

## Sample Ammonia Process Question Set

<https://www.industrydocs.org/pha.html>

Sequence	Category	Question	Consequence/Hazard
1.1	Generic Compressor	What if there is no pressure relief valve [hereafter "SRV" for "Safety Relief Valve"] on this equipment?	An overpressure condition exists and there is no SRV. This causes a leak or rupture, resulting in a release.
1.2	Generic Compressor	What if the equipment's preventative maintenance [hereafter referred to as "PM"] program for SRVs is insufficient or non-existent?	An SRV's PM program is insufficient or non-existent. The SRV fails to perform as designed (e.g., SRV fails to lift at set pressure during an overpressure condition; SRV leaks; or SRV lifts below its set pressure). This results in a release.
1.3	Generic Compressor	What if the set pressure of the equipment SRV is more than the design pressure of the equipment?	Pressure rises above equipment design. The SRV does not lift because the set pressure is too high. The overpressure causes a leak/rupture, resulting in a release.
1.4	Generic Compressor	What if the SRV capacity is too low?	An overpressure condition exists. The SRV lifts but can not meet relief capacity demand. The overpressure causes a leak/rupture, resulting in a release.
1.5	Generic Compressor	What if the SRV opens below its set pressure?	Vibration, incorrect design, weakened SRV spring, failure of valve seat material, etc. causes SRV to lift below its set pressure, resulting in a release.
1.6	Generic Compressor	What if the SRV fails to lift at/above its set pressure?	An overpressure condition exists. The SRV fails to lift at its set pressure. The overpressure causes a leak/rupture, resulting in a release.
1.7	Generic Compressor	What if liquid accumulates in the SRV discharge piping?	Rain/condensate in piping corrodes SRV, accumulates on SRV, or freezes in piping. Corrosion causes premature lifting; accumulation on SRV causes overpressure and a leak/rupture; or ice blocks SRV discharge. This results in a release.
1.8	Generic Compressor	What if an SRV lifts and no follow up action is taken?	An SRV lifts below, at, or above its set pressure and relieves the system pressure. The SRV is not replaced to ensure proper re-seating. Later, the SRV leaks or lifts below its set pressure, resulting in a release.
1.9	Generic Compressor	What if there is a closed stop valve before/after an SRV?	A stop valve before/after an SRV is not secured open, and the valve is left shut after maintenance or inadvertently closed. An overpressure develops, causing a leak/rupture and resulting in a release.
1.10	Generic Compressor	What if an SRV discharges into piping/system that is not vented to atmosphere?	An SRV discharges into piping/system that is not vented to atmosphere. There is a rise in pressure downstream of the SRV. This causes a rise in the set point of the SRV. An overpressure develops, resulting in a leak/rupture and a release.
1.11	Generic Compressor	What if a sealing component (e.g., packing, O rings, mechanical seals, gaskets/flanges, etc.) fails?	A sealing component fails and a leak develops, resulting in a release.
1.12	Generic Compressor	What if a compressor discharge valve is closed?	A compressor discharge valve is closed. An overpressure condition develops. The overpressure lifts SRVs and/or causes an equipment leak/rupture, resulting in a release.
1.13	Generic Compressor	What if a compressor suction valve is closed?	A compressor suction valve is closed. Starved compressor overheats and fails one or more sealing components. Leaks develop in the equipment, resulting in a release.
1.14	Generic Compressor	What if there is insufficient flow of the cooling medium to the compressor?	Insufficient flow of cooling medium overheats compressor oil, mechanical seals, etc. The excessive heat fails one or more sealing components. Leaks develop on the equipment, resulting in a release.
1.15	Generic Compressor	What if the discharge check valve is in an open position and the compressor is not running?	A discharge check valve is open (e.g., stuck open, left in open position by mechanical lifting stem/jackscrew). Slugging occurs and damages compressor casing/sealing components, resulting in a release.
1.16	Generic Compressor	What if the compressor cut outs/safeties/interlocks are not periodically tested or inspected?	The compressor is equipped with cut outs/safeties/interlocks. The cut outs/safeties/interlocks are not periodically tested/inspected. The compressor does not shut down when an unsafe condition arises, resulting in a release.
1.17	Generic Compressor	What if compressor cut outs/safeties/interlocks are not designed to fail safe?	A cut out/safety/interlock fails. The operator does not detect the failure. An unsafe condition arises and the cut out/safety/interlock is unavailable because it has failed. This causes a leak/rupture, resulting in a release.
1.18	Generic Compressor	What if the compressor is inadequately lubricated?	The compressor is running. The lubrication system fails, such as a plugged filter, a stopped oil pump, or an oil loss. Compressor experiences accelerated mechanical wear. The sealing component fails, resulting in a release.
1.19	Generic Compressor	What if there are incomplete swing compressor cut outs/safeties/interlocks?	A compressor is piped to multiple suction systems. The compressor does not have cut outs/safeties/interlocks for all systems served. The compressor fails to shutdown during an emergency situation, resulting in a leak/rupture and a release.
1.20	Generic Compressor	What if plugs, caps, or blind flanges are missing on purge or drain valves?	A valve is inadvertently opened or leaks. There is no plug, caps, or blind flange, resulting in a release.