POSITION PAPER

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Abuse of Gases

The sale of industrial gases to private individuals is not legally restricted. Due to the frequently misunderstood dangers of the misuse of gases, for example when some gases are inhaled, they should not be supplied for unspecified use.

EIGA Members have seen an increase of reports and presentations in television programmes and other media demonstrating different effects of inert gases including helium, nitrous oxide also known as "laughing gas" and sulphur hexafluoride (SF_6). In these cases, the use of the gas can only be described as substance abuse. The media reports generally trivialise the effects of inhaling gases such as helium to achieve a very high-pitched voice. EIGA Members and emergency services are aware of several accidents and fatalities as a result of the abuse of gases.

EIGA strongly disapproves of the use of gases on the human body without medical surveillance and, in particular, the inhalation of any gases, except those when prescribed and used as medicines, or when specifically produced, sold and used for breathing applications such as diving. EIGA recommends that its Members or their National Associations to contact and inform any media or party involved in these presentations.



The intention of this Position Paper is to clarify EIGA's position, explaining the reasons for this, by describing the main hazards involved in the most common abuse of gases such as helium, nitrous oxide and sulphur hexafluoride.

Depending on the gas composition and exposure conditions, inhalation may rapidly lead to unconsciousness, irreversible injury or death. Quite simply, industrial, food and medical gases should never be inhaled unless under medical supervision or when being used by trained professionals or competent sportspersons, for example diving activities.

Main effects of helium (He) and its variant balloon gas on humans:

Helium is a very light, non-flammable, non-toxic, colourless and odour-free gas. It is a completely inert gas and does not react with other substances.

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Helium is abused by inhaling it, to achieve a very high-pitched voice.

Despite the low density of helium, approximately seven times lighter than air, the gas remains in the lungs after it is breathed in.

Inhaled helium can lead to unconsciousness, suffocation and sudden death. The inhaled helium displaces air from the lungs.

WARNING

- Even a few breaths of helium can lead to suffocation and you will not realise you are suffocating;
- Inability to move and limited consciousness occur without warning; and
- Unconsciousness following inhalation of helium can lead to uncontrollable apnoea, and thus to lack of oxygen to the brain and irreversible damage to the central nervous system with lifelong paralysis or even sudden death as a result.

These symptoms are typical of the inhalation or 'sniffing' of all gases and vapours, which prevent or impair the normal breathing air (oxygen) intake.

EIGA strongly recommends the use of warning labels with every helium-filled balloon and with every canister of the gas supplied to members of the public.

Main effects of nitrous oxide, (N_2O, laughing gas) on humans:

Nitrous oxide is an invisible, colourless gas with a slightly sweet smell. It is not flammable but supports combustion. Contact with liquid nitrous oxide can cause frostbite, as the gas is typically supplied in liquid pressurised form in the gas cylinder and when released from the liquid phase cold gas quickly appears.

The media often trivialise the intoxicating effects of the inhalation of nitrous oxide and this in part is due to it being referred to as laughing gas.

The effects of nitrous oxide inhalation start with inhaled concentrations as low as 10%. The effects are to alleviate physical pain and alter perception. At higher concentrations, feelings of euphoria will appear, with increasingly negative side effects such as slurred speech, balance defects, slow reactions (similar to alcoholic intoxication) and insensitivity to physical stimuli up to sudden unconsciousness. These effects are used, under strict medical supervision, in anaesthetics.

However, in non-medical use, the greatest acute dangers of improper use of nitrous oxide are:

- Central Nervous System depression
- Hypoxia due to oxygen displacement
- Cardiorespiratory compromise
- Potentially fatal asphyxia if exposure is prolonged or uncontrolled

The symptoms are as described above for helium

Main effects of sulphur hexafluoride (SF_6) on humans:

Sulphur hexafluoride is a heavy, non-flammable, colourless and odourless gas. Contact with liquid sulphur hexafluoride can cause frostbite, as the gas is supplied in liquid pressurised form in the gas cylinder and when released from the liquid phase cold gas quickly appears.

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Sulphur hexafluoride is abused by inhalation, to achieve a very deep voice.

Because of the high density of sulphur hexafluoride - 5 times heavier than air - the gas is retained in the lower lungs after inhalation. This severely impairs the ability of the lungs to expel the gas during the normal breathing cycle.

Inhaled sulphur hexafluoride can lead to unconsciousness, suffocation and sudden death. The basic lack of oxygen is the real danger.

Main effects of 'Fogging Drinks' and the rapid cooling of drinks on humans

Gas in liquefied or solid form is now being used to create a fogging effect in drinks such as cocktails and to create a rapid cooling effect. Such practices can deliver severe burns to the hands, throat or stomach and should only be used by competent users exercising extreme caution.

- Solid carbon dioxide (CO2), Dry ice:

  Dry ice can be used safely to create a fogging or cooling effect only when securely encased in a specialist compartmentalised glass or in a caged cocktail stick, which prevents ingestion.

- Cryogenic Liquids:

  Cryogenic liquids, such as liquid nitrogen or oxygen, should NEVER be used within a drink, especially at the point of consumption, as the liquid, which is at an extremely low temperature, could be swallowed causing severe internal burns, which could require surgical intervention.

Main effects of misusing solid carbon dioxide, dry ice on humans:

Dry ice can cause cold burns if it comes into direct contact with the skin. An example of the misuse of dry ice is detailed below:

> *"Contestants participating in a challenge on an entertainment show were requested to see how long they could sit on a block of dry ice (as the organisers didn't realise the temperature difference between dry ice (-78 °C) and water ice (0 °C). This challenge went badly wrong leaving contestants with third degree burns and needing skin grafts."*

Main effects of misusing gas pressure to rupture containers or propel objects

Cryogenic liquid or dry ice has been used to rupture containers for entertainment value. This is particularly dangerous as the time to failure is unpredictable and these explosions can, and do, lead to serious injury. Those performing such experiments, who consider themselves as experts, are often the worst offenders. Gases should only ever be stored in the containers in which they were supplied.

The contained pressure in gas cylinders is sometimes misused as a propellant for the purposes of entertainment. Television programmes have been seen to breakoff the valves off cylinders with a hammer or strap cylinders to improvised vehicles to create propulsion. People generally have little understanding of the hazards of releasing contained gas pressure in this way. The pressure in a car tyre can be sufficient to cause death. Gas cylinders typically contain 100 times the pressure energy of a tyre.

Main effects of using liquid nitrogen or liquid carbon dioxide to create 'Fogging' atmospheres

The release of liquid nitrogen or liquid carbon dioxide to produce a large fogging effect, such as on dancefloors in nightclubs, can be extremely hazardous. Unless carried out correctly, these activities can create a significant risk of asphyxiation, which could contravene confined space regulations. There is also a risk of cryogenic burns.

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The use of liquid nitrogen to create fogging effects over swimming pools creates a high risk of asphyxiation to those in, or close to the pool.

Main effects of misusing cryogenic liquids in molecular cooking on humans

The use of cryogenic liquids in food and drink has become increasingly fashionable in recent years and is commonly termed 'Cryo-cooking'. People who have attempted to 'cook' with liquid nitrogen while inadequately trained and poorly equipped have caused serious injuries to themselves and others.

Cryo-cooking can:

- cause burns because of the extreme cold;
- lead to explosions arising from volume changes if the substance is stored inappropriately, such as in a Thermos flask; and
- result in asphyxiation caused by the displacement of oxygen creating a dangerous atmosphere.

Only trained, competent personnel, should have access to and use of cryogenic liquids. When doing so they should only use appropriate equipment and should wear suitable personal protective equipment.

Summary:

Gases are widely used safely throughout industry and leisure and provide an invaluable resource. EIGA provides advice on safety and specific applications on request. People need to understand the properties and hazards of gases they are using and should ensure they are properly trained and use appropriate equipment, including personal protective equipment.

The misuse of gas can result in serious injury including death. Media coverage portraying the abuse of gases as harmless is irresponsible and should consider the potential effects on the general public, both through direct exposure to any hazard and in terms of what they could be indirectly encouraging others to try to replicate without the proper protection and training.

Further information

EIGA Focus Area, *Asphyxiation* www.eiga.eu
EIGA Safety Leaflet SL 01, *Dangers of Asphyxiation* www.eiga.eu
EIGA Doc 44, *Hazards of Oxygen Deficient Atmospheres* www.eiga.eu
EIGA Safety Info 26, *Liquid Nitrogen in Molecular Cooking* www.eiga.eu

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