

Annual Report on High Pressure Gas  
Related Accidents  
(2016 version)

The High Pressure Gas Safety Institute of Japan (KHK)

## 1. Introduction

This Annual Report is a compilation of statistics on accidents related to the High Pressure Gas Safety Act that occurred between 1997 and 2016, with a focus on accidents resulting in injury or death, especially those occurred at manufacturing plants for high pressure gas.

Note that among high pressure gas-related accidents, this Annual Report excludes those involving general consumers, which pertain to the Act on the Securing of Safety and the Optimization of Transaction of Liquefied Petroleum Gas.

About accidents resulting in injury or death  
 “Accidents resulting in injury or death” refer to accidents resulting in death, serious injury, or minor injury to a total of one or more people.  
 The definitions of death, serious injury, and minor injury are as follows.  
 Death: the victim dies within five days of the occurrence of the accident.  
 Serious injury: the victim requires at least 30 days for treatment of injuries.  
 Minor injury: the victim requires less than 30 days for treatment of injuries.

## 2. Changes in the numbers of accidents resulting in injury or death and of deaths related to the High Pressure Gas Safety Act

The changes in the numbers of accidents resulting in injury or death and of deaths related to the High Pressure Gas Safety Act between 1997 and 2016 are shown in Fig. 1. Between 20 and 50 accidents resulting in injury or death occur each year, with numbers remaining steady overall. The number of deaths range between one and six people per year.

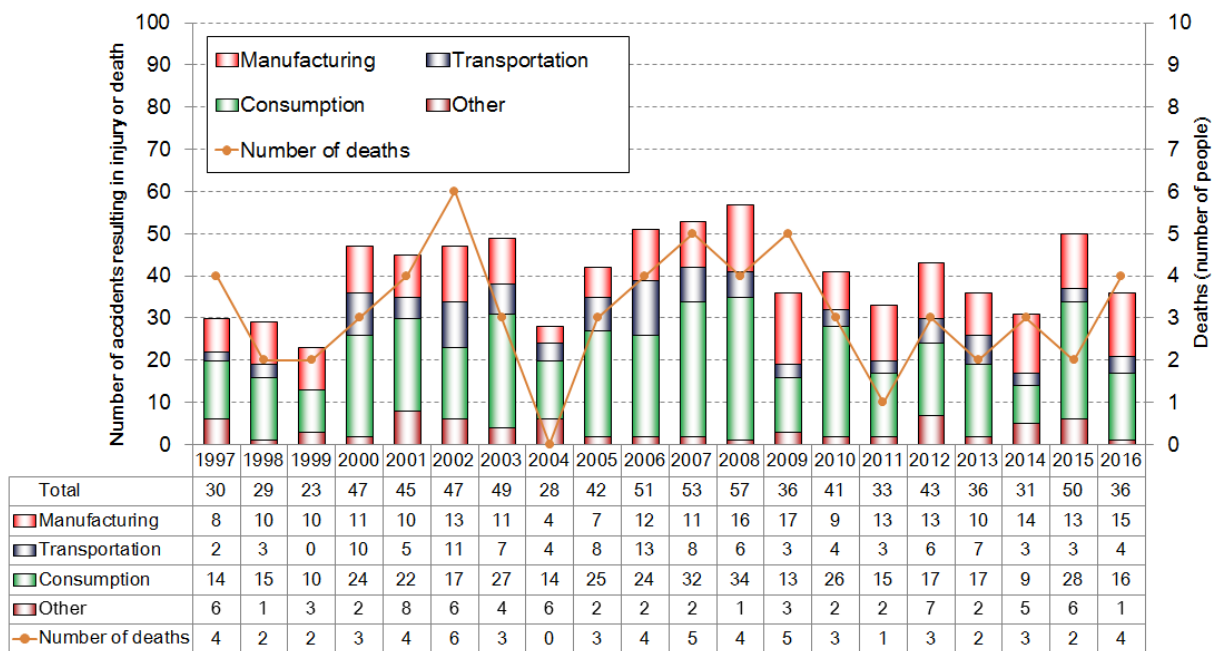


Fig. 1: Changes in the numbers of accidents resulting in injury or death and of deaths related to the High Pressure Gas Safety Act (1997 - 2016)

### 3. Changes in the numbers of accidents resulting in injury or death and of deaths at manufacturing plants for high pressure gas

The changes in the numbers of accidents resulting in injury or death and of deaths at manufacturing plants for high pressure gas between 1997 and 2016 are shown in Fig. 2. The total number of accidents resulting in injury or death fluctuates with a maximum of 20 per year. Looked at by industry, the largest number of accidents resulting in injury or death occur in the “Other industrial gas” field. The “Other industrial gas” field includes filling stations, ironworks, food manufacturing, etc. The second-largest number of accidents resulting in injury or death occurs in the “General chemicals” field, with the number of accidents resulting in injury or death occurring in the “Other industrial gas” and “General chemicals” fields together making up around 90% of all accidents resulting in injury or death.

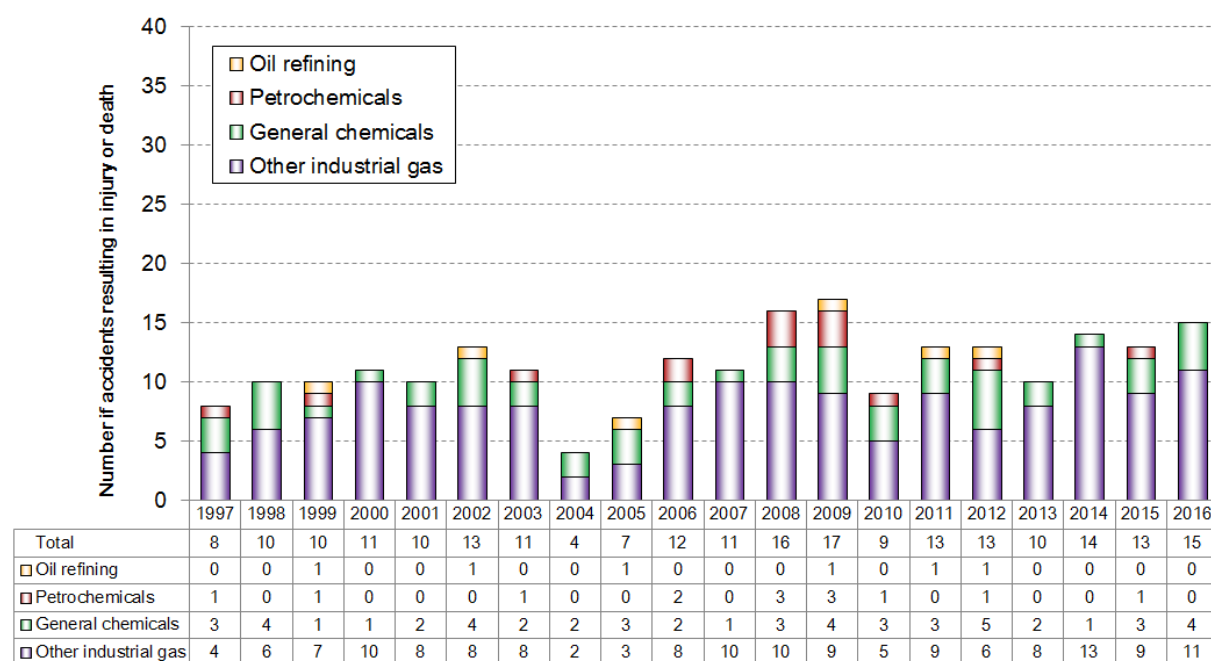


Fig. 2: Change in the numbers of accidents resulting in injury or death at manufacturing plants for high pressure gas (1997 - 2016)

Fig. 3 shows the numbers of deaths in accidents occurring at manufacturing plants for high pressure gas. There have been 13 deaths over the past 20 years. Looked at by industry, a large number of deaths, those of nine people, have occurred in the “Other industrial gas” field. The “Other industrial gas” field encompasses accidents which take place at filling stations and in refrigerating and air conditioning, and the causes of accidents resulting in deaths include the bursting of containers, leakage of poisonous gases, etc. On the other hand, there have been no accidents resulting in deaths in the “Oil refining” field between 1997 and 2016.

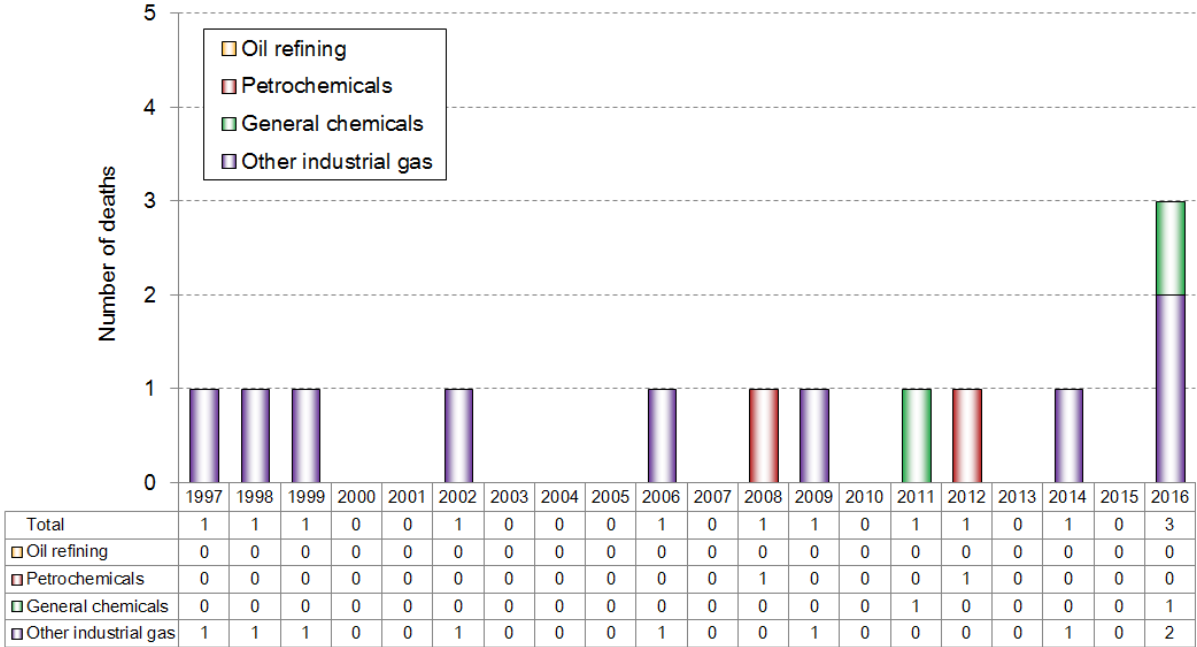


Fig. 3: Change in the numbers of deaths at manufacturing plants for high pressure gas (1997 - 2016)

#### 4. Analysis of accidents resulting in injury or death at manufacturing plants for high pressure gas by type of phenomenon

##### 4.1. Breakdown of types of phenomenon involved in accidents resulting in injury or death at manufacturing plants for high pressure gas (2016)

The breakdown of the types of phenomenon involved in the 15 accidents resulting in injury or death which occurred at manufacturing plants for high pressure gas in 2016 and the numbers of resulting deaths are shown in Table 1. Among the types of phenomenon involved in accidents resulting in injury or death, “Leakages” were the most common, with eight incidents, followed in descending order by “Fires, explosions,” “Bursting, ruptures, etc.” and “Other.”

Note that accidents in which leakages led to explosions or fires are classified as “Explosions” or “Fires.”

Table 1: Breakdown of types of phenomenon involved in accidents resulting in injury or death at manufacturing plants for high pressure gas (2016)

Phenomenon causing the accident	Number of cases	Number of deaths
Leakages	8	0
Fires, explosions	4	1
Leakages → Fires	2	1
Fires	1	0
Explosions	1	0
Bursting, ruptures, etc.	2	1
Other (oxygen deficiency within the tank)	1	1
Total	15	3

##### 4.2 Changes in the numbers of accidents caused by fires and explosions and of resulting deaths at manufacturing plants for high pressure gas

Of the accidents resulting in injury or death which occurred at manufacturing plants for high pressure gas between 1997 and 2016, the change in the numbers caused by fires and explosions is shown in Fig. 4. Looked at by industry, many of the accidents resulting in injury or death caused by fires and explosions occurred in the “Other industrial gas” field, a similar trend to that seen in Fig. 2.

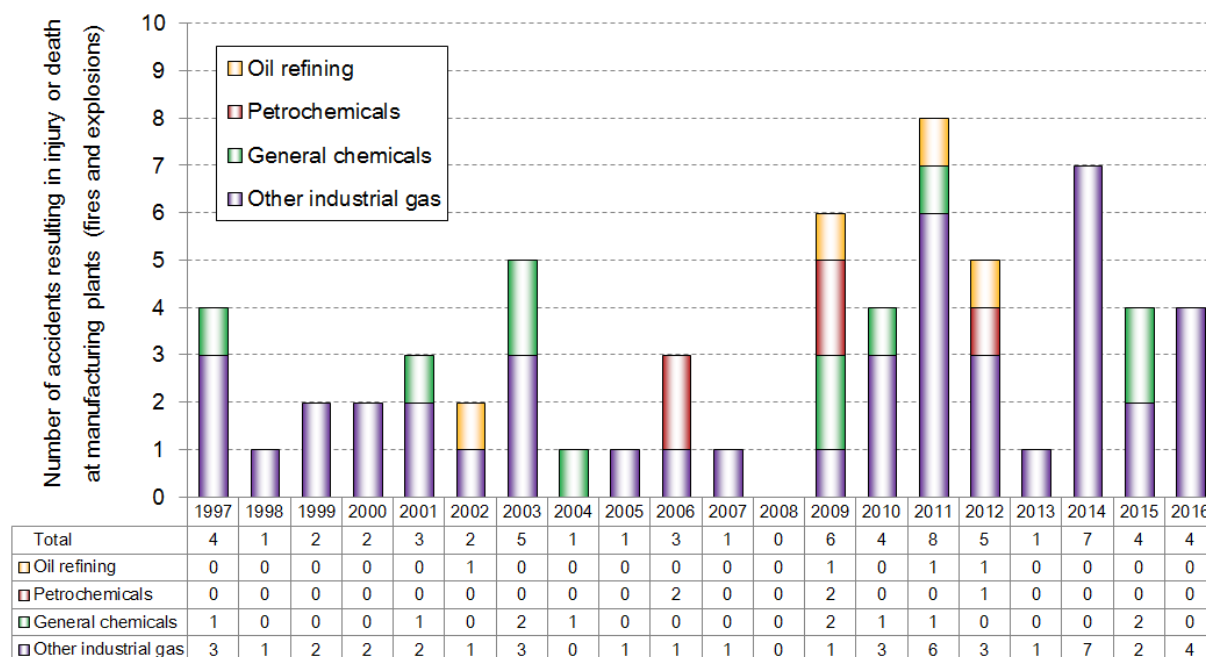


Fig. 4: Change in the numbers of accidents caused by fires and explosions at manufacturing plants for high pressure gas (1997 - 2016)

Fig. 5 shows the change in the numbers of deaths at manufacturing plants for high pressure gas related to accidents caused by fires and explosions. There were four deaths in the 20 years between 1997 and 2016.

By comparison with Fig. 3, we can see that of the accidents resulting in injury or death, which occurred at manufacturing plants for high pressure gas, nine deaths were caused by accidents other than fires or explosions.

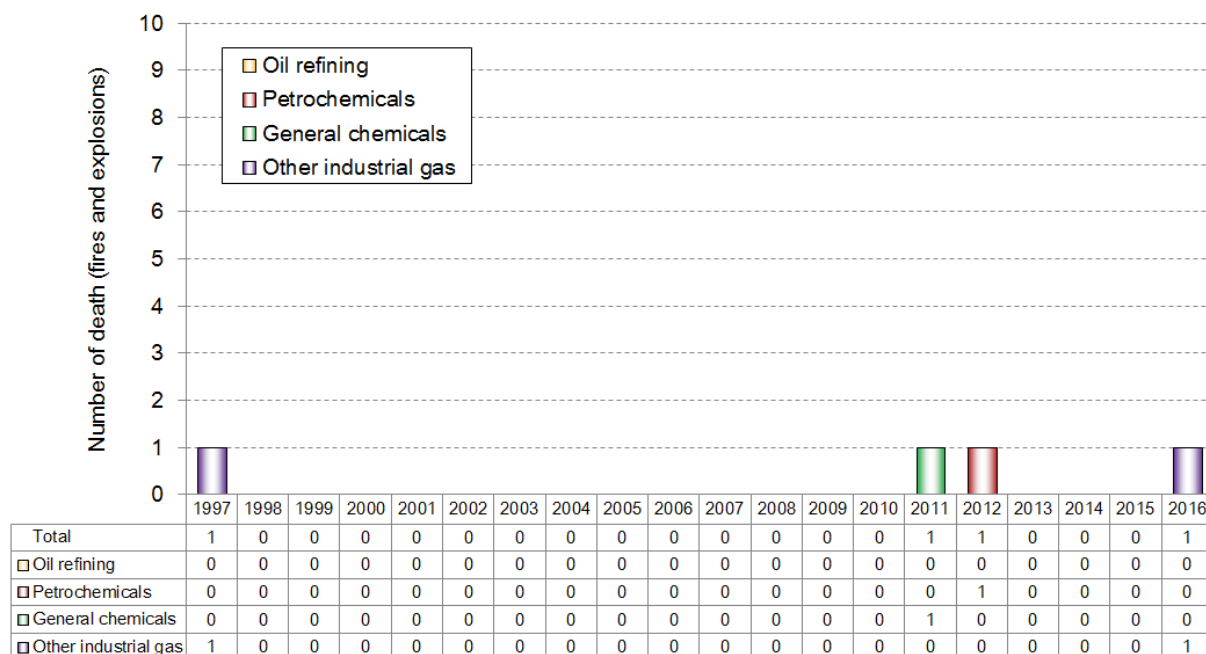


Fig. 5: Change in the numbers of deaths due to accidents caused by fires and explosions at manufacturing plants for high pressure gas (1997 - 2016)

### 4.3 Changes in the numbers of accidents caused by leakages (excluding leakages which led to fires or explosions) and of resulting deaths at manufacturing plants for high pressure gas

Of the accidents resulting in injury or death, which occurred at manufacturing plants for high pressure gas between 1997 and 2016, the change in the number caused only by leakages is shown in Fig. 6. Looked at by industry, many of the accidents resulting in injury or death caused by fires and explosions occurred in the “Other industrial gas” field, a similar trend to that seen in Fig. 2.

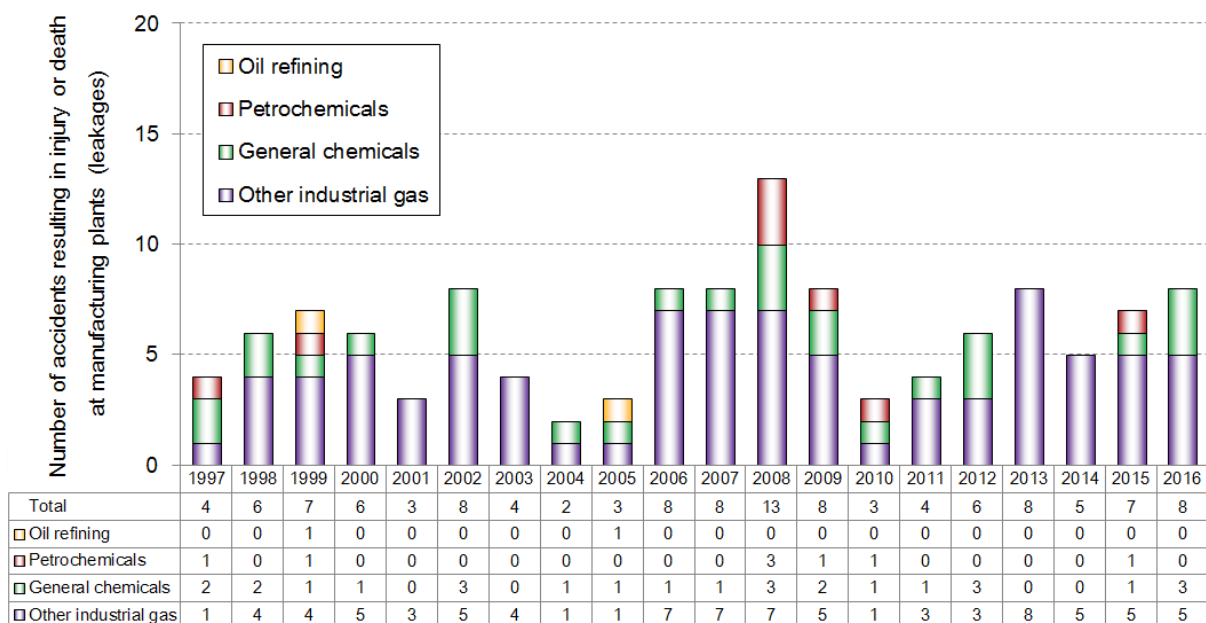


Fig. 6: Change in the numbers of accidents caused by leakages at manufacturing plants for high pressure gas (1997 – 2016)

Fig. 7 shows the change in the numbers of deaths at manufacturing plants for high pressure gas related to accidents caused by leakages. There were five deaths in the 20 years between 1997 and 2016. The main cause of accidents resulting in deaths was leakage of poisonous gases.

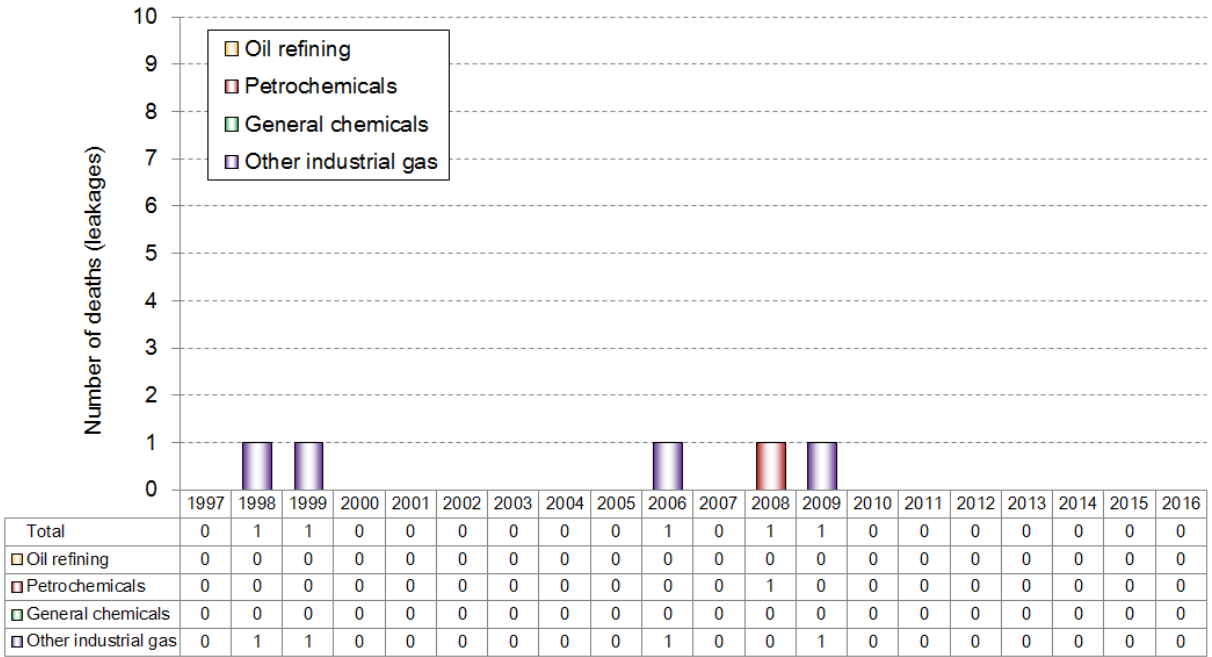


Fig. 7: Change in the numbers of deaths due to accidents caused by leakages at manufacturing plants for high pressure gas (1997 – 2016)

From Figs. 3, 5, and 7, we can see that the greatest number of deaths arose from accidents caused by leakages, followed by fires and explosions. Other causes of accidents resulting in deaths include the bursting of containers and oxygen deficiency during the overhaul inspection of storage tanks.

Contact for inquiries related to this document

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