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# The 30 Second Rules for Handling Hazardous Material Releases

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## Introduction

Emergency situations often require rapid decisions on the part of those involved. This is the case whether you are the person who is in charge of the emergency situation, or simply someone who finds yourself at the wrong place at the wrong time. What happens in the first few minutes of any emergency sometimes can often make the difference between success and failure. This is often even more critical in an emergency involving hazardous materials where the information that is needed to effectively manage the incident may take up precious time to obtain as often the information is only available on the Material Safety Data Sheet or other reference source. And for many of those in the safety profession, our direct knowledge of the specific materials involved may be limited.

So what do we do in those critical first few moments following a release? Are there things that we can generally count on to provide us with some important guidance? The answer is an emphatic "yes!" And we call these things our 30 Second Rules.

## The 30 Second Rules

What is are the 30 Second Rules you ask? Well, simply put, it is a list of some of the items that we learn from our review of materials that we can easily remember and apply in the event of a release. One doesn't need to be a chemist or even a highly specialized hazmat response person to be able to remember these and to apply them when the release has occurred. These are simple to use even for those with limited experience. Essentially, if you remember these rules, you will likely be better protected (i.e. safer) and additionally will not feel embarrassed or look like a total idiot when an incident occurs involving hazardous materials. While they are not perfect, they are things that you will find to be very useful and helpful to you until more definitive information about the release becomes available. We have found from a number of our students, that such

rules have helped them in both emergency and non-emergency situations. Remember, that these are guidelines only and should not take the place of more specific information.

Here they are:

1. The first rule relates to the release of vapors or gases. As we may know from our education of toxicology and fire chemistry, to know where the vapors will go when they are present will help you avoid the hazards associated with toxicology and know where the fire problem will be since it is the vapors that will ignite. So find the vapors and you will find the area of most concern.

   Simply put, there are three factors that most often influence the movement of vapors or gases. These include wind or ventilation systems, thermal extremes, and finally the vapor density. In the absence of wind/ventilation and thermal extremes, the material's vapor density will help us know whether the material will rise or sink when it is released. Generally materials that are lighter than air are safer to be around since they will both rise out of the breathing area and also away from where most ignition sources might be.

   When dealing with flammable or combustible liquids, the first of the rules comes into play. It is:

   Rule #1: If the material involved in the release is either a flammable or combustible liquid such as gasoline, diesel fuel, Acetone, MEK, and a variety of others, the vapors will be heavier than air.

   Yes, it is true. Can you name a flammable or combustible material with a vapor density less than one? No you can't. For this reason, when vapors are released you should think that these materials will present a higher problem for you given that their vapors will likely stay in the release area.

2. The second of the rules also relates to vapor density and the tendency of the vapors to rise or sink. Remember that those with a vapor density greater than one will sink, and remain in the area if you are not dealing with wind and ventilation or thermal extremes. A quick study on vapor density of materials shows us that there are considerably more vapors that are heavier than air than those that are less heavy than air. In fact, most materials will have a vapor density greater than one.

   Rule #2: Materials that are not on the H-A-H-A-M-I-C-E list are almost always heavier than air and will sink into low areas.

   What does this mean? Well, some of you may have learned this simple pneumonic for remembering the lighter-than-air gases. With a few exceptions, the gases can be associated with the pneumonic H-A-H-A-M-I-C-E. To remember this, think that the mice are saying "ha – ha" since the materials will rise and not affect them as much.

   - H – Hydrogen
   - A - Anhydrous Ammonia
   - H - Helium

- A - Acetylene
- M - Methane
- I - Illuminating Gases (Explained Below)
- C - Carbon Monoxide
- E – Ethylene

Note: There are a number of gases that fit within the category of "Illuminating" gases. They include gases that illuminate or light up.

- Neon is such a gas. It is lighter than air and is used in various types of light bulbs.
- Natural gas which is not composed of all Methane, was actually used in street lights at the turn of the 20th century. It, too, is lighter than air.
- Hydrogen Cyanide (HNC) is the third gas that is lighter than air in the list and takes a little more explanation and a bit of mind stretching to understand why it fits into the list. One of the situations where we use HCN is to execute convicted persons in the gas chamber. Well, pardon the very sick humor, but when the convict is exposed to the gas, there is a brief moment where they "see the light." I told you it was a bit sick, but I bet you will not forget it.

And for those who want to add to this list, there is also a more complicated version. It is called 4H, MEDIC, ANNA. The four "H" materials are Hydrogen, Helium, and Hydrogen Cyanide, which are gases that are already contained in H-A-H-A-M-I-C-E. The fourth "H" is Hydrogen Fluoride (HF). "MEDIC" is Methane, Ethylene, Diborane (an addition to the list). "ANNA" includes Ammonia, Neon, Natural Gas, and Acetylene.

3. The third rule relates to the properties of flammable and combustible liquids. From a safety perspective, it is generally better if the liquids are heavier than water and will not float when they contact water. If the material has a specific gravity less than one, it will float and create a greater surface area where more vapors can be released. If it is on fire and water is added to these materials, the fire will likely intensify.

   Rule #3: Almost all flammable and combustible liquids are either soluble/miscible in water or have a specific gravity less than one. In almost all cases, a spill of these materials will almost certainly be made worse by adding water to the spill.

4. Oxidizers are a group of materials that are often incompatible with other materials, and when involved in a spill, may initiate a reaction or cause the reactions that are already occurring to intensify.

   Rule #4: Always look for the presence of an Oxidizer in any release or spill scenario. If an Oxidizer is present, the potential for more serious consequences is more likely.

5. Because of rule #4, it is important to quickly determine if an Oxidizer is involved in the incident that you are faced with. In addition to the obvious yellow DOT placard or label, many Oxidizers can be identified by the presence of certain prefixes or suffixes in their chemical names.

Rule #5: The presence of these terms in the chemical name of the material present could indicate that the material is an Oxidizer.

If the chemical name of the material ends in “ate” or “ite”, such as Hypochlorite or Permanganate, the material is likely an Oxidizer.

If the material contains the “per,” “oxy,” or “hypo” in its chemical name, it might be an Oxidizer. Consider Hydrogen Peroxide, or Calcium hypochlorite, both of which are Oxidizers and contain those terms.

6. Selecting the appropriate level of protective clothing for handling the release, Level A, B, C, or D, can often be a problem for many of us who are not as experienced in dealing with chemical emergencies. Many people will simply default in a spill or cleanup situation and go with the highest level of protection. While it may be the highest level, it is not necessarily the safest level of protection. In fact, the safest level may actually be the lowest level in which you can safely perform the work.

   To help select the starting point for your level of protective clothing, consider the following rule.

   Rule #6: A good starting point for selecting the appropriate level of protection is to review the NFPA health rating assigned to the material involved and follow the guidance below. While not perfect, you can adjust the level up or down by one given other factors such as an indoor release versus an outdoor one, or by the amount of material present.

   If the material has an NFPA health rating of 0 or 1, the appropriate level of protection to consider as your starting point is Level D

   If the material has an NFPA health rating of 2, the appropriate level of protection to consider as your starting point is Level C

   If the material has an NFPA health rating of 3, the appropriate level of protection to consider as your starting point is Level B

   If the material has an NFPA health rating of 4, the appropriate level of protection to consider as your starting point is Level A

   Again, this is not a perfect system and, with that in mind, it is one that has a lot of flexibility built in. Those levels listed above are starting points, and as stated previously, you can always make adjustments as more information becomes known. For example, while not all materials with a NFPA health rating of 0 or 1 would require only level D protection, they certainly do not require Level A. Generally, though, you can move up or down one level for the guidance listed.

## Conclusion

For many safety personnel, the whole area of hazardous materials is one that can be confounding and at times even seem complicated. Yet, it does not have to be so difficult. With the application of a few basic concepts, some of that mystique may vanish and, at least in the early moments of a spill or emergency involving hazardous materials we won't get ourselves or others hurt, which is our first priority. And, secondly, we may not look like someone who knows little or nothing. Obviously, as with many other disciplines, continued education in the area of hazardous materials is always a good idea. Knowledge is power and the more we know about the materials that we deal with, the more likely we will be to properly handle the circumstances that we face.

## Bibliography

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