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Management Assurance System

Lessons Learned

Household Cleaning Chemicals Cautions

Maintaining the cleanliness of surfaces we typically contact throughout the day is a key contributor to preventing the spread of SARS-CoV-2, the virus that causes the disease COVID-19. Using the right cleaning chemicals the right way can produce the desired result. Using them the wrong way can prevent the desired result from being achieved and even introduce unexpected hazards.

Analysis

Being in a hurry, habits and practices carried over from the use of other products, lack of chemical safety awareness, and/or failure to read or follow the manufacturer's directions on labels can create an unsafe condition for the user, nearby people and pets and also damage the surface being cleaned.

Recommended Action

Read and follow label instructions. Although sometimes written in vanishingly small print, reading and heeding label instructions is the best way to use a cleaner safely while achieving maximum effectiveness.

Two incompatible cleaners from the same manufacturer with similar-looking labels. The one on the left contains bleach and cannot be used with ammonia, toilet bowl cleaner, rust removers, or acids. The one on the right cannot be used with bleach. Mixing these two can release small amounts of formaldehyde gas.

Note: The cleaner on the left in the other picture may be in these containers, too.

Information that is often overlooked can include:

Chemical incompatibility. Common household cleaners use ammonia, surfactants and a variety of bleaching agents, acids and caustics. Bleach-free cleaners often contain peroxides or ammonia, both of which will produce dangerous gases if mixed with bleach. Mixing some of them, even inadvertently, can result in a chemical reaction that can release noxious gases. Someone working close to this reaction or in a confined space where a reaction is occurring can be adversely affected. Examples of how adverse reactions can occur include:

- Mixing different and incompatible cleaners into a single container.
- Applying a second and incompatible cleaner to a surface still wet with the first cleaner.
- Applying a second and incompatible cleaner to a surface containing dry residue from the first cleaner.
- Using the same applicator to apply incompatible cleaners.
- Refilling any container with a cleaner that is different from the cleaner that was originally in that container.

- Depositing disposable wipes wetted by incompatible cleaners into the same receptacle where they can contact each other (occurrence reports addressing fumes and even smoldering material or combustion indicate that this happens a few times every year across the complex with other chemicals).

NOTE: Chemical incompatibility should be considered when storing cleaners, too. Mixing can occur when containers leak and the chemicals combine. This has occurred on occasion in the DOE complex.

Human incompatibility. Some cleaners specify the use of certain personal protective equipment (PPE) to prevent direct contact with skin or eyes. The cleaner may also identify ventilation requirements or time exposure limits to prevent irritation or health problems. Keep in mind that if your eyes are watering or you can smell the cleaner, chemical vapors are contacting and possibly irritating or damaging your cornea or respiratory system membranes. Also note that some adults do not have the same sense of smell they once had and may be exposing themselves to fumes they cannot detect by smell.

Location incompatibility. Some over-the-counter cleaners may not be allowed in some locations. At LLNL, all chemicals, including cleaners, brought onto Lab property are subject to Lab requirements for chemical safety. This is why LLNL requires that all cleaners used on site, household or otherwise, be provided by the Lab.

Surface incompatibility. Cleaners that are compatible with some surfaces may stain, corrode, decompose or otherwise damage other surfaces.

Other details:

Mix ratios: Some cleaners sold in concentrated form are to be diluted with different amount of water depending upon the application. Likewise, other cleaners have other chemicals added to them (e.g., bleach) to achieve the desired effectiveness for a given application.

Surface exposure time: Some cleaners must be in contact with whatever it is they are cleaning/killing to be effective. Spraying and then quickly wiping (for example, in the time it takes to read this sentence) can prevent some cleaners from being effective.

Residue: Some cleaners leave a residue that, depending upon the surface being cleaned, needs to be removed before the surface is returned to use. Surfaces used for food preparation need to have such residues removed before food contacts the surface again.

Where to Get Help or More Information

- Container labels.
- Manufacturer web sites.
- Your ES&H Team representative.
- Spiro Zapantis, LLNL Chemical Safety SME, at zapantis1@llnl.gov, 925-422-4212 (office), 925-960-5729 (Lab cell).
- To search for other LLNL Lessons Learned, go to the "Lessons Learned" web site (https://mas.llnl.gov/lessons_learned/), select the topic of interest or click on "Search" and enter a keyword.

Priority Descriptor: Yellow/Caution.
Work/Function Categories (HSS entry): Conduct of Operations – Work Planning, Human Factors, Material – Material Handling, Material – Material Storage, Occupational Safety & Health – Other, Waste Management.
Hazard (HSS entry): Personal Injury / Exposure – Airborne Materials, Personal Injury / Exposure – Toxic Material.
ISM Category (HSS entry): Analyze Hazards, Develop / Implement Controls, Perform Work.
Keywords (HSS entry): chemical, cleaning, household, vapors.
Subject Category (LLNL LL web page): Chemical.