recently introduced the Professional Process Safety Engineer registration to provide public recognition of peer reviewed process safety practitioners. The registration is globally recognized and positioned at the same professional level as Chartered Engineer or Professional Engineer. The goal of this program is to distinguish those with a strong process safety competence and be a mark of professional excellence for practitioners worldwide. At MKOPSC's 2015 International Symposium, IChemE conferred the Professional Process Safety Engineer certification on Dr. Mannan. Dr. Mannan, also a Fellow of IChemE, joins fewer than 100 engineers worldwide who have achieved this qualification.

At the 2015 International Symposium, IChemE recognized the Master of Science in Safety Engineering (MS SENG) as a preferred pathway to obtaining the Professional Process Safety Engineer qualification. IChemE benchmarked the MS SENG curriculum and certified it as satisfying the academic requirements for registration as PPSE.