



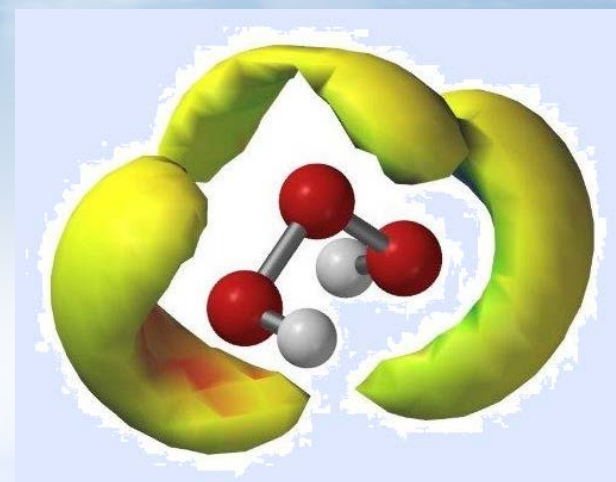
Univerza v Ljubljani
Fakulteta za kemijo in kemijsko tehnologijo

Najnovejša spoznanja na področju kemije vodikovega trioksida (HOOOH)

Janez Cerkovnik in Božo Plesničar

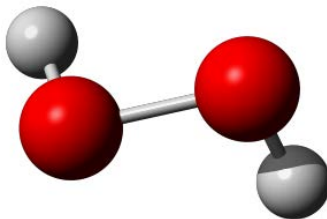
Fakulteta za kemijo in kemijsko tehnologijo, Univerza v Ljubljani

Chemical Reviews, **2013**, 113, 7930-7951

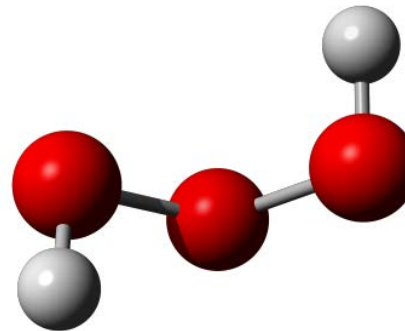




HOH



HOOH



HOOOH

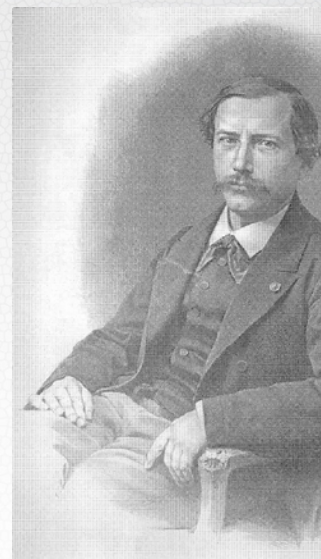
- Pogled v zgodovino
- Kako pripravimo HOOOH?
- Identifikacija, karakterizacija in lastnosti HOOOH
- Pogled v prihodnost ...



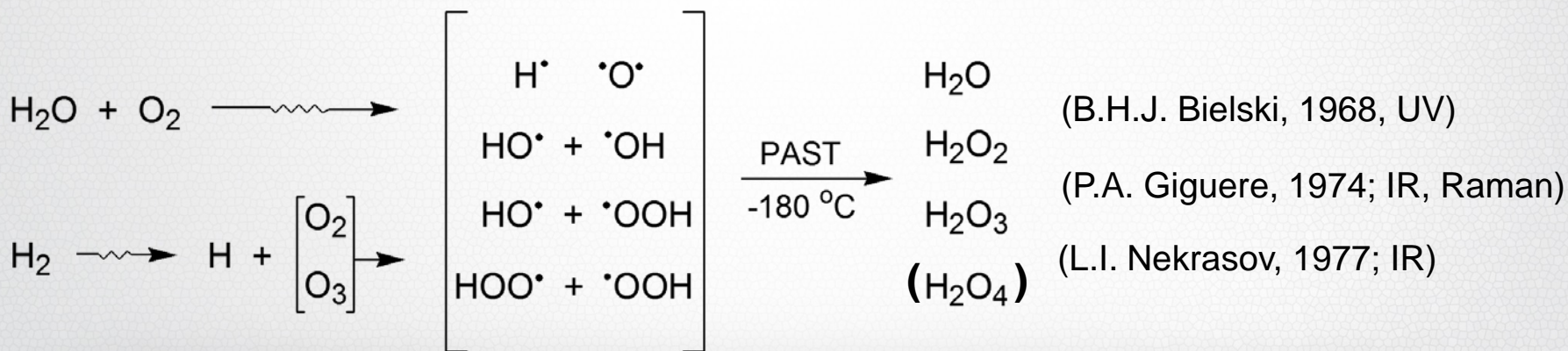
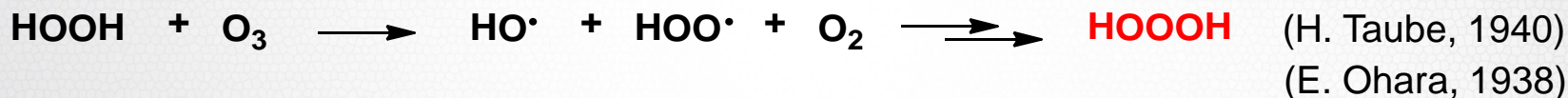
Prve omembe vodikovega trioksida:

D. I. Mendeljeev (1872)

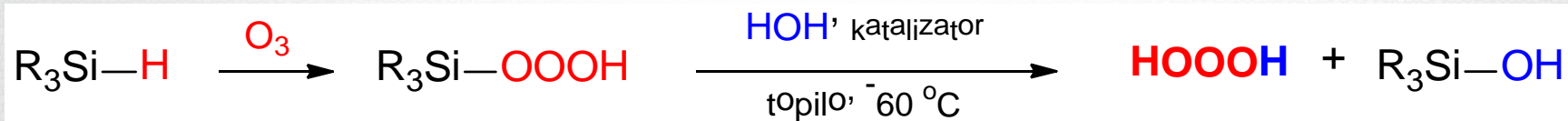
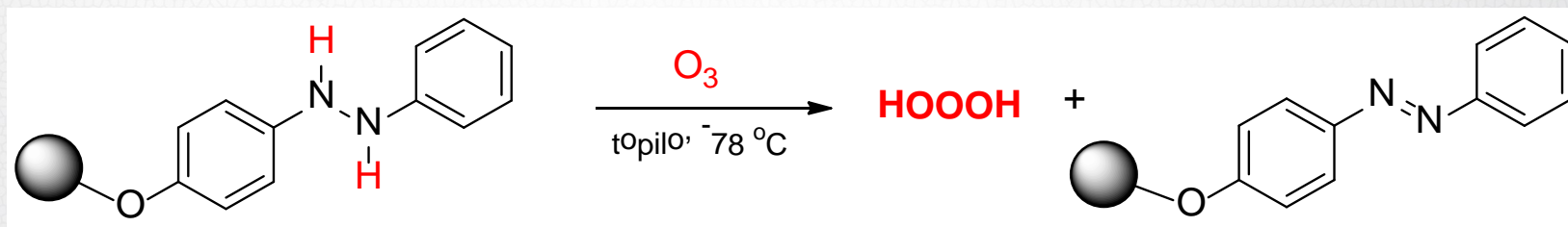
M. Berthelot (1880)



Prvi poskusi priprave vodikovega trioksida:



Novejši načini priprave HOOH



Reakcije, ki vključujejo nastanek HOOOH



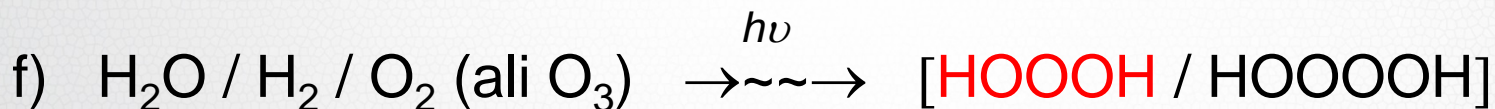
(*Science* 2002, *PNAS* 2002, *ACIE* 2004, *JACS* 2004)



(*Science* 2001, 2002, *PNAS* 2003)



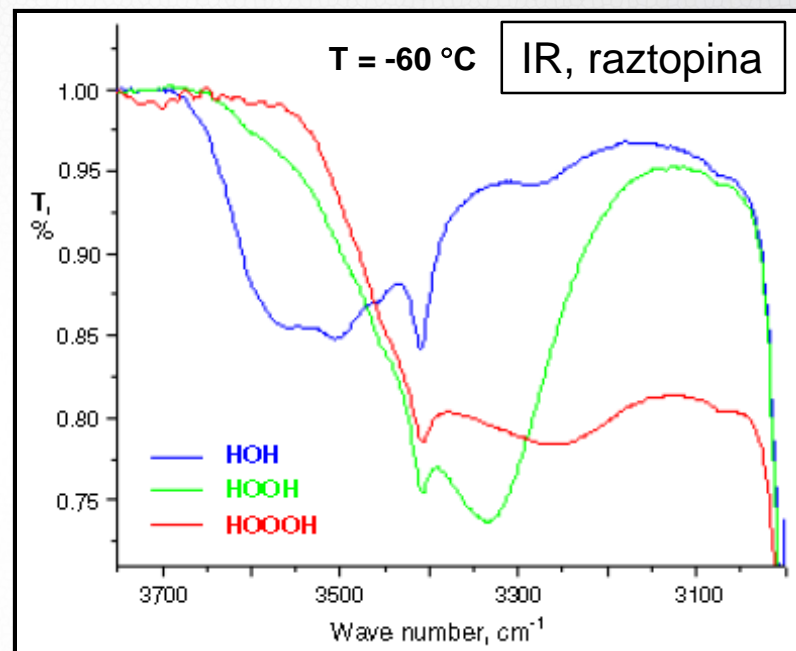
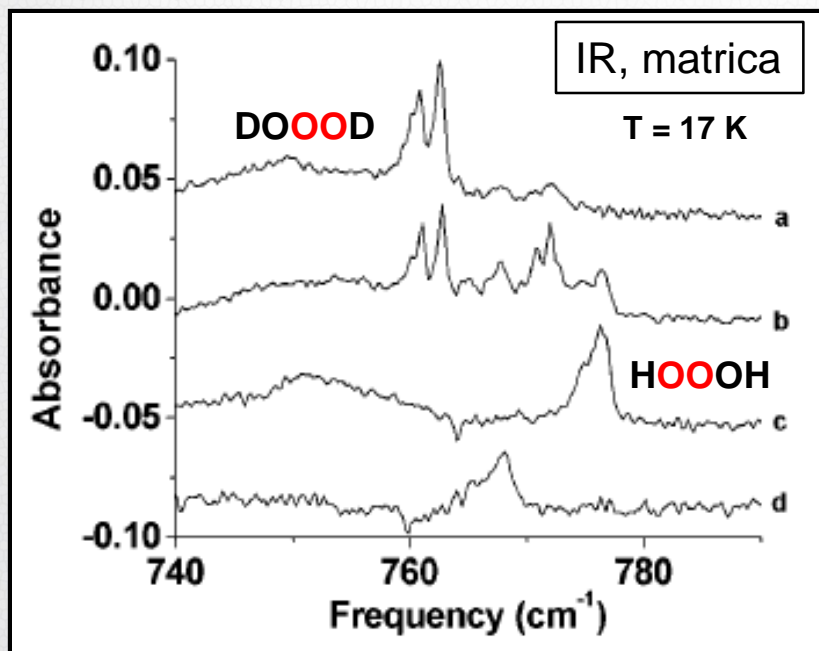
(*Chem. Lett.* 2009, *PCCP* 2014)



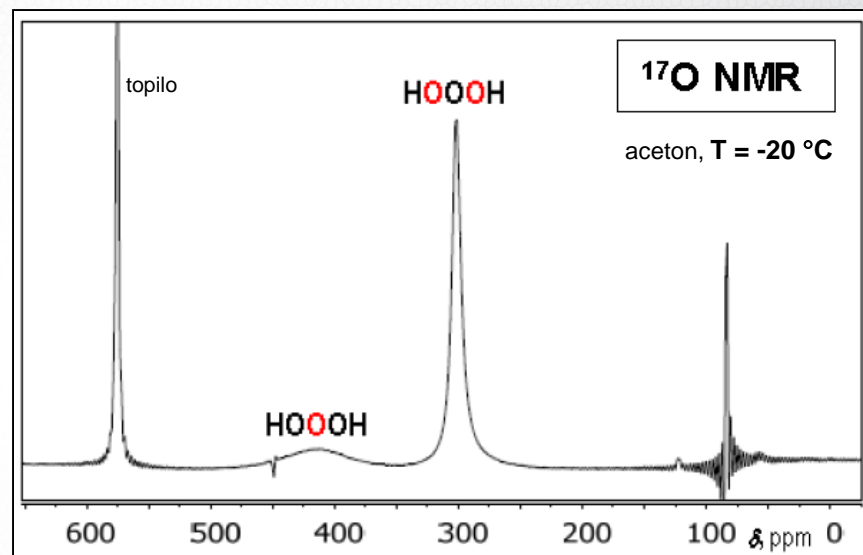
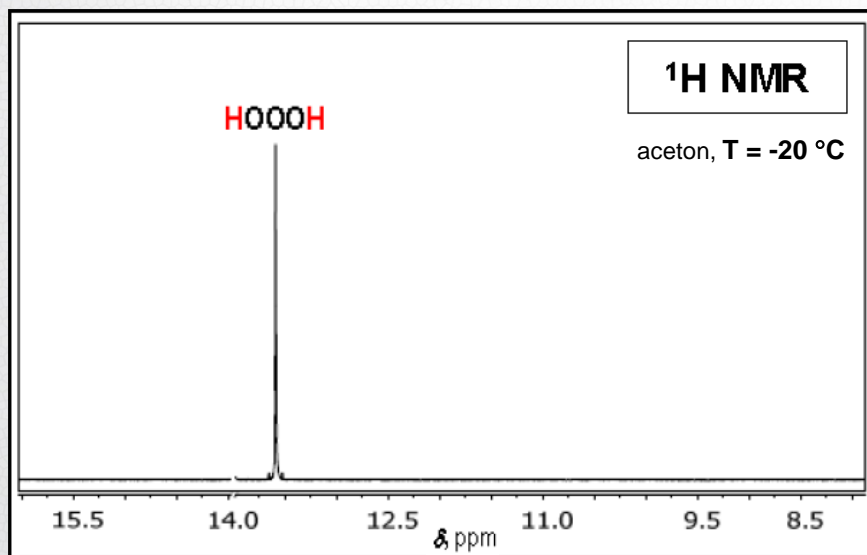
(*EJIC* 2011, *JPC-A* 2014, *Chem. Phys.* 2014)



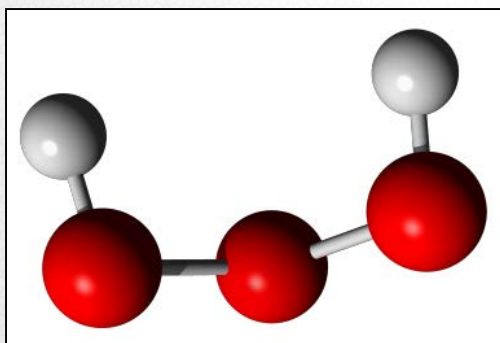
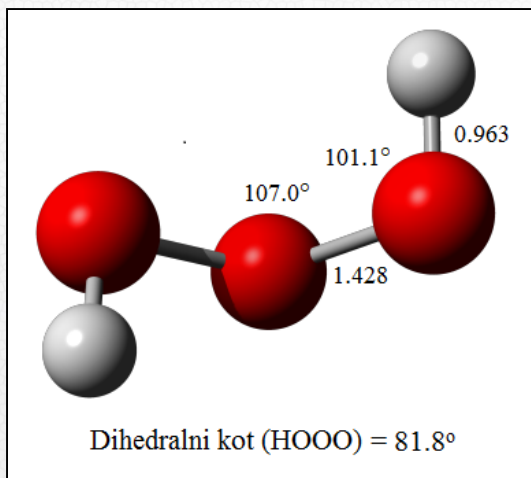
IR spektroskopska indentifikacija HOOOH



NMR spektroskopska indentifikacija HOOOH



Mikrovalovna spektroskopska karakterizacija in teoretični izračuni

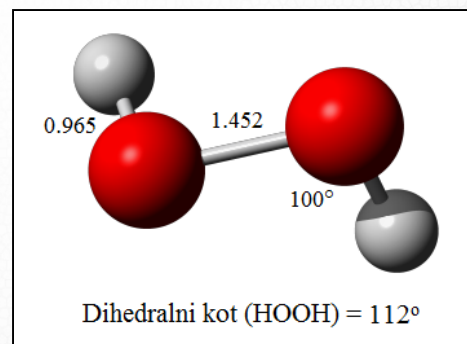


Dipolni moment, μ (D)

HOOOH 1.0 ± 0.1

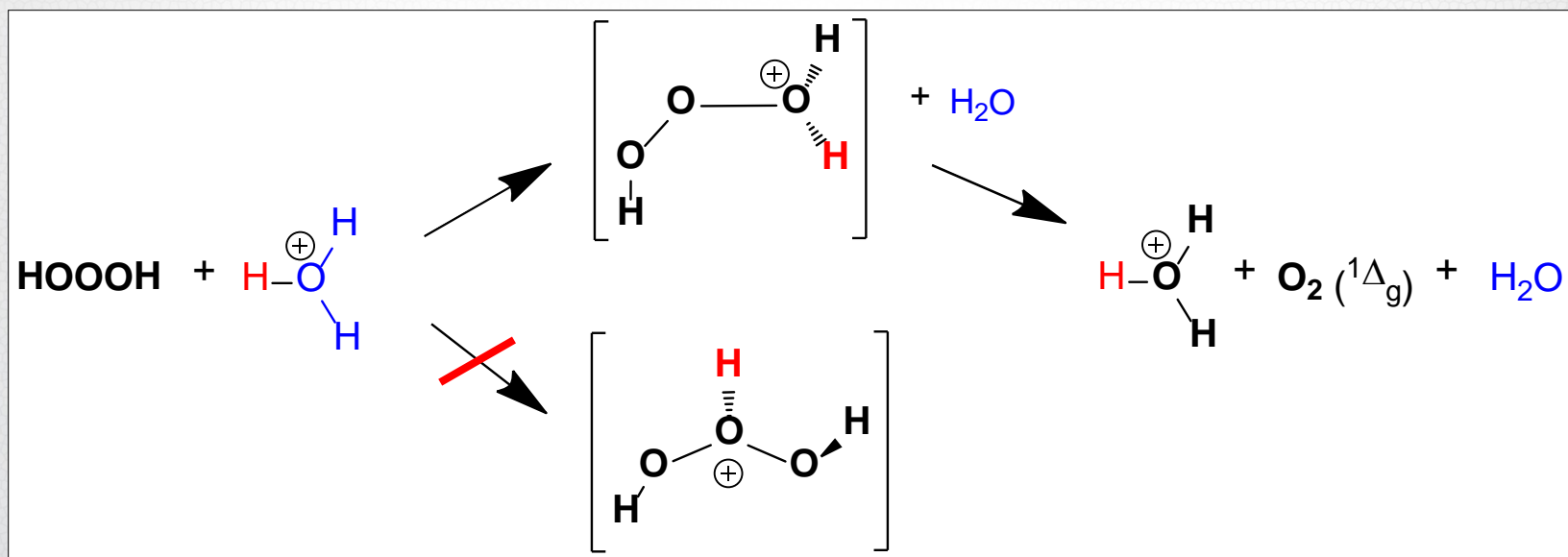
HOOH 1.572

HOH 1.847



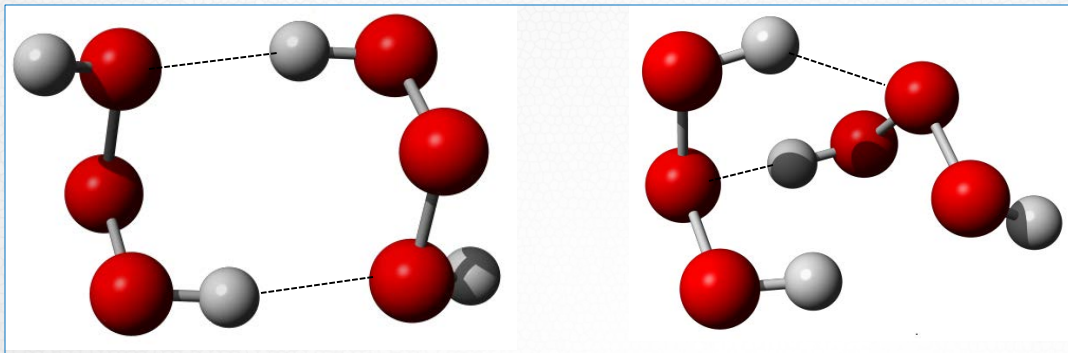
Kislost in bazičnost HOOOH

	pK_a
HOOOH	9.5 ± 0.5
HOOH	11.6
HOH	15.7

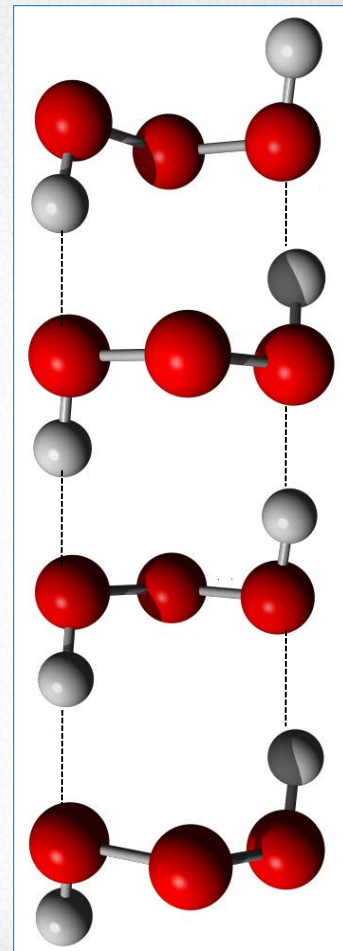


Agregati HOOOH

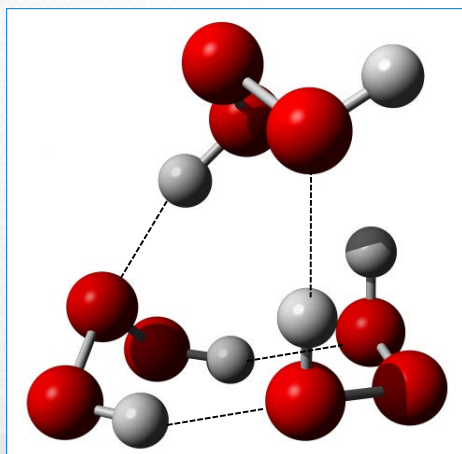
$(\text{HOOOH})_2$



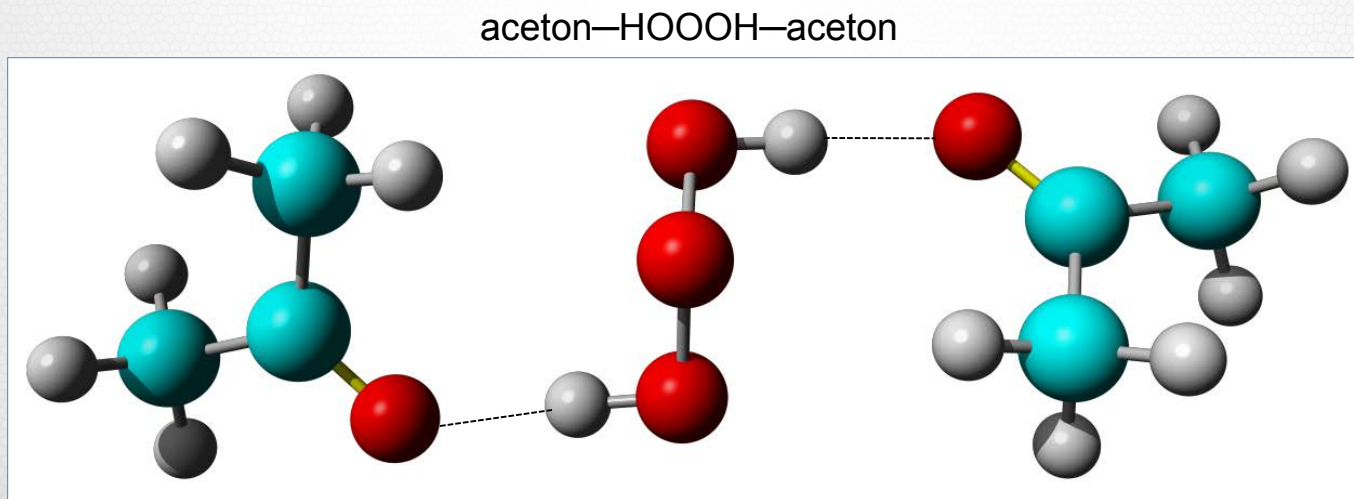
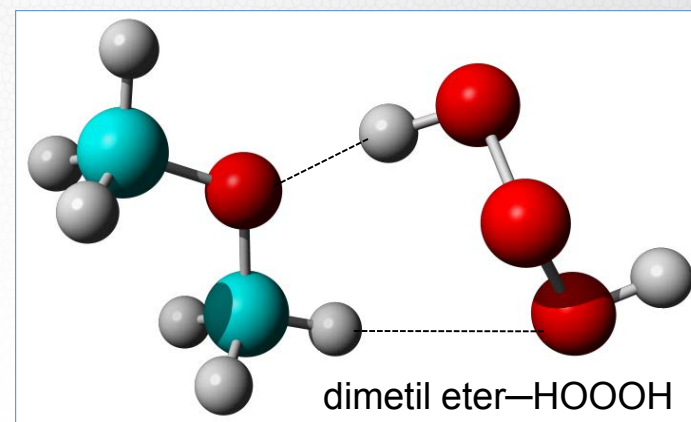
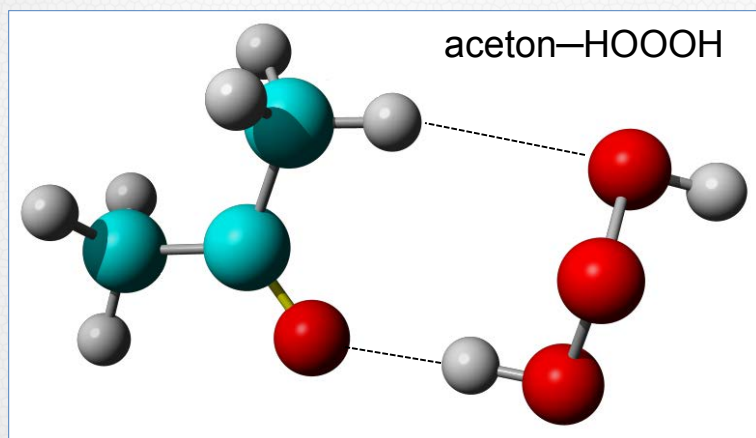
$(\text{HOOOH})_4$



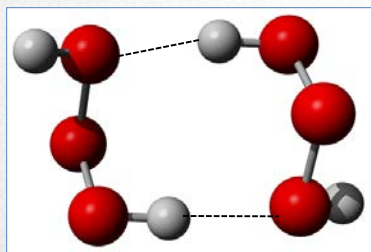
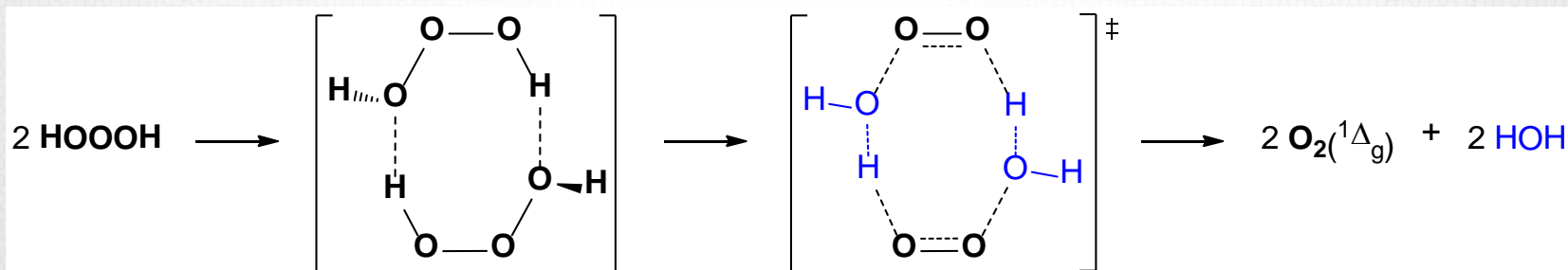
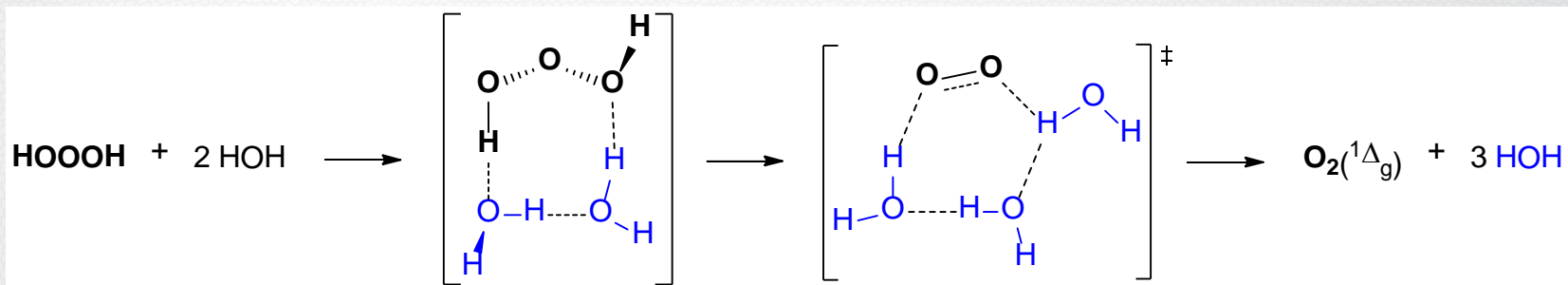
$(\text{HOOOH})_3$



Kompleksi HOOOH s topili



Razpad HOOOH



Razpolovni čas (20 °C):
 aceton....16 min
 voda....20 ms



Pogled v prihodnost

- Priprava in študij čistih raztopin HOOOH.
- Kristalizacija kompleksov HOOOH s (kisikovimi) bazami in rentgenska strukturna analiza.
- Selektivne oksidacije s HOOOH pri nizkih temperaturah.
- Priprava specifičnih molekul (markerjev) za detekcijo HOOOH in ozona v bioloških sistemih in v atmosferi.
- Načrtovanje katalizatorjev za učinkovito oksidacijo vode s singletnim kisikom do HOOOH.
- Raziskave reakcij HOOOH z ozonom, singletnim kisikom in drugimi reaktivnimi kisikovimi zvrstmi, ki sodelujejo pri atmosferskih, okoljskih in bioloških procesih.



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