

Dear Reviewer,

Thank you for your valuable suggestions. We have addressed each of your points in our response and made the necessary revisions accordingly.

Comments and Suggestions for Authors

In the paper, CFD was used to study the influence of temperature and humidity on the release and dispersion of hydrogen fluoride gas. It is a well-written paper, but the novelty of this paper is not clearly defined in the introduction. The novel elements of the research should be described in more detail in the introduction. In addition, several aspects should be corrected in the major revision of the manuscript:

1. Some additional comments on the 12 deaths in Weifang, Shandong, Rugao, Jiangsu, Ganzhou, Jiangxi, Guiyang, Guizhou, and Nantong, Jiangsu, which should be briefly described (see the Introduction).

Answer: ✓ corrected. Thank you for your valuable suggestion. In January 2016, there was a HF leakage accident at the Tetrafluorobenzyl alcohol workshop of Shandong Weifang Changxing Chemical Co., Ltd., resulting in 3 deaths and 1 injury; in December 2018, there was a HF leakage accident at the Fluoropyrimidine synthesis workshop of Zhongchang Chemical Co., Ltd. in Rugao City, resulting in 3 deaths and 1 injury; in January 2020, there was a HF leakage accident at Jiangxi Shilei Fluorine Chemical Co., Ltd., resulting in 3 deaths and 1 injury; in August 2020, there was a HF leakage accident at Guiyang Wengfu Kaiphos Fluorosilicon New Materials Co., Ltd., resulting in 2 deaths; in December 2020, there was an anhydrous HF leakage accident at the Lithium Hexafluorophosphate production workshop of Houcheng Technology (Nantong) Co., Ltd., resulting in 1 death. The above-mentioned additional details have been incorporated into the introduction of the newly submitted manuscript, which can be found at line 42-51 of the manuscript.

2. What do you mean by "CFD simulation combined with Latin hypercube sampling statistical techniques to study the leakage and diffusion conditions of flammable gases under various circumstances"? (Lines 95-96)

Answer: Thank you for your valuable suggestion. The study "CFD Simulation Combined with Latin Hypercube Sampling Statistical Technique for Investigating the Dispersion of Combustible Gases under Various Conditions" comes from reference [23]. Souza et al. employed a validated CFD model to verify the correlation between variables and to provide a reliable equation for the expansion of explosive atmospheres. They utilized an experimentally validated CFD model and parameterized it through multidimensional sampling using Latin hypercube sampling statistical technique to analyze the likelihood of extensive gas leaks. Latin hypercube sampling is a statistical method for generating near-random samples of input parameter values from multidimensional distributions. The basic idea is to randomly select a sample point in each region. A Latin hypercube is a generalization of the

Latin square, containing a square grid of sample locations where each row and column has only one sample, extending to any number of dimensions, forming a hypercube. In this hypercube, each sample is uniquely contained in each axial hyperplane. Latin hypercube sampling is a widely used method for generating controlled random samples.

3. How was the leakage rate experimental group selected with conditions of 2.5, 7.5, and 12.5 L/min?

Answer: The research object selected for this study is a hydrogen fluoride production line in an industrial park in Quzhou City, Zhejiang Province, China. Historically, there has been one HF leakage incident. After the incident, it was inferred that the leakage rate ranged from 2.5 L/min to 12.5 L/min. Therefore, these three leakage rates were chosen as the experimental groups for this study.

4. The quality of Figure 1 is unacceptable.

Answer: ✓ corrected. Thank you for your valuable suggestion. The quality of Figure 1(c) has been optimized.

4. Fig.4 needs additional comments in the M&M part.

Answer: ✓ corrected. Thank you for your valuable suggestion. The supplementary annotations for the M&M section of Figure 4 have been added to the new submitted manuscript, located specifically at line 255-264.

5. Three-dimensional concentration distribution of HF for complex scenes should be explained in more detail in the Results and Discussion section. At present, it is described too laconically.

Answer: ✓ corrected. Thank you for your valuable suggestion. A more detailed analysis and description of the three-dimensional concentration distribution of HF in complex scenarios have been supplemented in the main text. You can find it at line 322-331 & line 390-395.

6. SI units should be used throughout the manuscript. For example, temperature is currently presented in both °C and K, but should be presented in K only.

Answer: ✓ corrected. Thank you for your valuable suggestion. The temperature units in this paper have been standardized to the International System of Units, with the unit being Kelvin (K).

7. Please avoid lump citations. For example, after a very general sentence stating that hydrogen fluoride gas could cause serious harm to human health and the environment, you cited 5 references. When you cite these references, you should mention in one or two words why you cite these papers. Without this explanation, such a citation is meaningless.

If released into the atmosphere, it can cause severe harm to human health, the environment, and infrastructure [1-5].

Answer: ✓ corrected. Thank you for your valuable suggestion. The reasons for citing the referenced literature have been explained in the newly submitted manuscript, located specifically at line 35-38.