Mixing bleach and ammonia is extremely dangerous, since toxic vapors will be produced. The [primary toxic chemical](http://chemistry.about.com/od/toxicchemicals/f/What-Is-A-Toxic-Chemical.htm) formed by the reaction is chloramine vapor, with a potential for hydrazine formation. Here's a [look at the chemical reactions](http://chemistry.about.com/od/chemicalreactions/f/What-Is-A-Chemical-Reaction.htm) involved [in mixing bleach](http://chemistry.about.com/od/toxicchemicals/a/Mixing-Bleach-And-Vinegar.htm) and ammonia, as well as some first aid advice if you accidentally become exposed to a bleach and ammonia mixture.

**Chemicals Produced From Mixing Bleach and Ammonia**

Note that each and every one of these chemicals is toxic, except for the water, oxygen and salt.

* + NH3 = ammonia
  + HCl = hydrochloric acid
  + NaOCl = sodium hypochlorite (bleach)
  + Cl = chlorine
  + Cl2 = chlorine gas
  + NH2Cl = chloramine
  + NH4Cl = ammonium chloride
  + N2H4 = hydrazine
  + HOCl = hydrogen hypochlorite
  + NaCl [= sodium chloride](http://chemistry.about.com/od/moleculescompounds/a/Sodium-Versus-Salt.htm) or salt
  + O2 = oxygen gas
  + H2O = water

### Likely Chemical Reactions from Mixing Bleach and Ammonia

The bleach decomposes to [form hydrochloric acid](http://chemistry.about.com/od/acidsbases/ig/Acids---Structures/Hydrochloric-Acid.-Qsg.htm), which reacts with ammonia to form toxic chloramine fumes:

First the hydrochloric acid is formed in a two-step process, the first of which is the following balanced equation:

**NaOCl + H2O → NaOH + HOCl**

1. If 10.00g of sodium hypochlorite reacts with a sufficient amount of hydrochloric acid, how many grams of each product is produced?

A. NaOH

B. HOCl

The second step is the following UNBALANCED equation:

**HOCl → HCl + O2**

2. If 20.00g of HCl is produced, how many grams of HOCl was decomposed?

Then the sodium hypochlorite reacts with the hydrochloric acid to form chlorine gas, sodium chloride and water in the following UNBALANCED equation:

**NaOCl + HCl → Cl2 + NaCl + H2O**

3. If 30.00g of NaOCl is reacted, how many grams of each product is produced?

A. Cl2

B. NaCl

C. H2O

And then the ammonia [and chlorine gas](http://chemistry.about.com/od/imagesclipartstructures/ig/Chemical-Weapons/Chlorine-Gas.htm) react to form chloramine, which is released as a vapor in the following UNBALANCED equation:

**NH3(g) + Cl2(g) → NH2Cl(g) + NH4Cl(s)**

4. 40.00g of chloramine is synthesized, how many grams of each reactant was reacted?

A. NH3

B. Cl2

If ammonia is present in excess (which it may or may not be, depending on your mixture), toxic and potentially explosive liquid hydrazine may be formed. While impure hydrazine tends not to explode, it's still toxic, plus it can boil and spray hot toxic liquid.

NH3 + NaOCl → N2H4 + NaCl + H2O

(UNBALANCED equation)

5. If 50.00g of sodium chloride is produced, how many grams of each reactant is reacted?

A.

B.

### What to Do If You Mix Bleach and Ammonia - First Aid

If you do accidentally become exposed to fumes from mixing bleach and ammonia, immediately remove yourself from the vicinity to fresh air and seek emergency medical attention. The vapors can attack your eyes and mucous membranes, but the biggest threat comes from inhaling the gases.

1. Get away from the site where the chemicals were mixed. You can't call for help if you are overwhelmed by the fumes.

1. Call 911 for emergency help. If you really don't think it's that bad, then at least call Poison Control for advice on handling the after-effects of exposure and cleaning up the chemicals. The number for Poison Control is:1-800-222-1222

1. If you find someone who you think has mixed bleach and ammonia, chances are he or she will be unconscious. If you can, remove the person to fresh air, preferably outdoors. Call 911 for emergency assistance. Do not hang up until instructed to do so.

1. Thoroughly ventilate the area before returning to dispose of the liquid. Seek specific instructions from Poison Control so that you don't hurt yourself. You're most likely to make this mistake in a bathroom or kitchen, so leave and seek assistance, return later to open a window, allow time for the fumes to dissipate, and then go back to clean up. Dilute the chemical mixture with plenty of water. Wear gloves, just as you would for either bleach or ammonia.