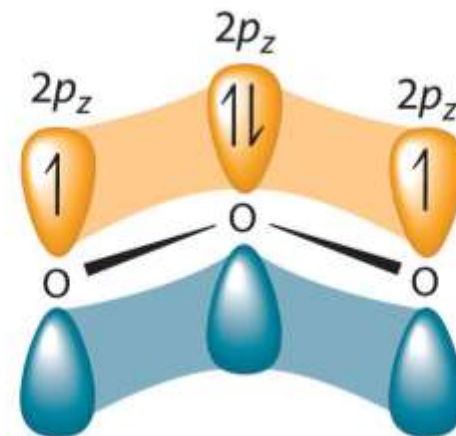
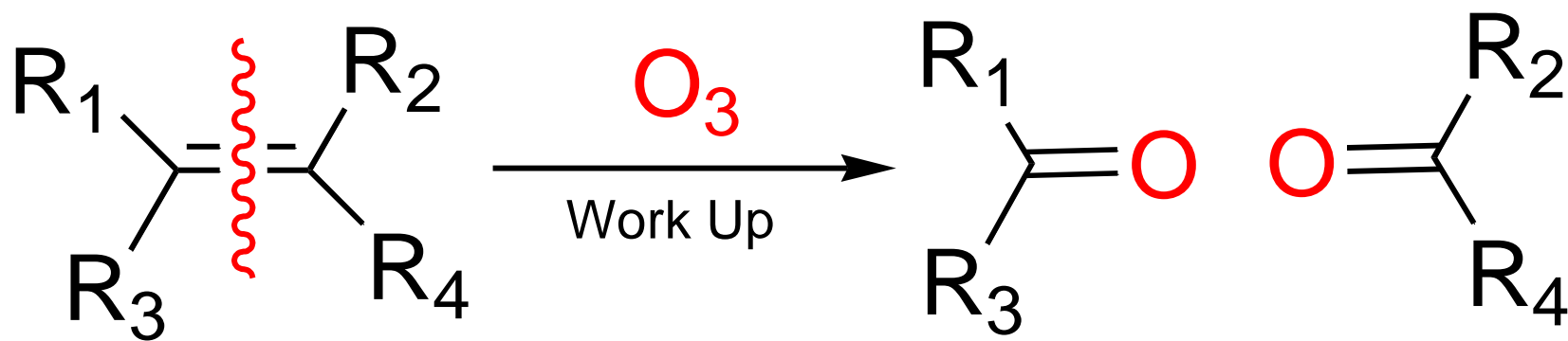


OZONOLYSIS

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Oxidative cleavage of carbon-carbon double bond using ozone as an oxidizing agent is called Ozonolysis.



The reaction is performed in common organic solvents such as Dichloromethane (or) Methanol (or) Acetone at $-78^\circ C$.

Ozonolysis of carbon-carbon double takes place through ozonide intermediate followed by work up results in the formation of respective products.

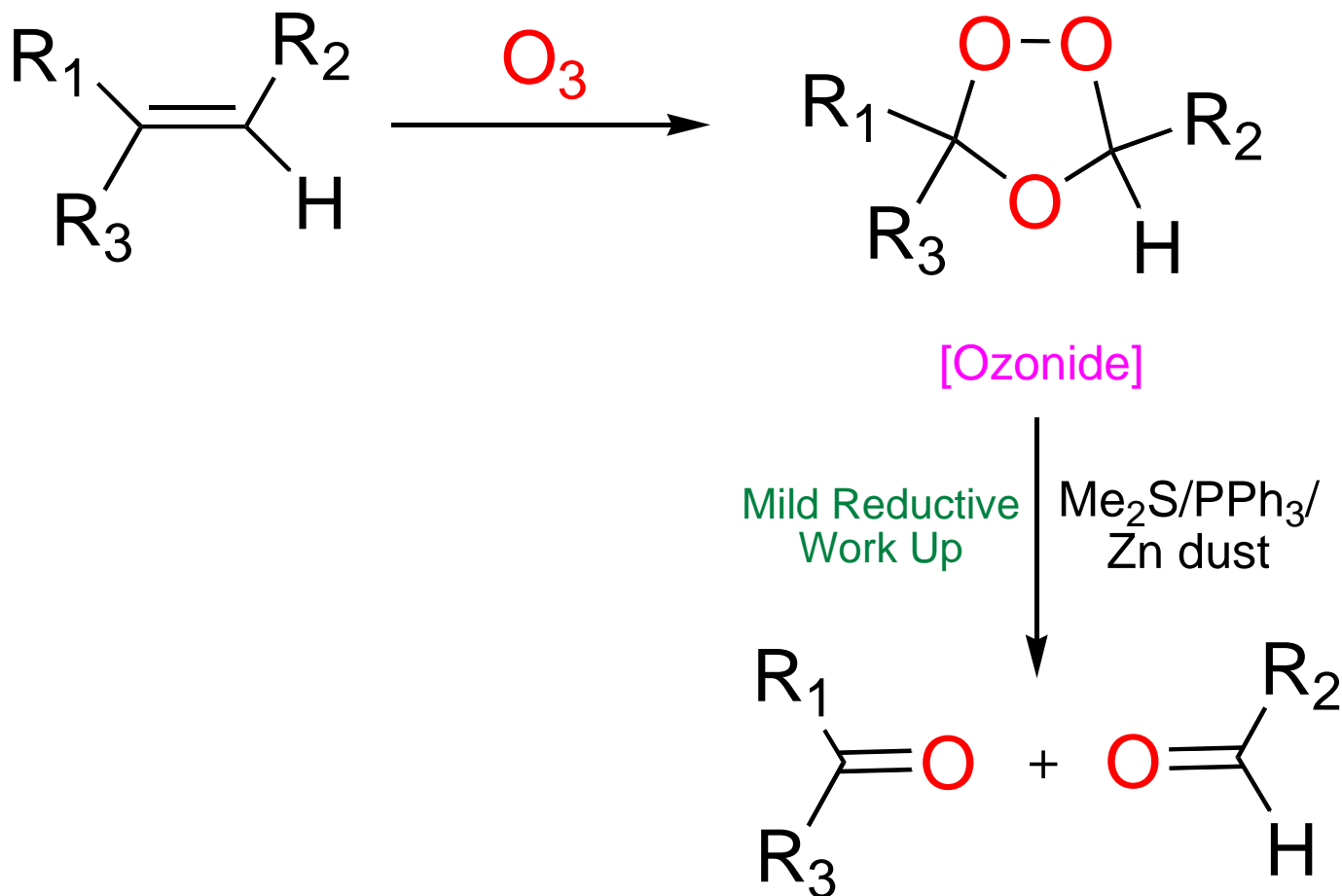
Work up in the ozonolysis may be divided into three categories.

(1) Reductive work up using mild reducing agents such as Me_2S (or) PPh_3 (or) Zn dust.

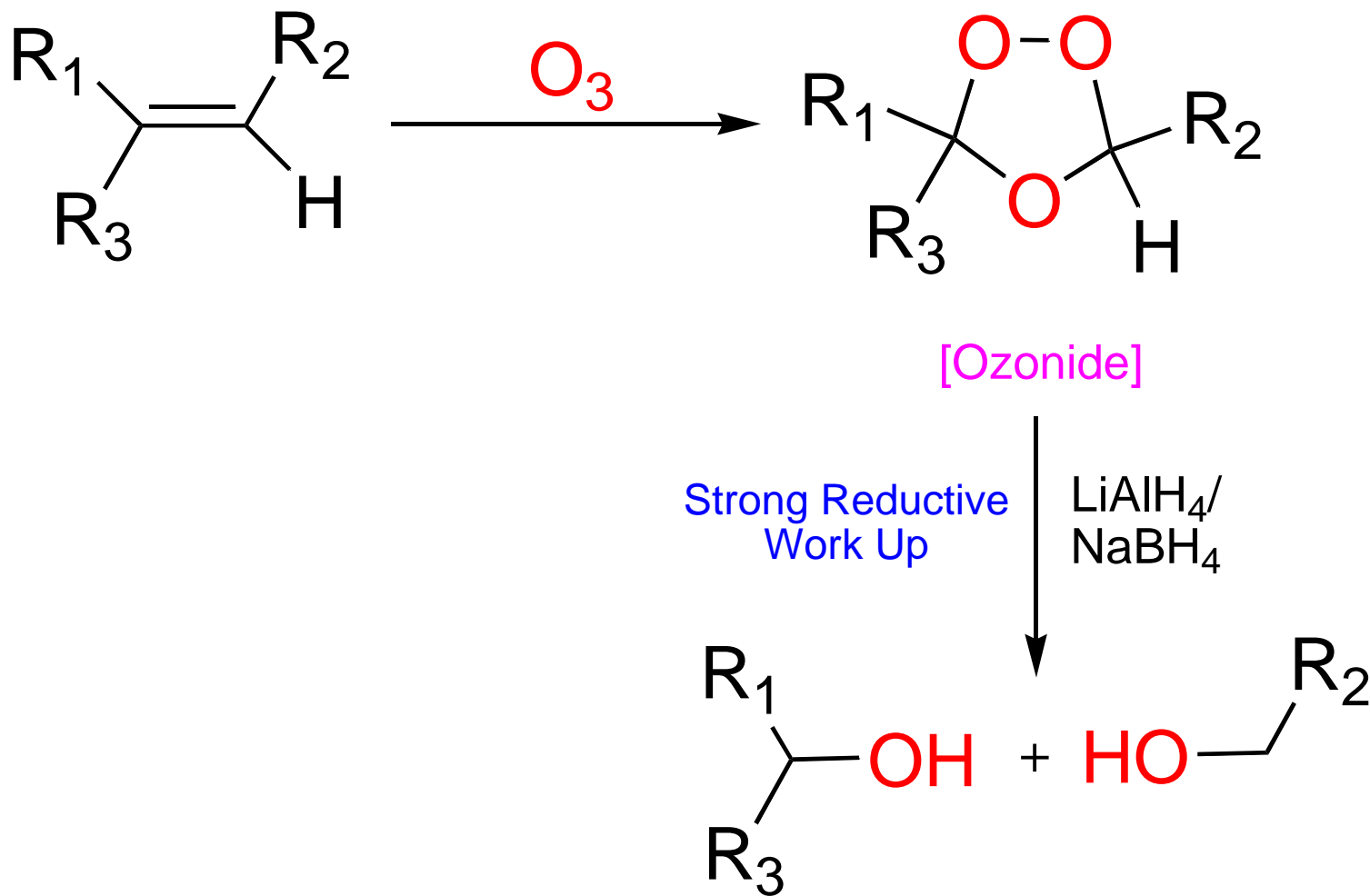
(2) Reductive work up using strong reducing agents such as LiAlH_4 (or) NaBH_4 .

(3) Oxidative work up using oxidizing agents such as H_2O_2 (or) O_2 .

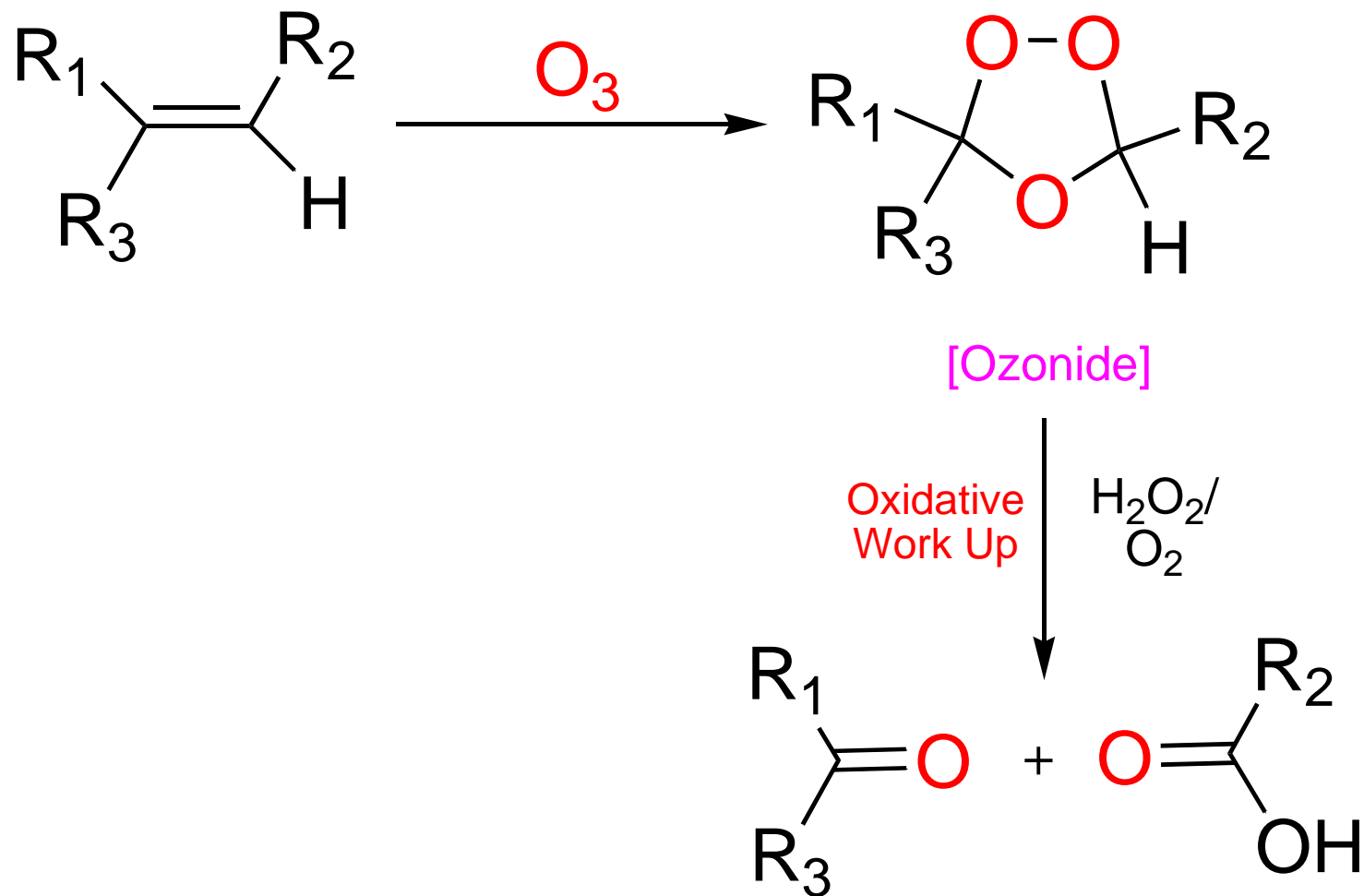
(1) Reductive work up using mild reducing agents such as Me_2S (or) PPh_3 (or) Zn dust produces aldehyde and ketone.



(2) Reductive work up using strong reducing agents such as LiAlH_4 (or) NaBH_4 produces alcohols.

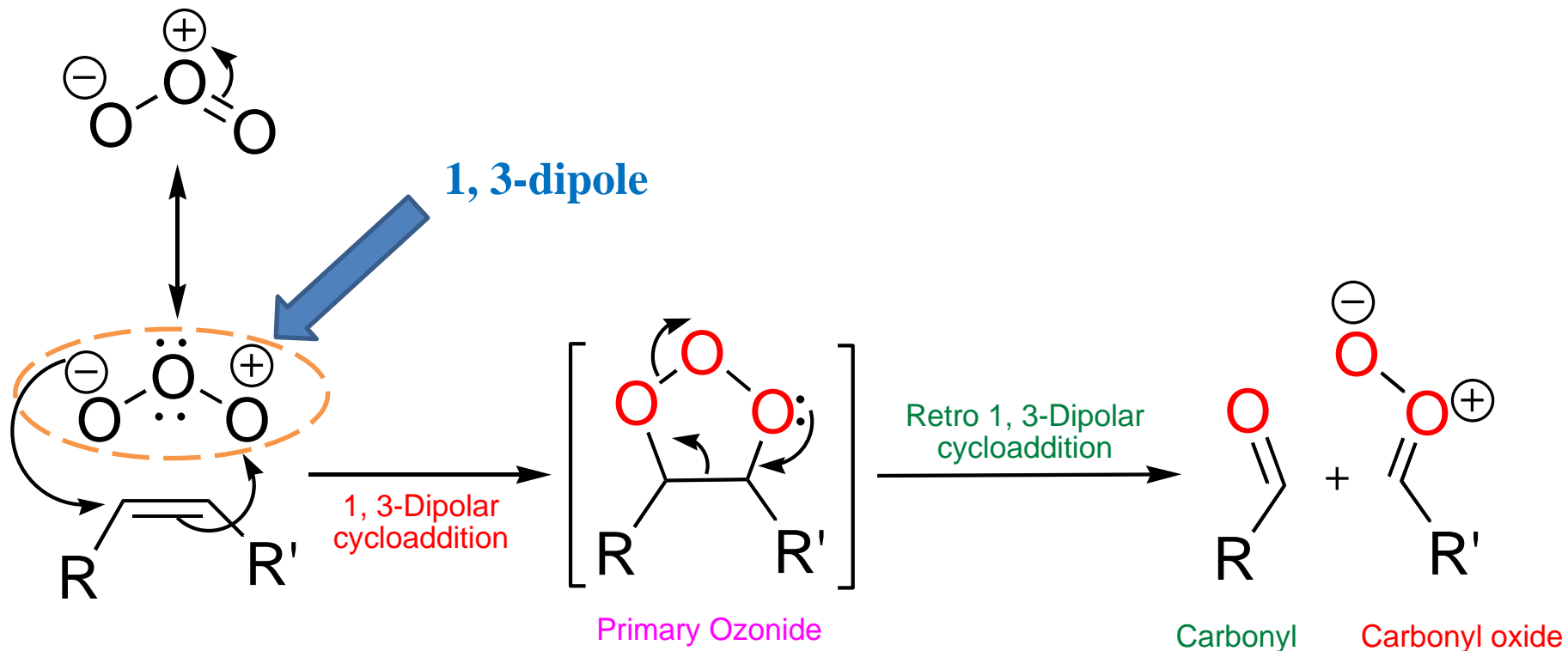


(3) Oxidative work up using oxidizing agents such as H_2O_2 (or) O_2 provides carboxylic acids.

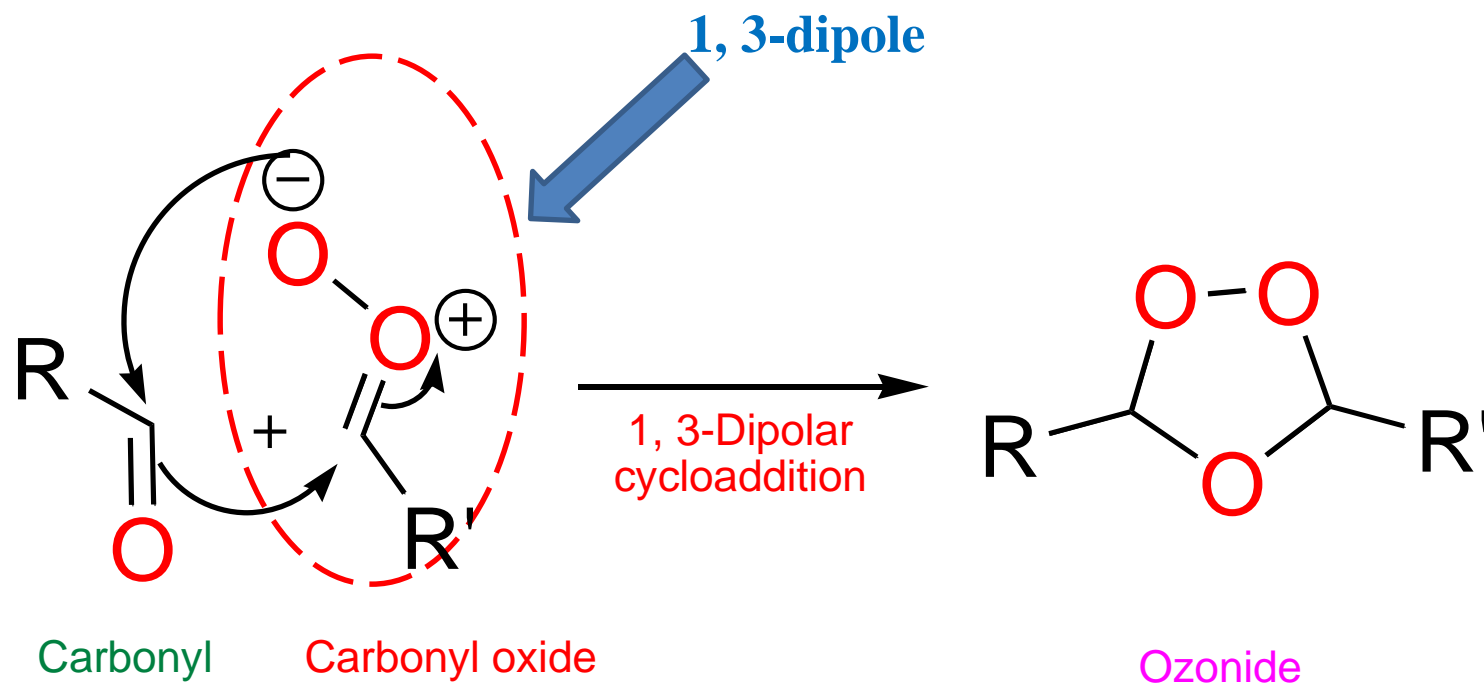


Mechanism

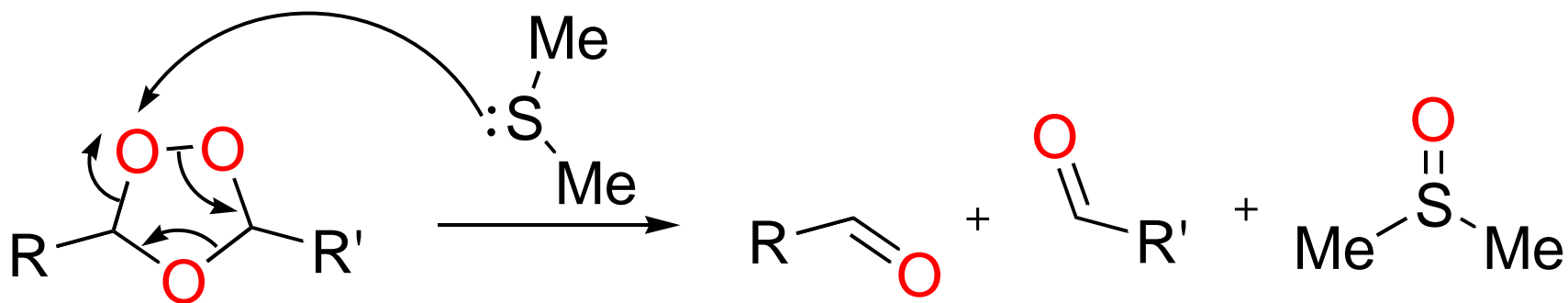
Ozone inserts to the alkene by 1, 3-dipolar cycloaddition to form primary ozonide, which is highly unstable and undergoes retro 1, 3-dipolar cycloaddition to form carbonyl and carbonyl oxide.



Carbonyl oxide which has a dipole undergoes once again 1, 3 – dipolar cycloaddition reaction with carbonyl to form the stable ozonide.

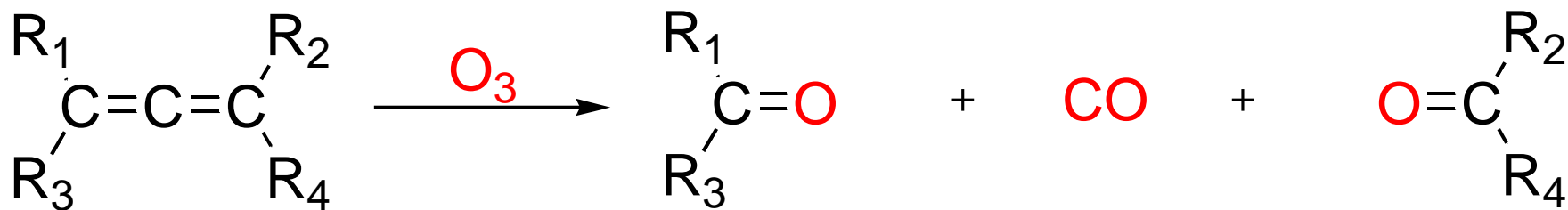


The stable ozonide reacts with reducing (or) oxidizing agents to give desired products.



Ozonide

Ozonolysis of simple allenes leads to the formation of two carbonyl fragments and carbon monoxide.



Ozonolysis of alkynes leads to the formation of either acid anhydrides or a diketone.

