



## Lösungshinweise für die KMK FSZ-Prüfung

Berufsbereich: Chemieberufe

Sprache: Englisch

Niveau It. GER: B2

### Tapescript zu Aufgabe 1

#### Male speaker

May 3rd 2019, the AB Specialty Silicones facility in Waukegan, Illinois.

During production of an emulsion product two incompatible chemicals were mixed. The chemicals reacted and produced flammable hydrogen gas that ignited causing a massive explosion that killed four workers and destroyed the company's production building.

Following the incident, the Chemical Safety Board launched an investigation, and found that a number of safety issues led to the fatal explosion. One such safety issue was that AB Specialty did not have a written procedure requiring employees to separate 10 percent potassium hydroxide drums from XL10 drums in the emulsions area or to remove leftover containers after use. This plus the fact that the two incompatible chemicals were stored in nearly identical blue drums made mixing of the two materials all too possible.

#### Vonzella Vincent, CSB Lead Investigator

In processes that rely on operators to gather and mix chemicals it is critical that companies reduce the risk of human error by making it easy to do the job right and hard to do the job wrong. In this case that could have been as simple as having written procedures that specify storing incompatible chemicals in separate areas and in different color containers.

#### Male speaker

The CSB also found that the design of the batch equipment and ventilation system likely led to the severity of the incident. The emulsion process tank had an open hatch type lid and no vent pipe to direct gases to a safe location. As a result, the hydrogen gas produced during the incident released directly into the production building where workers were located, and the production building's ventilation system included an air mover which was designed to introduce outside air to the building and was positioned near the location where EM 652 was being manufactured. This may have helped distribute the hydrogen within the production building where it mixed with air, creating a large and explosive gas cloud.

The CSB learned that during the incident workers knew that a process upset had occurred, but they did not recognize the hazard of flammable hydrogen gas. Hydrogen is a colorless and odorless gas indistinguishable from air without the use of additional technology such as gas detectors. But the CSB found that the production building did not have a hydrogen gas or flammable gas detection and alarm system. Such a system could have automatically activated an alarm to alert workers to the danger they were facing, making it less likely they would have remained inside the production building between the start of the hydrogen release and the time of ignition. And the CSB found that the workers lacked effective emergency preparedness training to recognize the potential for a hydrogen gas release and know to immediately evacuate if a possible release should occur.

**Vonzella Vincent, CSB Lead Investigator**

**Effective safety management systems** that address process safety are critical for companies that handle reactive chemicals and to prevent future reactive incidents. AB Specialty did not have a process safety management program in place at the time of the incident.

**Dr Katherine Lemos, CSB Chairperson and CEO**

The explosion at AB Specialty is one of many reactive chemistry incidents investigated by the CSB during the agency's history. Reactive chemicals can lead to major explosions, fires or toxic emissions that can cause death, injury, property damage and negative effects in the environment. Chemical reactivity hazards can be **more difficult to anticipate and recognize** than other types of process hazards. Inadequate recognition and evaluation of reactive chemical hazards has been a causal factor in a significant number of the reactive chemical incidents with known causes. And yet, **companies are often not required by regulation to implement the most basic safety management system elements to control these hazards.** For these reasons, serious incidents like the one at AB Specialty continue to occur.

**Male speaker**

Although AB Specialty processed chemical is capable of undergoing highly hazardous chemical reactions, those chemicals are not listed for coverage in either **OSHA's** process safety management standard or the **EPA's** risk management plan rule. Therefore, AB Specialty was not required to implement baseline process safety management system elements that are required under these regulations, including performing an effective process hazard analysis. In response, the CSB reiterated a previous recommendation to OSHA to amend the process safety management standard to achieve more comprehensive control of reactive hazards that could have catastrophic consequences, and to augment the process hazard analysis element of the standard to explicitly require an evaluation of reactive hazards. The CSB also reiterated a recommendation to the EPA to revise the accidental release prevention requirements to explicitly cover catastrophic reactive hazards that have the potential to seriously impact the public, including those resulting from self-reactive chemicals and combinations of chemicals and process specific conditions.

**Dr Katherine Lemos, CBC Chairperson and CEO**

When chemical reactivity hazards are identified, it is critical for companies to understand if the hazards can be eliminated or reduced. If not, these hazards must be managed throughout the operational lifetime of the facility and products to protect workers, property and the environment. It is past time for regulators to fully recognize the hazards presented by reactive chemicals. **We call on OSHA and EPA to update their regulatory standards** to include better coverage of reactive chemicals. Closing the regulatory gap will prevent further tragic incidents and save lives. Together we can impact safety for our chemical industries, our workers, our community and our environment.

**Male speaker**

For more information, visit **csb.gov**.

**Items und Bepunktung:****Wann passierte der Unfall? (1)**

- 3. Mai 2019

**Folgen des Unfalls bei AB Specialty (3)**

- massive Explosion
- vier Mitarbeiter gestorben
- Produktionsanlage zerstört

**Funktion der CSB (1)**

- Ermittlung des Unfalls

**Sicherheitsprobleme bei AB Specialty laut CSB (8)**

- keine schriftlichen Betriebsanweisungen (1)
- Lagern von inkompatiblen Chemikalien zusammen in einem Bereich (1)
- Behälter in ähnlichen Farben (1)
- Design des Reaktors/Behälters (offen) (1)
- Belüftungssystem insgesamt (1)
- keine Gaswarnanlage (1)
- mangelnde Notfallunterweisung/Vorbereitung der Mitarbeiter (1)
- ein effektives Programm für Sicherheitsmanagement (1)

**Warum passieren Unfälle mit reaktiven Chemikalien immer wieder (3)**

- schwieriger vorherzusagen und zu erkennen
- fehlende Vorschriften
- mangelndes Sicherheits- und Risikomanagement

**Zuständige Aufsichtsbehörden (2)**

- OSHA
- EPA

**Appell der CSB an die Aufsichtsbehörden (1)**


- die Sicherheitsvorschriften aktuell halten

**Webseite für mehr Informationen (1)**

- [www.csb.gov](http://www.csb.gov)

**Summe: 20**

Items und Bepunktung:  
 adapted from <https://www.solway.com/en/>

<p><b>(3) von 6</b></p> <p><b>Einsatz der Produkte in</b></p> <ul style="list-style-type: none"> <li>→ Flugzeugen</li> <li>→ Mobilgeräten</li> <li>→ Medizintechnik</li> <li>→ Luft- und Wasserreinhaltung</li> <li>→ Autos</li> <li>→ Batterien</li> </ul>	<p><b>Segmente</b></p> <p><b>je 1 (3)</b></p> <p>Solutions</p> <p>Produkte:</p> <p>II technologische Lösungen</p> <p>Chemicals</p> <p>II Düfte</p> <p><b>je 0,5 (1)</b></p>
<p><b>Firmenprofil</b></p> <p>II wissenschaftliches Unternehmen</p> <p>II Hauptsitz in Brüssel</p> <p>II 2100 Mitarbeiter*innen in 63 Ländern</p> <p>II gegründet 1863</p> <p>II eins der drei führenden Unternehmen weltweit</p> <p>II Umsatz von 10,1 Mrd. Euro in 2021</p>	<p><b>Materials</b></p> <p>Produkte:</p> <p>II Hochleistungspolymere</p> <p>II Verbundwerkstoffe</p> <p><b>je 0,5 (1)</b></p> <p>Produkte:</p> <p>II Waschsoda</p> <p>II Peroxide</p> <p><b>je 0,5 (1)</b></p>
	
<p><b>Nachhaltigkeit</b></p> <p><b>Aktivitäten:</b></p> <p>II Ersatz von Kohle durch Altholz in 2 Produktionsstätten</p> <p>II saubere Energie</p> <p><b>je 1 (2)</b></p>	<p><b>soziales Engagement (Programme)</b></p> <p><b>je 1 (2)</b></p> <p>Corporate Citizenship Program</p> <p>Future Innovator's Library</p> <p>Innovation/ Kooperation</p> <p><b>je 1 (2)</b></p> <p>mit</p> <p>Kunden, Startups und Wettbewerbern/Konkurrenz</p>
<p><b>Programmi-Ziel</b></p> <p>One Planet</p> <p>Reduktion der Umweltauswirkungen der Betriebe weltweit bis 2030</p> <p><b>je 1 (2)</b></p>	<p>mit:</p> <p>Universitäten und Forschungseinrichtungen</p>

Checkliste in der **Zielsprache** ohne Punkte (im Zusammenspiel mit Deskriptoren Mediation)

- Suitable heading, e.g. Safety rules for the visitors
- Name tags must be worn visibly
- Items to be worn before entering the chemical plant
  - Safety shoes/boots always
  - Hard hats always
  - Safety glasses in designated areas
  - Ear protection in designated areas
- Smartphones/cameras are not allowed.
- Eating, drinking and smoking is prohibited.
- Waste should be disposed in appropriate containers and be sorted properly.
- In case of emergency: follow the loudspeaker announcements and go to the protected area with the escort person
- Inform in case of health complaints
- Stay in areas marked yellow
- No touching of plant components (pipes, tanks, valves etc.)



corrosive/  
skin burns  
and eye  
damage



toxic/  
fatal if swallowed,  
inhaled,  
in contact with  
skin



health  
hazard



serious (long-  
term) health  
hazard

Checkliste in der **Zielsprache** ohne Punkte  
(im Zusammenspiel mit Deskriptor Produktion)

Formale Aspekte einer E-Mail (da es sich um einen beruflichen Bezug handelt) sind einzuhalten (Bezug, Anrede, Satzsatz etc....), insbesondere ein angemessenes Register sowie Höflichkeitsgebote, denn Absender:in und Adressatin stehen noch nicht in einem vertrauten freundschaftlichen Kontakt.

- subject line
- salutation
- opening line
- 
- reference to the conference visit
- background information on the conference
- proposal to visit the next year's conference
- reference to personal interest in chemistry
- amicable tone
- motivational address
- further information on daily tasks in the job
  - likes
  - dislikes
  - special ideas and challenges

Vom Prüfling wird die Darstellung von kreativen und interessanten Aspekten in der Arbeitstätigkeit erwartet.

- closing line
- signature