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Hydrochloric acid and ammonia reaction: Hi, could you please advise me about a demo of HCl and NH<sub>4</sub>OH fumes mixing? Is it safe enough to put 30 ml (or less?) of each into separate petri dishes in the fume hood? Can the fume hood be turned off for 10 seconds for better visibility of the NH<sub>4</sub>Cl and then turned back on again?

#### Voting:



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**Publication Date:** 26 August 2016

**Asked By:** Anonymous

Tags

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## HCl + NH<sub>4</sub>OH Reaction

Submitted by [Science ASSIST ...](#) on Wed, 2016-08-31 13:13

Expert Answer

Answer reviewed 21 February 2023

We understand that you are trying to demonstrate the diffusion of the two gases, which react when they come together to form solid ammonium chloride. The concentrated solutions of HCl and NH<sub>4</sub>OH are both corrosive and should be handled in an operating fume cupboard.

Many models of fume cupboards have a purge system that keeps the fan running after it has been switched off to allow any residual hazardous vapours/fumes in the cupboard to be removed. Therefore, it may not be possible to turn off the fume cupboard for 10 seconds. In addition, we are not sure for your procedure whether 10 seconds would be sufficient time to see the reaction, even if you were able to turn off the fan in the fume cupboard.

### Alternate method

We recommend an alternative way of demonstrating this reaction see: 'Diffusion of gases - ammonia and hydrogen chloride'<sup>1</sup>

This method also clearly demonstrates the different rates of diffusion of the two gases. While wearing PPE (laboratory coat, closed-in shoes, safety glasses and nitrile gloves) the demonstration should be performed in a working fume cupboard as the concentrated hydrochloric acid<sup>2</sup> and ammonia solution<sup>3</sup> are extremely corrosive and have strong pungent odours.

You could connect an iPad to a projector to project the experiment onto a screen so that the students can clearly see the reaction. If you also video the experiment then the teacher can demonstrate what is happening in greater detail.

Cleaning up should be conducted in the fume cupboard: the cotton buds/balls can be placed in a beaker of water to dilute the reagents before disposal and the tube can be rinsed using water.

### Reference

<sup>1</sup> Royal Society of Chemistry (nd) 'Diffusion of gases - ammonia and hydrogen chloride', Retrieved (21 February 2023) from the Royal Society of Chemistry website. <https://edu.rsc.org/experiments/diffusion-of-gases-ammonia-and-hydrogen-...>

<sup>2</sup> Chem-Supply. (2022) *Hydrogen chloric acid 32%*, Safety Data Sheet. Search <https://shop.chemsupply.com.au/> to source the latest Safety Data Sheet via the product information page.

<sup>3</sup> Chem-Supply. (2019) *Ammonia solution 10-32%*, Safety Data Sheet. Search <https://shop.chemsupply.com.au/> to source the latest Safety Data Sheet via the product information page.

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