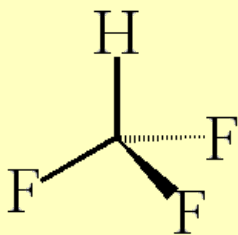
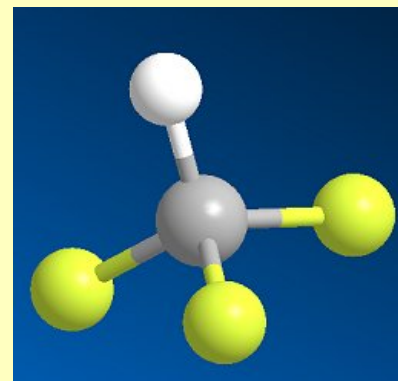


# Fluoroform, CHF<sub>3</sub>



**It's not the same as chloroform!**

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Molecule of the Month January 2013

Also available: [JSMol](#) version.

## Sounds just like chloroform?

Exactly, simply replace Cl with F. In fact it is similar to the other CHX<sub>3</sub> molecules (X = halogen), the melting and boiling points just increase as the molecules get heavier, with more electrons, and Van der Waals' forces become stronger.

	<b>CHF<sub>3</sub></b>	<b>CHCl<sub>3</sub></b>	<b>CHBr<sub>3</sub></b>	<b>CHI<sub>3</sub></b>
Appearance (298 K)	Colourless gas	Colourless liquid	v. pale yellow liquid	v. pale yellow liquid
m.p. (°C)	-163	-63.2	9	119.2
b.p. (°C)	-82.1	61.3	150-3-151.2	-

## So it is an anaesthetic too?

Not that I know of, it is mainly used in the semiconductor industry, for plasma etching of silicon dioxide or silicon nitride. It has been used to put out fires because it is unreactive, not toxic and, for a gas, has a high density. It is also used in refrigerating systems, not least in car air-conditioning.

## Sounds like it has found its niche.

Quite so, but there are problems with it.



## Ozone layer depleting?

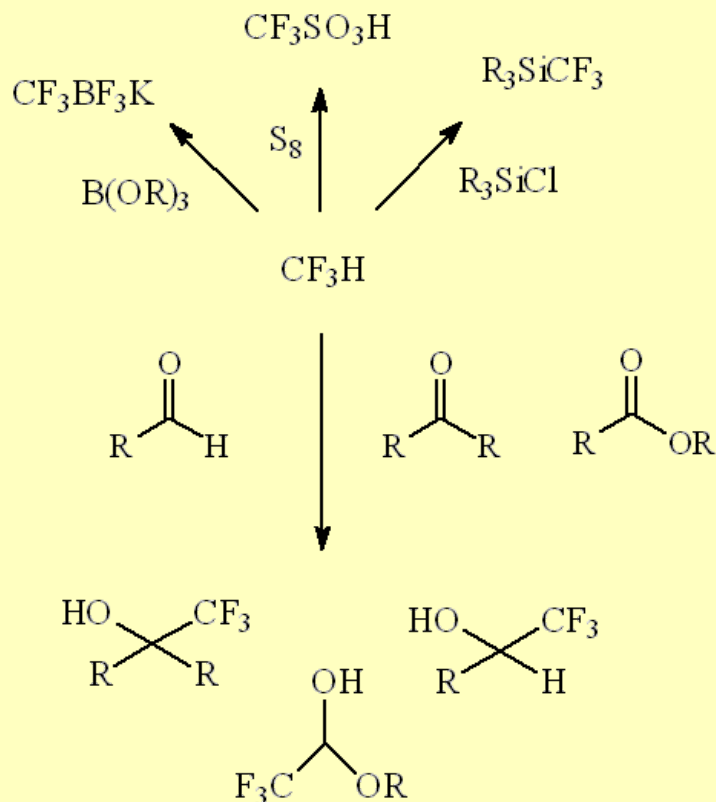
No, it is far too stable for that - and there are no Cl atoms to release. It's the stability that is its downfall, as it has a lifetime in the atmosphere of around 270 years and is a greenhouse gas (HFC-23) with 11700 times the power of CO<sub>2</sub>. Add to that the fact that it is produced industrially in large quantities as a by-product in the manufacture of chemicals like [Teflon](#), and there's a problem, not least because it's hard to decompose.

## So what can be done with fluoroform?

Because it is so unreactive, chemists have found it hard to create uses for it, but lately some more possibilities have opened up. A lot of modern medicinal molecules contain fluorine atoms or even CF<sub>3</sub> groups, notably [Prozac](#).

Anionic alkoxycuprates M[Cu(OBu<sup>t</sup>)<sub>2</sub>] (M = Na, K) react with CHF<sub>3</sub> forming CuCF<sub>3</sub> derivatives, which efficiently trifluoromethylate a whole range of electrophiles (both organic and inorganic).





## Bibliography

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