

Dammexplosion på en fabrik för produktion av farmaceutika.

880617 MARS 1988_13

En kristallin slutprodukt spann i ca 5 minuter i en batch centrifug då en explosion inträffade. Luft och lösningsmedel bildade en explosiv gasblandning. Centrifugens lock blåstes bort av explosionen. Övertrycket krossade ett antal glasrörledningar och fönster upp till 20 m bort. Ingen skadades.

Inblandade ämnen och mängder

	CAS Nr.	Mängd
isopropanol	67-63-0	mindre än 10 kg

Skador:

Människor: Inga.
Materiella: Skador på anläggningen.
Miljö/ekologi: Inga effekter rapporterade.
Infrastruktur: Inga.

Erfarenheter redovisade (Ja/Nej): Ja

Mycket kortfattat anges förebyggande åtgärder.

Report Profile

Identification of Report:

country: FA ident key: 1988_013_01

reported under Seveso I directive as major accident reports: SHORT+FULL

Date of Major Occurrence: Time of Major Occurrence

start: 1988-06-17 start:

finish: finish:

Establishment:

name:

address:

industry: 2004 pesticides, pharmaceuticals, other fine chemicals

Pharmaceutical (Process Plant)

Seveso II status: not applicable: Yes art. 6 (notification): No

art. 7 (MAPP): No

art. 9 (safety report): No

Date of Report:

short: full:

Authority Reporting:

name:

address:

Authority Contact:

rep_cont_name:

rep_cont_phone:

rep_cont_fax:

Additional Comments:

- a) - not applicable -
- b) - not applicable -
- c) - not applicable -
- d) - not applicable -
- e) - not applicable -

Short Report

country: FA ident key: 1988_013_01

Accident Types:

release: No explosion: Yes

water contamination: No other: No

fire: No

description:

A crystalline finished product was spinning for about 5 minutes in a batch centrifuge when an explosion occurred. The centrifuge's lid was blown up by the force of the explosion. The overpressure shattered nearby glass pipelines and windows... see Appendix Short Report / description of accident types

Substance(s) Directly Involved:

toxic: No explosive: Yes

ecotoxic: No other: No

flammable: Yes

description:

- Isopropanol (C.A.S. CODE: 67-63-0, E.E.C. CODE: 603-003-00-0): amount involved = < 10 kg... see Appendix Short Report / description of substances involved

Immediate Sources of Accident:

storage: No transfer: No

process: Yes other: No

description:

The accident occurred in a pharmaceutical industry during the centrifuging of a crystalline finished product in a batch centrifuge. The product had been refrigerated to -7°C before it was separated from a methanol/isopropanol mixture. It wa... see Appendix Short Report / description of immediate sources

Suspected Causes:

plant or equipment: Yes environmental: No

human: No other: No

description:

CAUSES:... see Appendix Short Report / description of suspected causes

Immediate Effects:

material loss: Yes

human deaths: No

human injuries: No **community disruption:** No

other: No

ecological harm: No

national heritage loss: No

description:

EFFECTS ON PEOPLE:... see Appendix Short Report / description of immediate effects

Emergency Measures taken:

on-site systems: No **decontamination:** No

external services: No **restoration:** No

sheltering: No **other:** No

evacuation: No

description:

No emergency measures were taken, neither on-site nor off-site.

Immediate Lessons Learned:

prevention: Yes **other:** No

mitigation: No

description:

After the accident, the company has been requested to use nitrogen inerting when centrifuging highly flammable liquids at all temperatures.

A Occurrence Full Report

country: FA **ident key:** 1988_013_01

1 Type of Accident

remarks: A crystalline finished product was spinning for about 5 minutes in a batch centrifuge when an explosion occurred (code 1307) due to the ignition of a flammable mixture of air and isopropanol vapours.

2 Dangerous Substances

remarks: No data are available about the type and the amount of the crystalline finished product contained in the batch centrifuge when the explosion occurred. The total establishment and the potential directly involved inventories refer to the amou... see Appendix Full Report A / dangerous substances

3 Source of Accident

illustration: - not applicable -

remarks: The accident occurred in a pharmaceutical industry (code 2004) during the centrifuging of a crystalline finished product (code 3104) in a batch centrifuge (code 4007). The product had been refrigerated to -7°C before it was separated from a... see Appendix Full Report A / source of accident - remarks

4 Meteorological Conditions

precipitation none: fog: rain: hail: snow:

No No No No No

wind speed (m/s):

direction (from):

stability (Pasquill):

ambient temperature (°C):

remarks: - not applicable -

5 Causes of Major Occurrence

main causes

technical / physical 5102 operation: component/machinery failure/malfunction

5109 operation: electrostatic accumulation

- not applicable -

- not applicable -

- not applicable -

human / organizational 5302 organization: management attitude problem

5307 organization: process analysis (inadequate, incorrect)

- not applicable -

- not applicable -

- not applicable -

remarks: No nitrogen inerting was used during the centrifuging of the crystalline finished product containing highly flammable liquids (codes 5302, 5307). The teflon coating on the centrifuge's basket was worn away and a metal-to-metal contact between... see Appendix Full

Report A / causes of major occurrence

6 Discussion about the Occurrence

- not applicable -

Type of Accident country: FA ident key: 1988_013_01

event:

major occurrence 1307 explosion: VCE (vapour cloud explosion; supersonic wave front)

initiating event 1307 explosion: VCE (vapour cloud explosion; supersonic wave front)

associated event - not applicable -

Dangerous substances

country: FA ident key: 1988_013_01

a) total establishment inventory

CAS number: 67-63-1 **identity:** Isopropanol

name from Seveso I Directive: - not applicable -

name from Seveso II Directive: - not applicable -

category from Seveso II: - not applicable -

other hazards (1): - not applicable -

other hazards (2): - not applicable -

maximum quantity (tonnes): 0,01

use of substance as: NORMAL FINISHED PRODUCT

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: 0,01 **potential quantity:** 0,01

c) substance belongs to relevant inventory indirectly involved: No

actual quantity: -1 **indir_pot_quant:** -1

a) total establishment inventory

CAS number: identity: Crystalline Finished Product

name from Seveso I Directive: - not applicable -

name from Seveso II Directive: - not applicable -

category from Seveso II: - not applicable -

other hazards (1): - not applicable -

other hazards (2): - not applicable -

maximum quantity (tonnes): -1

use of substance as: NORMAL FINISHED PRODUCT

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: -1 **potential quantity:** -1

c) substance belongs to relevant inventory indirectly involved: No

actual quantity: -1 **indir_pot_quant:** -1

Source of Accident - Situation country: FA ident key: 1988_013_01

situation

industry

initiating event 2004 pesticides, pharmaceuticals, other fine chemicals

associated event - not applicable -

activity/unit

major occurrence 3104 process: physical operations (mixing, melting crystallizing, etc.)

initiating event 3104 process: physical operations (mixing, melting crystallizing, etc.)

associated event - not applicable -

component

major occurrence 4007 machinery/equipment (pump, filter, column separator, mixer, etc.)

initiating event 4007 machinery/equipment (pump, filter, column separator, mixer, etc.)

associated event - not applicable -

B Consequences Full Report

country: FA ident key: 1988_013_01

1 Area concerned

affected

extent of effects installation: Yes

establishment: No

off-site; local: No

off-site; regional: No

off-site; transboundary: No

illustration of effects - not applicable -

remarks In the Original Report there is no evidence of significant effects outside the i... see Appendix

Full Report B / area concerned - remarks

2 People

establishment popul. emergency personnel off-site population

total at risk

immediate fatalities

subsequent fatalities

hospitalizing injuries

other serious injuries

health monitoring

remarks As no operator was in the vicinity at the time of the explosion, no one was inju... see Appendix

Full Report B / people

3 Ecological Harm

pollution/contamination/damage of:

- residential area (covered by toxic cloud) Suspected

- common wild flora/fauna (death or elimination) Suspected

- rare or protected flora/fauna (death or elimination) Suspected

- water catchment areas and supplies for consumption or recreation Suspected

- land (with known potential for long term ecological harm or Suspected

preventing human access or activities)

- marine or fresh water habitat Suspected

- areas of high conservation value or given special protection Suspected

remarks In the Original Report there is no evidence of significant ecological harms.... see Appendix

Full Report B / ecological harm

4 National Heritage Loss

effects on:

- historical sites not applicable - historic monuments not applicable

- historic buildings not applicable - art treasures not applicable

remarks No data available.

5 Material Loss

establishment losses off site losses

costs (direct costs to operator) (social costs)

in ECU Irish Pounds ECU Irish Pounds

material losses 5000

response, clean up, restoration

remarks The lid of the centrifuge was blown-off by the force of the explosion and the ov... see Appendix

Full Report B / material loss

6 Disruption of Community Life

establishment/plant evacuated disabled/unoccupiable destroyed

- nearby residences/hotels No No No

- nearby factories/offices/small shops No No No

- schools, hospitals, institutions No No No

- other places of public assembly No No No

interruption of utilities etc. no / yes duration

- gas No

- electricity No

- water No

- sewage treatment works No

- telecommunications No

- main roads No

- railways No

- waterways No

- air transport No

significant public concern none local level national level

- off site populations Yes No No

- media interest No No No

- political interest No No No

remarks In the Original Report there is no evidence of significant effects outside the i... see Appendix

7 Discussion of Consequences

C Response Full Report

country: FA ident key: 1988_013_01

1 Emergency Measures

taken - on site - not applicable - - not applicable -

- not applicable - - not applicable -

- not applicable - - not applicable -

- off site - not applicable - - not applicable -

- not applicable - - not applicable -

- not applicable - - not applicable -

still - on site - not applicable - - not applicable -

required

- not applicable - - not applicable -

- not applicable - - not applicable -

- **off site** - not applicable - - not applicable -

- not applicable - - not applicable -

- not applicable - - not applicable -

continuing contamination or danger

-**on site** not applicable

-**off site** not applicable

remarks - not applicable -

2 Seveso II Duties

pre-accident evaluation

Article item not due yet not done done/submitted evaluated

6 notification No No No No

7 policy (MAPP) No No No No

9 safety report No No No No

9, 10, 11 update No No No No

11 internal plan No No No No

11 external plan No No No No

13 informing public No No No No

9, 12 siting policy No No No No

post-accident evaluation

Seveso II duty was actual were actual compared with actual

contingency consequences consequences, the

addressed? addressed? predicted extent was?

Article item

7 policy (MAPP) not applicable not applicable not applicable

9 current safety report not applicable not applicable not applicable

11 internal plan not applicable not applicable not applicable

11 external plan not applicable not applicable not applicable

13 informing public not applicable not applicable not applicable

9, 12 siting policy not applicable not applicable not applicable

evaluation of safety organisation

organisational element element existed did element relate to actual circumstances of

yes / no no / partly / yes adequate?

- **written policy objectives** No

- **specified management** No

structure

- **specified responsibilities** No

- specified working procedures No

- specified procedures for No

assessment/auditing of

management system

- specified procedures for No

review and update of

management policy

- specified general training No

procedures

- specified emergency No

training procedures

evaluation of ecological impact control

organisational element element existed did element relate to actual circumstances of

yes / no no / partly / yes adequate?

- ecological status review No

before incident

- potential ecological No

consequences assessment

- ecological impact review No

after incident

- ecological restoration No

procedures

- subsequent review of No

restoration success

remarks - not applicable -

3 Official Action Taken

legal action

- not applicable -

other official action

- not applicable -

4 Lessons Learned

measures to prevent recurrence

After the accident, the compan... see Appendix Full Report C / lesson learned - prevent

measures to mitigate consequences:

- not applicable -

useful references:

- not applicable -

5 Discussion about Response

- not applicable -

Appendices for the FA / 1988_013_01 report

Appendix Short Report / description of accident types:

A crystalline finished product was spinning for about 5 minutes in a batch centrifuge when an explosion occurred. The centrifuge's lid was blown up by the force of the explosion. The overpressure shattered nearby glass pipelines and windows inside the process area (up to 20 metres away) but nearby plants were not damaged. As no operator was in the vicinity at the time of the explosion, no one was injured.

Appendix Short Report / description of substances involved:

- Isopropanol (C.A.S. CODE: 67-63-0, E.E.C. CODE: 603-003-00-0): amount involved = < 10 kg.
- Crystalline finished product: composition and amount involved = not known.

Appendix Short Report / description of immediate sources:

The accident occurred in a pharmaceutical industry during the centrifuging of a crystalline finished product in a batch centrifuge. The product had been refrigerated to -7°C before it was separated from a methanol/isopropanol mixture. It was subsequently washed with isopropanol pre-cooled to -9°C .

Appendix Short Report / description of suspected causes:

CAUSES:

The following investigation revealed a number of factors which could have contributed to the explosion. No nitrogen inerting was used and enough time was elapsed to allow sufficient air could have been drawn into the machine to create a flammable atmosphere. Sufficient heat could also have been generated by friction to raise the temperature of the solvent medium above its flash-point. The investigation also showed that the teflon coating on the centrifuge's basket was worn away. Metal-to-metal contact between the basket and the bottom outlet chute of the centrifuge could have caused a friction spark and it was the most probable source of ignition even if continuity checks failed to eliminate the possibility that a static discharge occurred.

Appendix Short Report / description of immediate effects:

EFFECTS ON PEOPLE:

As no operator was in the vicinity at the time of the explosion, no one was injured.

MATERIAL LOSS:

The lid of the centrifuge was blown-off by the force of the explosion and the overpressure shattered nearby glass pipelines and windows inside the process area (up to 20 metres away) but nearby plants were not damaged. The amount of the damages has been evaluated in about 5,000 Irish Pounds (about 0.006 MECU).

Appendix Full Report A / dangerous substances:

No data are available about the type and the amount of the crystalline finished product contained in the batch centrifuge when the explosion occurred. The total establishment and the potential directly involved inventories refer to the amount of isopropanol vapours involved in the explosion. The amount of isopropanol vapours involved in the explosion must be considered as conservative (the true value was less than 10 Kg).

Appendix Full Report A / source of accident - remarks:

The accident occurred in a pharmaceutical industry (code 2004) during the centrifuging of a crystalline finished product (code 3104) in a batch centrifuge (code 4007). The product had been refrigerated to -7°C before it was separated from a methanol/isopropanol mixture. It was subsequently washed with isopropanol pre-cooled to -9°C .

Appendix Full Report A / causes of major occurrence:

No nitrogen inerting was used during the centrifuging of the crystalline finished product containing highly flammable liquids (codes 5302, 5307). The teflon coating on the centrifuge's basket was worn away and a metal-to-metal contact between the basket and the bottom outlet chute on the centrifuge (code 5102) could have caused a friction spark. It was the most probable ignition source even if continuity checks failed to eliminate the possibility that a static discharge occurred (code 5109).

Appendix Full Report B / area concerned - remarks:

In the Original Report there is no evidence of significant effects outside the installation. The overpressure shattered nearby glass pipelines and windows inside the process area (up to 20 metres away) but nearby plants were not damaged.

Appendix Full Report B / people:

As no operator was in the vicinity at the time of the explosion, no one was injured.

Appendix Full Report B / ecological harm:

In the Original Report there is no evidence of significant ecological harms.

Appendix Full Report B / material loss:

The lid of the centrifuge was blown-off by the force of the explosion and the overpressure shattered nearby glass pipelines and windows inside the process area (up to 20 metres away) but nearby plants were not damaged. The amount of the damages has been evaluated in about 5,000 Irish Pounds (about 0.006 MECU).

Appendix Full Report B / disruption of community life:

In the Original Report there is no evidence of significant effects outside the installation.

Appendix Full Report C / lesson learned - prevent:

After the accident, the company has been requested to use nitrogen inerting when centrifuging highly flammable liquids at all temperatures.