Sulfur Hexafluoride

Posted by Anonymous on Fri, 2015-02-13 15:17

Sulfur hexafluoride: I require information on availability, safety, cost and suppliers of sulfur hexafluride. I would also appreciate advice from anyone with experience in using and disposal of the gas. Thank you.

Voting:
No votes yet

Year Level:
7
8
9
10
Senior Secondary
Laboratory Technicians:
Laboratory Technicians

Showing 1-1 of 1 Responses

Sulfur Hexafluoride

Submitted by sat on 26 February 2015

Answer reviewed 17 Februray 2022

Sulfur hexafluoride (SF_6) is a colourless, odourless gas, produced from the reaction of sulfur with fluorine gas. It is a chemically inert gas with a density about five times greater than air and is commonly used as an insulator in electricity transmission and distribution equipment. It was even used as a filler for sports shoes and balls.[1]

Sulfur hexafluoride is a very potent greenhouse gas, which does not break down in the atmosphere. It has a very high global warming potential, 23,900 times that of carbon dioxide,[2] due to its low reactivity. The only way to dispose of sulfur hexafluoride is to release it to the atmosphere. As it is a greenhouse gas, emissions are reportable across all industry sectors and the importation of sulfur hexafluoride is subject to licensing and handling requirements.[3] Its cost is quite high, making it prohibitive for most schools.

Using sulfur hexafluoride in schools

This gas has been used in a similar way to helium showing the effect of a high-density gas on the voice. When inhaled, sulfur hexafluoride has the effect of lowering the timbre of the voice, the opposite effect of a gas of low density such as helium. Inhaling sulfur hexafluoride is very dangerous, as the high density of the gas, settling at the lowest point, makes it difficult to expel from the lungs.

Inhaling any inert gas can have serious health consequences and can potentially lead to asphyxiation; please see the references below for more information about the dangers of inhaling industrial gases.[4,5,6]

Recommendations

Taking into consideration the asphyxiation hazard of using sulfur hexafluoride, as well as the environmental concerns, Science ASSIST does not endorse the use of sulfur hexafluoride in schools and recommends that schools **do not** carry out any activities, experiments or demonstrations using sulfur hexafluoride.

Substitution of a safer alternative

A less hazardous and cheaper substitute for sulfur hexafluoride is carbon dioxide. It can be used to demonstrate the properties of a high-density gas. This property of carbon dioxide, which is 1.6 times denser than air, can be demonstrated by floating bubbles on a bed of the gas or by ‘pouring’ the gas from a jug or bucket into a vessel which contains lighted candles of different heights.

It is important to note that dry ice also has associated cryogenic and asphyxiation hazards; please see the Science ASSIST Standard Operating Procedure 'SOP: Handling dry ice'[7] for more information.

Another alternative is to show a *YouTube* video that demonstrates the properties of sulfur hexafluoride. For example, https://youtu.be/DzLX96VWTkc [8] demonstrates the buoyancy of the gas. We advise against promoting videos that encourage the extremely hazardous practice of inhaling this gas.

References

1 Royal Society of Chemistry website. Bennett H., (2019, October 23), '*Magnificent molecules: Sulfur hexafluoride'*. https://edu.rsc.org/magnificent-molecules/sulfur-hexafluoride/4010538.article

2 Forbes website, De La Fuente, D., Meidl, R.A., and Michot Foss, M.,(2021, March 25) '*SF6: The little gas that could make global warming worse'* https://www.forbes.com/sites/thebakersinstitute/2021/03/25/sf6-the-little-gas-that-could-make-global-warming-worse/?sh=3048c86522ad

3 Australian Government, Clean energy regulator (2022, July) *'Reporting hydrofluorocarbons and sulphur hexafluoride gases'* https://cer.gov.au/DocumentAssets/Pages/Reporting-Hydrofluorocarbons-and-Sulphur-Hexafluoride-gases-guideline.aspx

4 Australia New Zealand Industrial Gas Association, Safety Advice No. 22, Version 03 (2022, October) click on '*The Dangers of Industrial Gas Abuse'*, https://www.anziga.org/publications/

5 ELGAS LPG, (2014, November 17), '*Be Gas Wise - Community Service Announcement'*, https://youtu.be/0In9O0CXAFs

6 ELGAS LPG/Blog, (2019, September 25), 'Is inhaling helium dangerous?', https://www.elgas.com.au/blog/1030-helium-balloon-gas-safety-don-t-be-a-daffy-duck/

7 Science ASSIST (2014, May) '*SOP: Handling dry ice',* Retrieved from the Science ASSIST website: https://assist.asta.edu.au/resource/657/sop-handling-dry-ice

8 Woodburyadpost, YouTube video (2007, January 17), '*Invisible water floating foil boat – actually a dense gas called sulfur hexafluoride',* https://youtu.be/DzLX96VWTkc

---