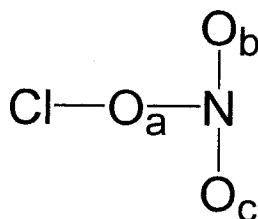


6. A key player in stratospheric ozone depletion is chlorine nitrate, ClONO_2 . Its connectivity (that is, the location of its sigma bonds) is known to be the following:



- (a) (6 points) Draw the two best resonance structures for ClONO_2 . (They will be equivalent.) Be sure to show all valence electrons, and label all non-zero formal charges. Keep the oxygens labeled as O_a , O_b , and O_c for the purpose of further discussion.

- (b) (3 points) Write down the hybridization for the following atoms in chlorine nitrate. You need not justify your answers beyond what you have drawn for part (a).

Cl _____ O_a _____ N _____

- (c) (4 points) Experimentally, one of the ClONO_2 bond angles is known to be 133° . Which angle would you predict it to be? (Circle your choice.)

(i) $\theta(\text{Cl}-\text{O}_a-\text{N})$ (ii) $\theta(\text{O}_a-\text{N}-\text{O}_b)$ (iii) $\theta(\text{O}_a-\text{N}-\text{O}_c)$ (iv) $\theta(\text{O}_b-\text{N}-\text{O}_c)$

- (d) (6 points) Justify your answer to part (c) by using the concepts of VSEPR theory. Be sure to discuss both what is expected ideally, and deviations from that ideal.

-3 no discussion of deviations from ideality
 -2 lone pairs on O's relevant to angles about N
 -1 some mis-statement (in addition to a correct argument)
 -3 no discussion of ideality
 -4 some correct reasoning