Chemical Reaction Was Unexpected



Some workplace fire hazards are obvious. You toss a match into a pile of dry sawdust, and you get a fire. Other hazards are harder to recognize.

Consider the chemical reactions which can result in fires and explosions without an ordinary source of ignition such as spark or heat. That’s how an explosion occurred in a wastewater treatment plant at an oil refinery. It caused burn injuries for five workers.

The crew was getting ready to repair and coat the interior walls of the tank. Using a chain, they hoisted the tank cover about six inches (15 centimeters) so they could check the level of the sludge. As they let the cover back down, flames and white smoke erupted from the tank.

Investigators said it happened like this: The wastewater treatment facility was made up of oil/water separation equipment, dissolved gas removal equipment, activated carbon adsorption equipment and other equipment to remove environmental pollutants from the wastewater discharged from each process of the plant. The wastewater tank was used for holding operations in order to keep the treatment volume constant.

During normal operations, the upper 60 percent of this wastewater tank contained gas, while wastewater after oil separation and accumulated sludge made up the remaining portion. Most of the gas was hydrogen sulfide, although some nitrogen, ammonia and hexane were also present.

The gases that had built up in a wastewater tank were flammable. When the outside air contacted iron sulfide generated by the hydrogen sulfide in the wastewater, a chemical reaction occurred, setting off the explosion.

Chemical reactions can cause fires and explosions. Make sure you understand the chemical hazards in your workplace.