

Accident Case Histories



MANUFACTURING CHEMISTS ASSOCIATION

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READER'S COMMENT

July 1973 Issue

"Please refer to Case History No. 1920 as published in your Accident Case Histories of May 1973, in which an employee was burned by steam from a hose on a tank car using quick-opening couplings.

"The solution to the problem as published should not be by the use of bleed valves only, but should also discontinue the use of quick-couplings on steam hose as they are apt to blow off and then the hazard is much greater. We would suggest a Boss type connection on any steam hose. Piping - where practical - should be used because pipe is much safer than hose."

CASE HISTORY NO. 1931

Oxygen System - Flash Fire

Description: Employee received flash burns to his hand and chest when he opened a needle valve to an oxygen manifold system. The valve had been newly installed, and employee did not know it contained hydrocarbon oil lubricant in the stem and packing area. Apparently the oxygen at 2,000 pounds pressure ignited the lubricant and the valve failed in a cutting torch effect. The 80% polyester - 20% cotton shirt he was wearing ignited and could have been a contributing factor in the severity of the burns.

Cause:

1. Lack of awareness of the extreme precautions that must be taken around oxygen system to assure safe operation.
2. Failure to investigate standards, procedures, and other sources to assure safe fabrication, installation, and operation.

Preventive Measures:

1. Education and emphasis to assure

that all employees know of the hazards involved in oxygen installations.

2. Some other means of heating the switches will be devised.
3. Special newsletter and flyer published to communicate details of incident.
4. Guidelines for the location, safety manual will be developed to specify appropriate selection, use, cleaning, and maintenance of all equipment to be used in oxygen service.

CASE HISTORY NO. 1932

Release of Flammable Gas

Description: A reactor was charged with 250 gallons of vinyl chloride with the bottom valve and sewer valve open. Although a serious hazard was created by this release, no one was injured and no equipment was damaged.

A helper was working with the mechanical cleaner operator to prepare #2 and #3 reactors for charging. It is part of his job to close the bottom and sewer valves. The helper related that he normally waits until a pair of reactors are cleaned before closing the bottom valves, but in this instance, he closed the valves on #2 reactor while the mechanical cleaner was still running in #3 reactor. At this time he put the initial charge water in #2 reactor and then proceeded to other work while waiting for #3 reactor. Upon returning later, he thought he had closed the bottom valves on #3 reactor the same time he closed the valves on #2 reactor, so he proceeded to add the initial charge

water.

The charging operator stated that prior to charging reactors #2 and #3 he checked and tagged the bottom valves on #2 reactor and saw the valves open on #3 reactor. Later he proceeded with the charging of #2 reactor and noted the helper putting water into #3 reactor. He then proceeded with the charging of #3 reactor, at which time the gas release occurred.

Cause: The specific cause of this accident lies in the failure of the helper to close the bottom valves on #3 reactor and the failure of the charging operator to check and tag the bottom valves prior to charging.

Preventive Measures:

1. Appropriate disciplinary action was given both the helper and the charge operator for not following operating procedures.
2. This accident was reviewed in all departmental safety meetings.

CASE HISTORY NO. 1933

Static Spark Ignites Methanol-Acetone Mixture

Description: A chemical operator suffered first and second degree burns of the face, arms and chest when a methanol-acetone mixture was ignited by a static spark. At the time the operator was trying to push some crystals into a centrifuge drop line at the bottom of a crystallizer using a non-conductive Teflon rod, when the vapors ignited and caught him as he stood over the manhole. The injured was admitted to the hospital and his lost time is estimated at 47 days.

Preventive Measures: There are obvious lessons to be learned from this incident.

1. The man was wearing a sweater of synthetic material which ignited, melted, and contributed to his burns, and may even have contributed to the static build-up on the rod. Personnel must be warned against these materials in chemical operations.
2. Vessel manholes should not be permitted to be opened indiscriminately, especially when there are flammable or toxic

solvents in the vessel.

3. Where flammable vapors in the vapor space are in the explosive range we should not introduce objects into the vessel which can be a source of ignition--especially non-conductive rods or scoops.
4. Nitrogen was piped into the drop line to be used for facilitating the flow of slurry to the centrifuge. This was not used. In addition nitrogen was piped to the bottom valve through a 3 cfm capacity rotameter to avoid absorption of air and control product color. Investigation showed that there was a slight flow through the plugged nitrogen rotameter. This flow was not sufficient to inert the vessel. It is important to reaffirm periodically with each supervisor that he has instructed his workers about the differences between nitrogen for inerting and for other purposes.

CASE HISTORY NO. 1934

Operators Exposed to Toxic Gases

Description: Four men became ill while working in the Liquids Department with one man requiring hospital treatment. At the time, the men were handling a number of chemicals including amines, hydrochloric acid, and formaldehyde when one or more of them, or even a combination, created sufficient vapors or gases which resulted in these illnesses.

Preventive Measures: Both immediate and long range steps have been taken to prevent a recurrence including rearrangement of production schedules, better housekeeping and major equipment changes on pumping, piping and vent systems. The man treated at the hospital lost 1 day of work.

CASE HISTORY NO. 1935

Valve Opened Unintentionally

Description: A contractor welder received

a fire permit to burn a hole in the toe-board of a process structure. As he was burning, his elbow came into contact with the handle of a one-half inch ball valve. The ball valve opened and spilled flammable liquid into the work area. The liquid ignited and the welder received first and second degree burns to his legs.

Cause:

1. Easily opened ball valves with long handles.
2. Open ended valves containing flammable liquids which were not plugged when the fire permit was issued.

Preventive Measures:

1. Replace all long handles on ball valves in drain service with "T" shaped handles.
2. Plug all open ended valves in flammable service when fire permit is issued.

CASE HISTORY NO. 1936

Drumming

Description: Employee drummed hot residue (375°F) from a reactor into a used 55 gallon tighthhead steel drum. He placed a screwed plastic bung cap in the opening and proceeded to wheel the drum away with a hand truck. Suddenly the hot residue erupted from the bung opening and splashed the employee with hot residue. He suffered second and third degree burns to his upper right arm, shoulder and chest.

Cause:

1. The drum contained a residual amount of volatile chemical and was capped soon after filling, causing a build-up of pressure.
2. The hot residue softened or melted the plastic bung cap and the internal pressure forced the hot residue to erupt.

Preventive Measures:

1. Instructed employees to use only completely empty used drums.
2. Provided a supply of steel bung caps and instructed employees to replace any plastic caps with steel ones.

CASE HISTORY NO. 1937

Tank Car Maintenance

Description: Maintenance employee was removing bolts on the inlet valve on the dome of a tank car. He was using a crows foot tool, specifically designed for the job, and also using a 48" pry bar as a turn handle. When pressure was applied, the wrench slipped and caught the employee's hand between the pry bar and the tank car dome handrail.

Cause: Special tool did not fit properly and the 48" pry bar was not a suitable turning handle.

Preventive Measures: A proper turning handle will be designed and kept with the crows foot wrench. A second man will be used to help keep stability on the wrench to prevent slipping.

CASE HISTORY NO. 1938

Transfer Line

Description: Operator was removing a stainless steel dust cap from a transfer line. As he loosened the dogs, pressure trapped behind the cap forced it off suddenly. It swung upward, striking the employee in the nose.

Cause: Employee failed to depressurize line correctly, and safety chain holding cap was anchored improperly.

Preventive Measures: Safe operating procedure has been prepared. Safety chains on caps will be relocated.

CASE HISTORY NO. 1939

Tank Maintenance

Description: Employee was adjusting a grating on the top of a tank used to transport acid. The tank was being pressure tested prior to shipment, when the rupture disc suddenly blew and acid struck employee in the eye, resulting in the burn.

Cause: Rupture disc was weakened from corrosion, and test procedure required operator to be on the tank.

Preventive Measures: Testing mechanism is being altered so that the test can be performed without an operator on the tank. The Job Safety Analysis has been rewritten.

CASE HISTORY NO. 1940

Mechanic Loses Fingers

Description: An experienced maintenance man was attempting to lubricate the out-board bearing of a pinion gear that drove the ring gear of a steam tube dryer. To

obtain access to the lubricating fitting, the employee had to raise a spring loaded guard access panel and, thereby, exposed an inrunning nip between the gears. As he positioned himself to attach the grease gun fitting, a portion of the dryer struck his safety helmet causing him to lose balance. His hand went into the exposed nip causing amputation of two joints of the middle finger and the end joint of the index finger.

Preventive Measure: Grease fitting will be extended outside of guard and the plant will be thoroughly surveyed to correct any similar hazards that may exist.

FGS:ckm
7/11/73

Readers are invited to submit accident case histories for publication in this report. The involvement of personal injury is not essential, but each report should include (a) a description of the accident (b) a statement of the cause of the accident and (c) a list of measures introduced to prevent its recurrence. Address correspondence to the attention of F. G. Stephenson.

NOTE: The "Preventive Measures" included in these case histories are, in each case, the recommendations of the company reporting the incident. They are not necessarily endorsed by the Manufacturing Chemists Association.

CMA 036113