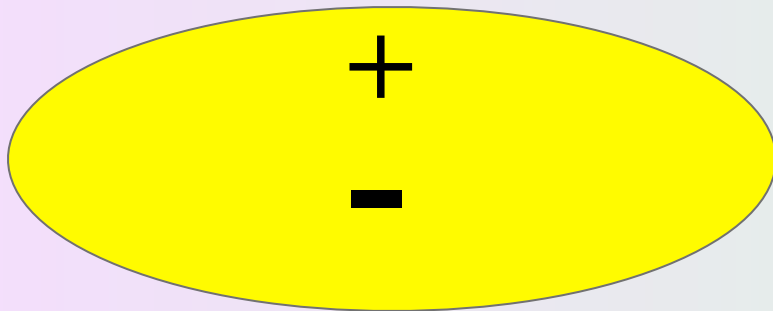


Dipole Moments

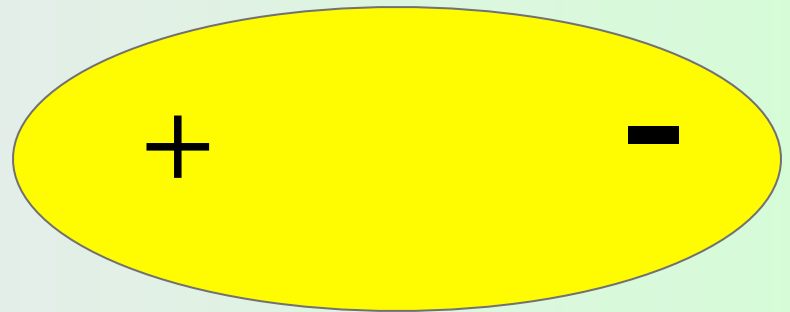
Dipole Moment

A substance possesses a dipole moment if its centers of positive and negative charge do not coincide

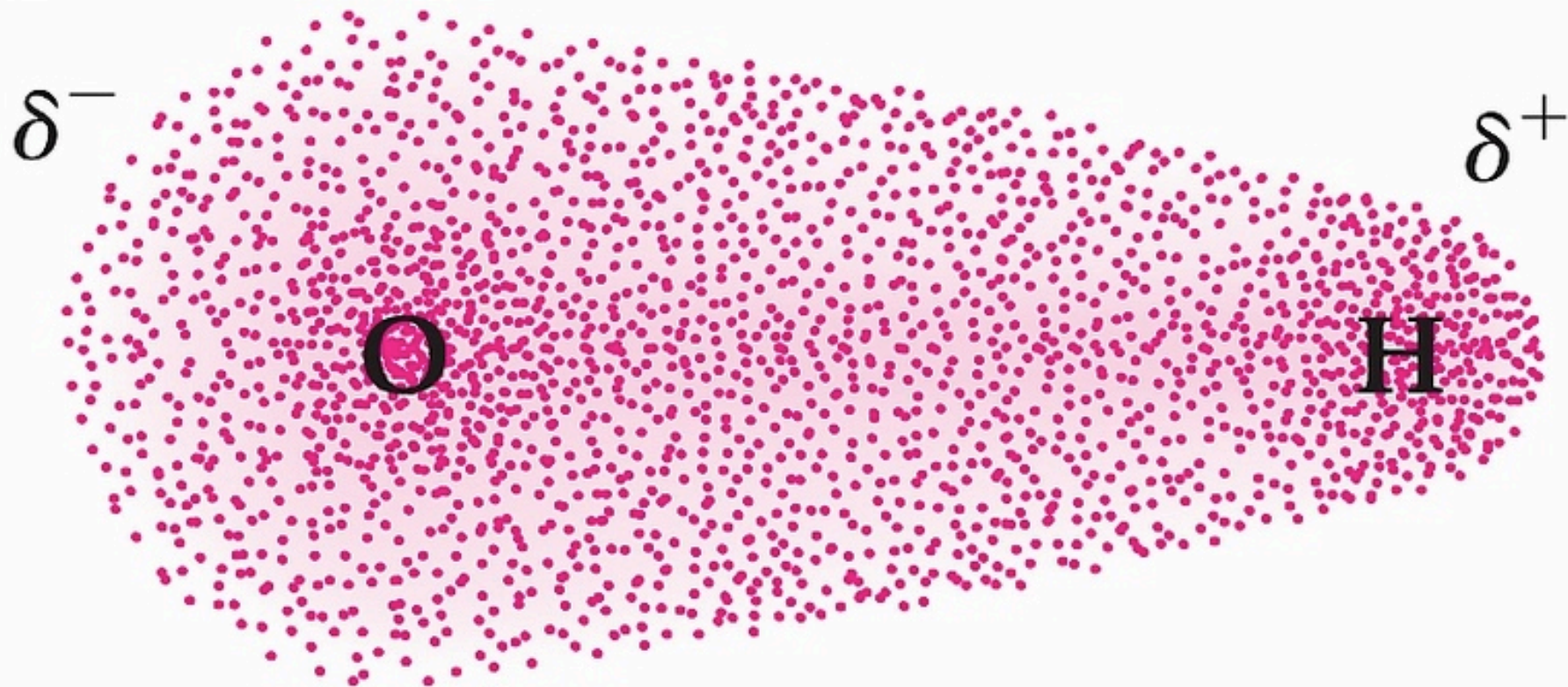
$\mu = e \times d$ Expressed in debye units



not polar



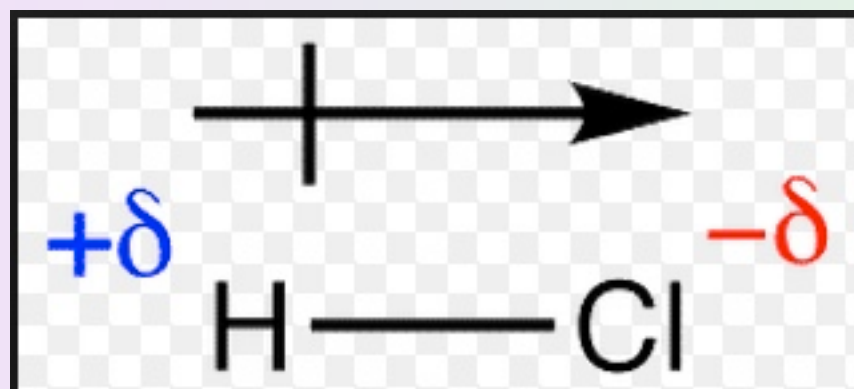
polar



Dipole moment

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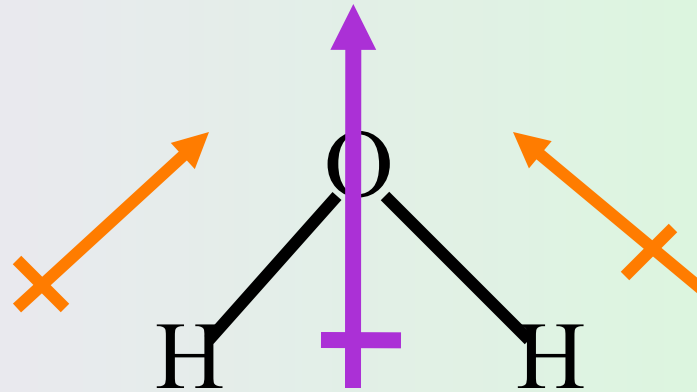
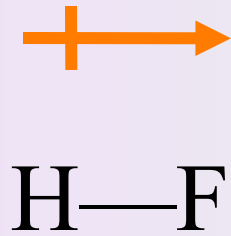


Molecular Dipole Moment

need to know molecular shape

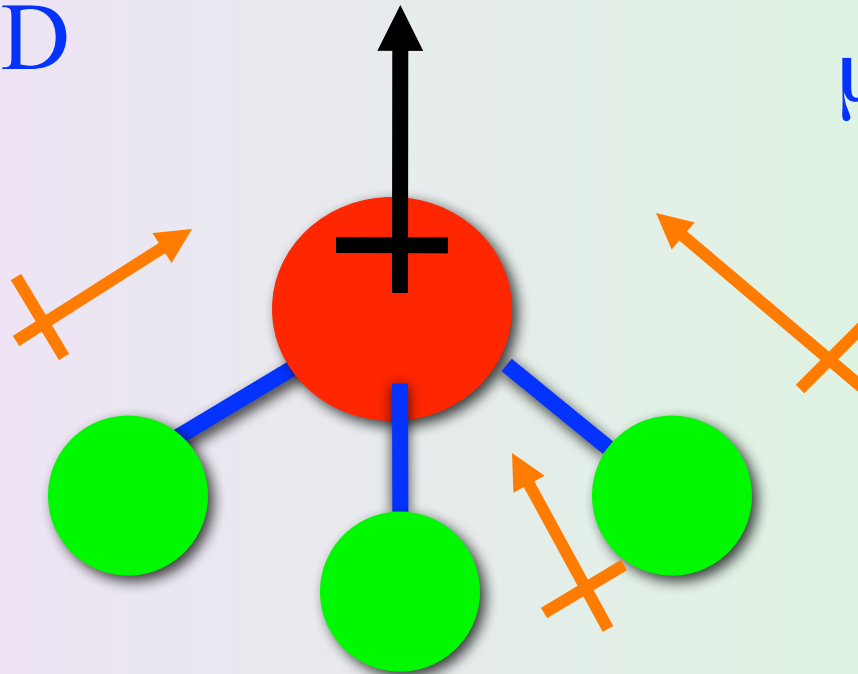
because individual bond dipoles can
cancel each other out

examples

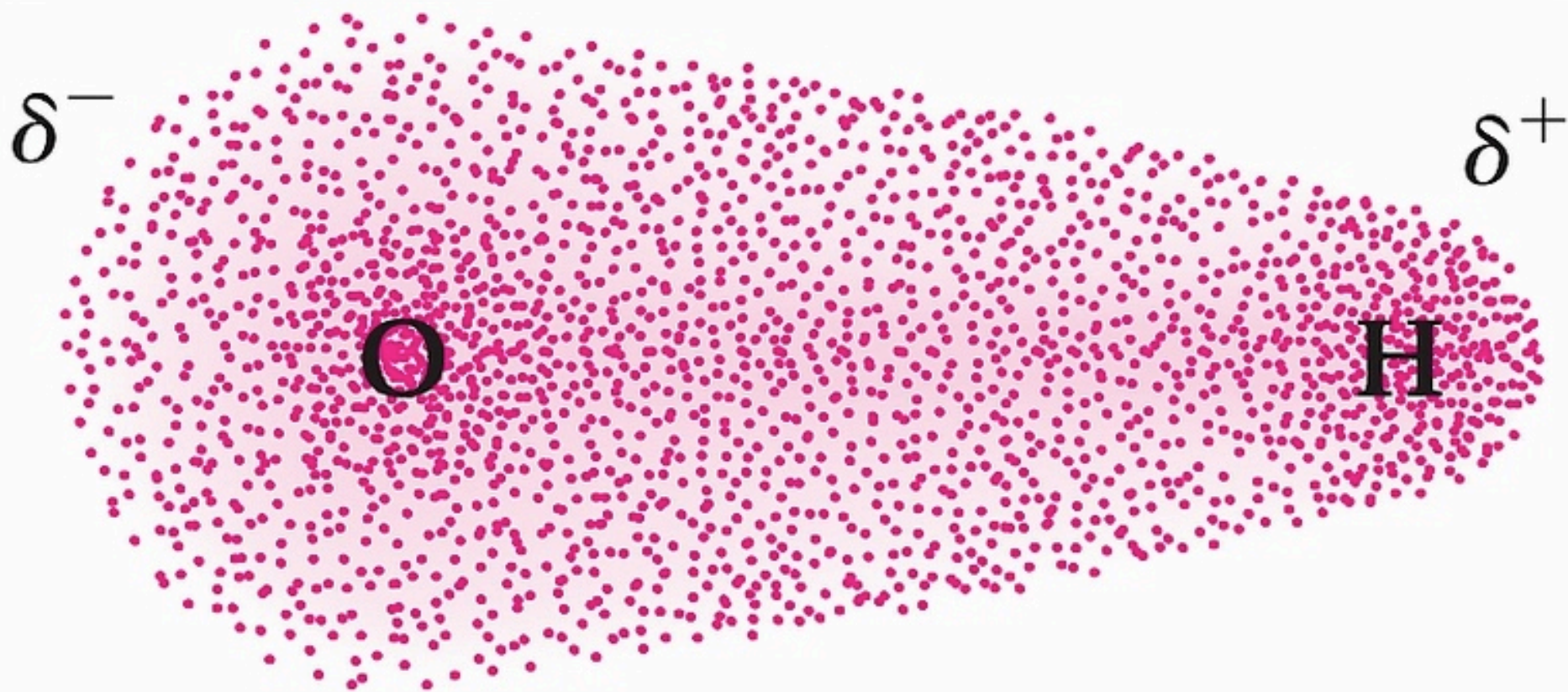


$$\mu = 1.7 \text{ D}$$

$$\mu = 1.8 \text{ D}$$



$$\mu = 1.5 \text{ D}$$

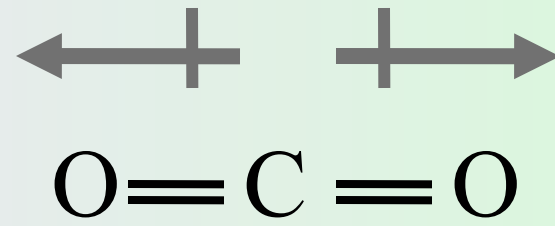


Dipole moment

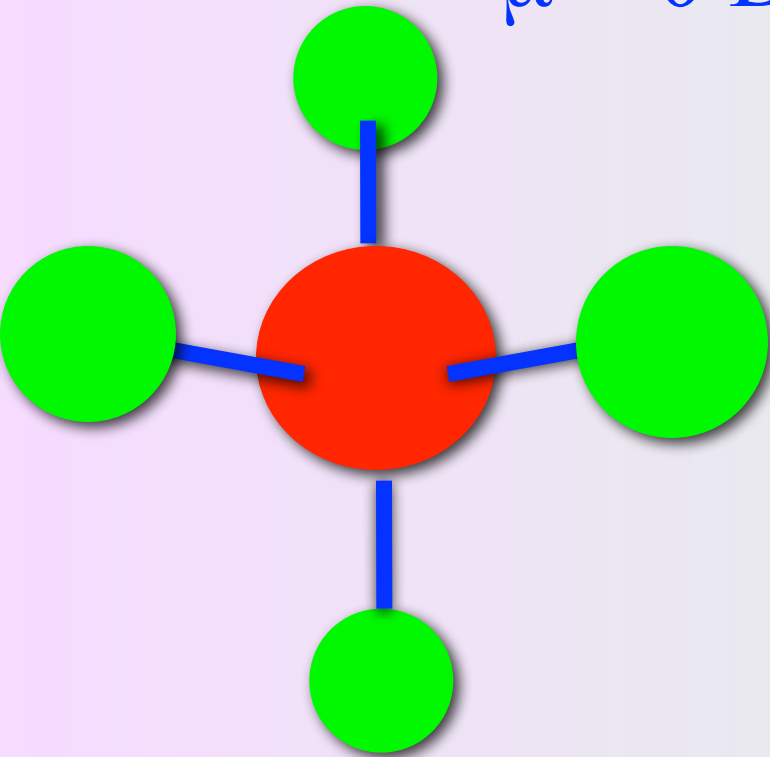
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 Share Image

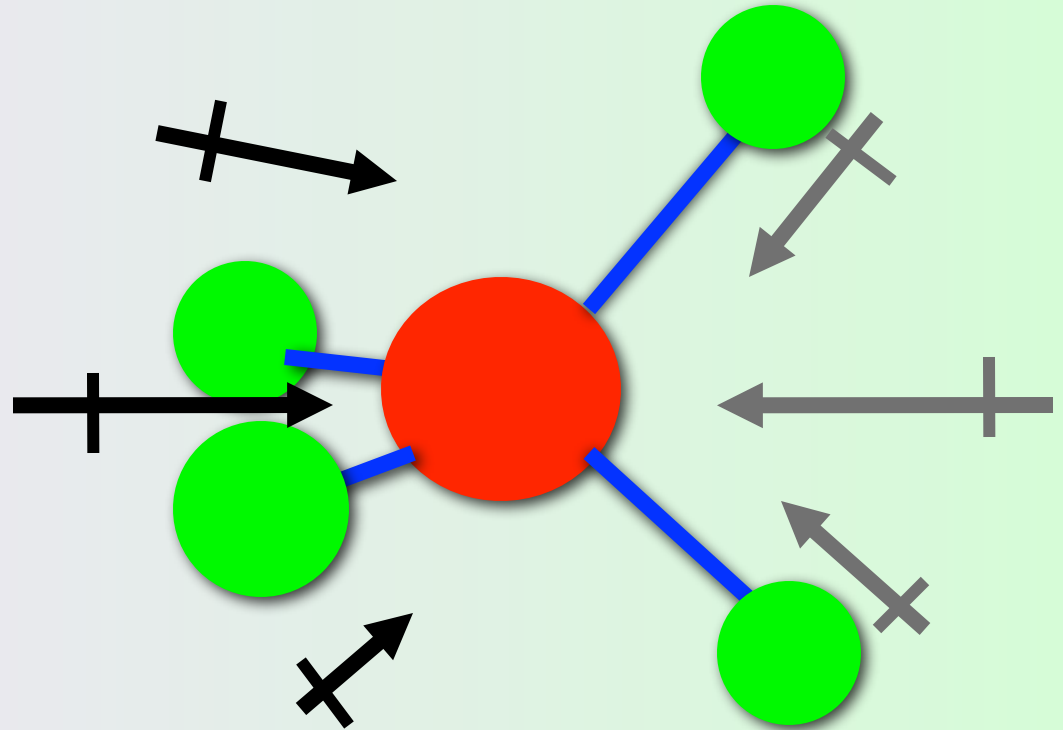
More examples



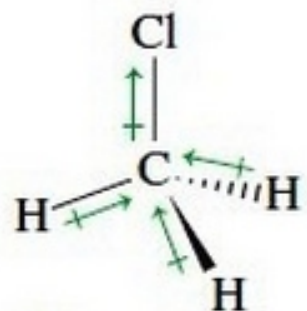
$\mu = 0$ D



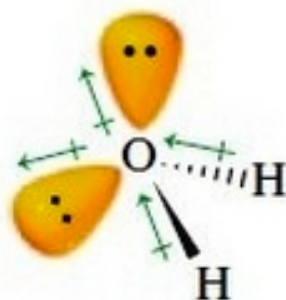
$\mu = 0$ D



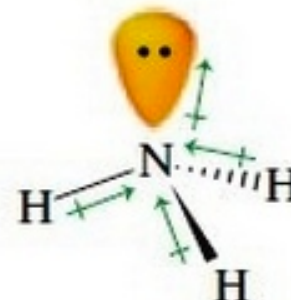
More examples



chloromethane
 $\mu = 1.87 \text{ D}$



water
 $\mu = 1.85 \text{ D}$



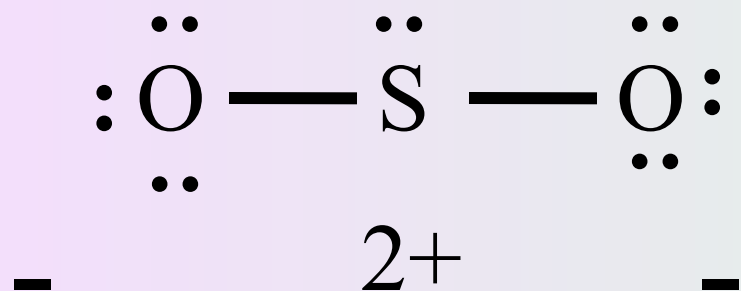
ammonia
 $\mu = 1.47 \text{ D}$

Problem

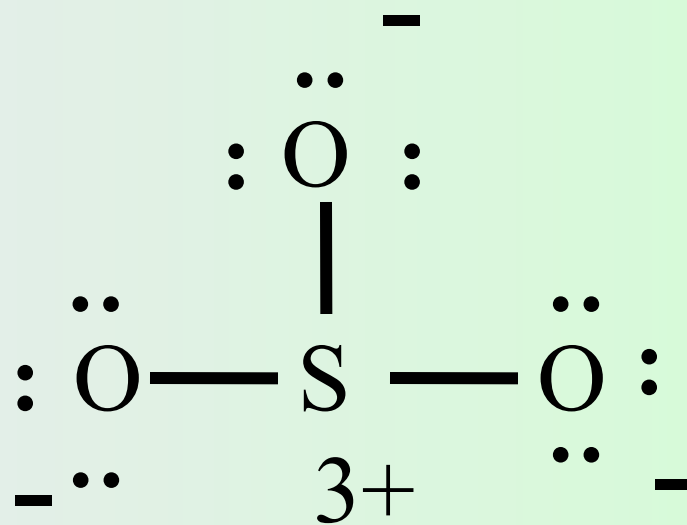
Which has the larger dipole moment, sulfur dioxide or sulfur trioxide?

First

Write Lewis structures for sulfur dioxide and sulfur trioxide



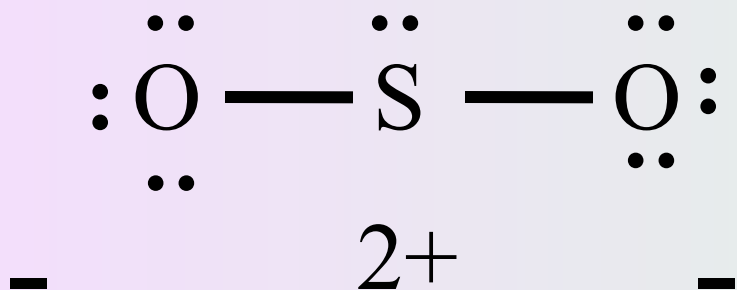
18 electrons



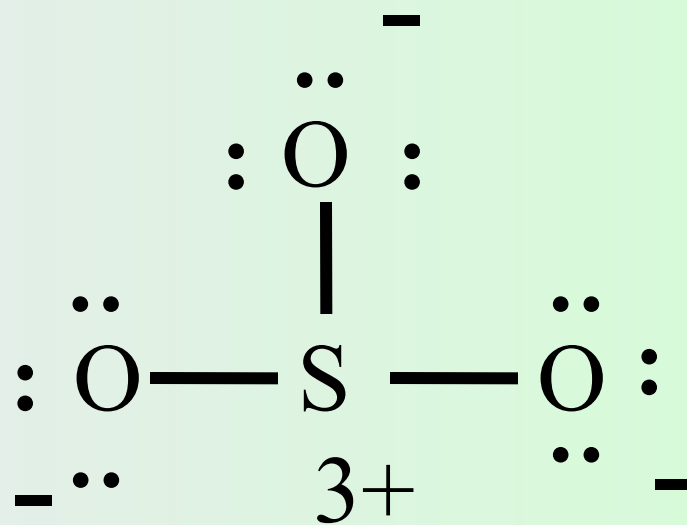
24 electrons

Next

Use VSEPR to deduce geometry



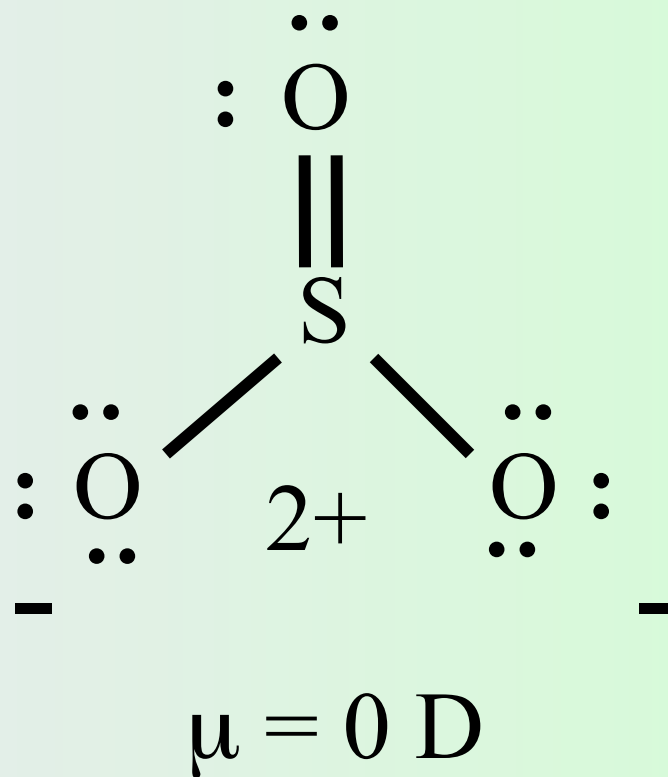
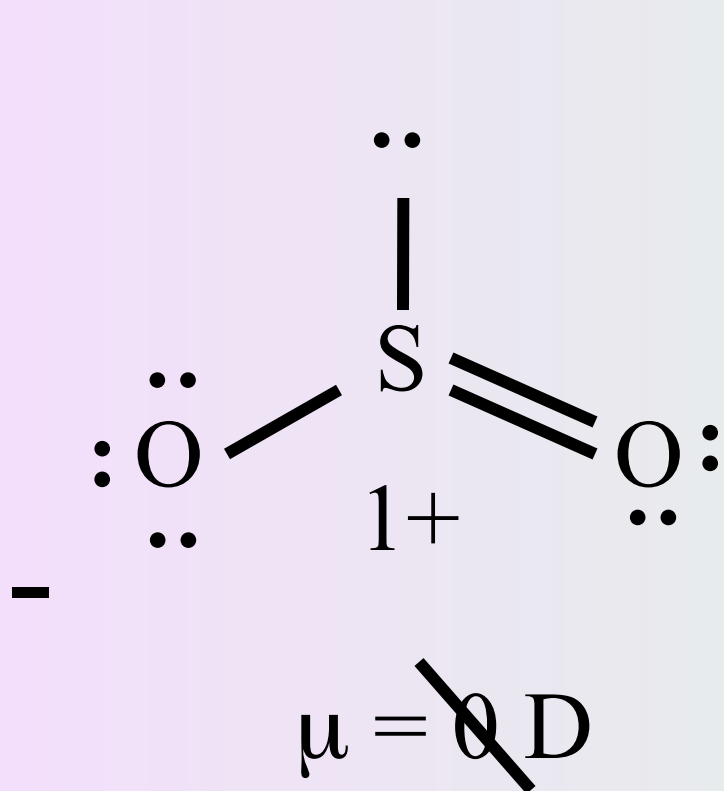
Three electron pairs

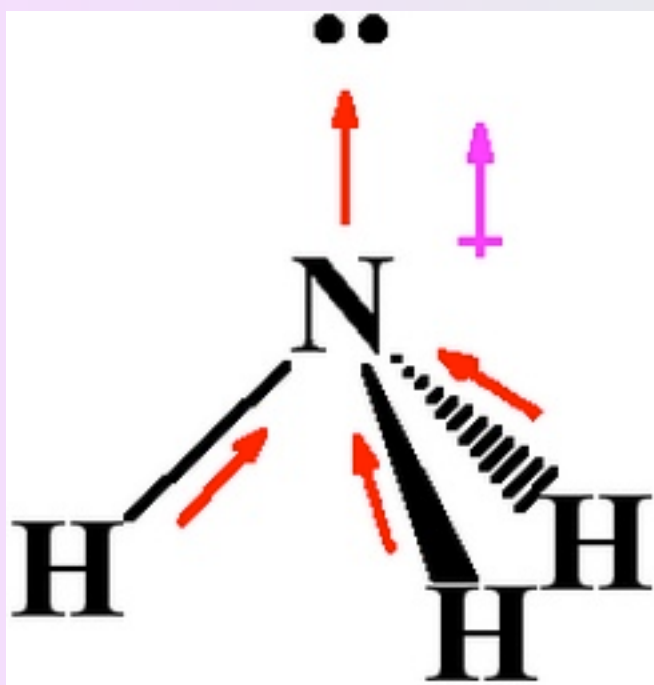


Three electron pairs

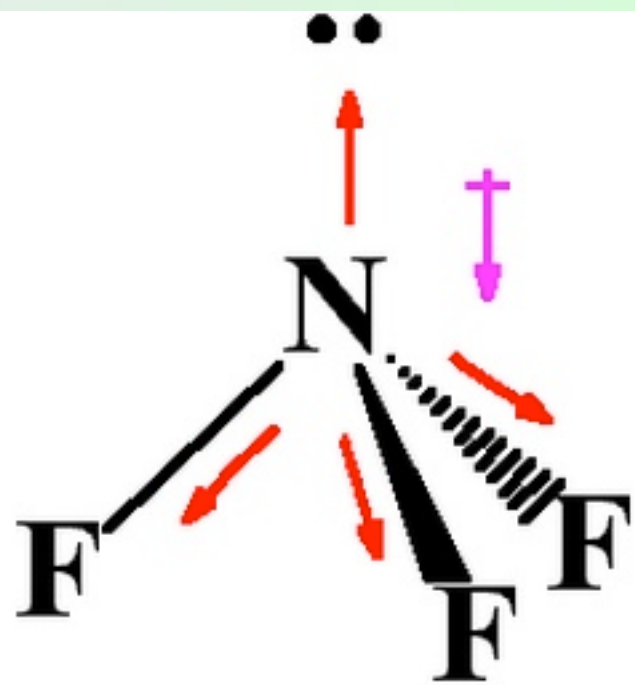
Next

Use VSEPR to deduce geometry





$\mu = 1.46 \text{ D}$



$\mu = 0.24 \text{ D}$