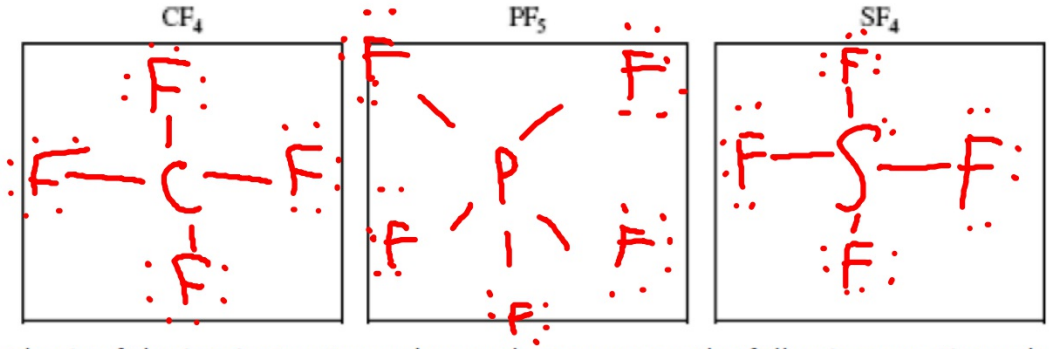
Bonding FRQ

Answer the following questions that relate to chemical bonding.

(a) In the boxes provided, draw the complete Lewis structure (electron-dot diagram) for each of the three molecules represented below.



(b) On the basis of the Lewis structures drawn above, answer the following questions about the particular molecule indicated.

(i) What is the F-P-F bond angle in PF_5?

90° or 120

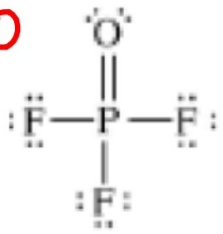
(ii) What is the hybridization of the valence orbitals of C in CF_4?

sp^3

(iii) What is the geometric shape formed by the atoms in SF_4? seesaw

(c) Two Lewis structures can be drawn for the OPF_3 molecule as shown below.

P = 5 − 0 − 5 = 0
O = 6 − 4 − 2 = 0



Structure 1

P = 5 − 0 − 4 = 1
O = 6 − 6 − 1 = −1

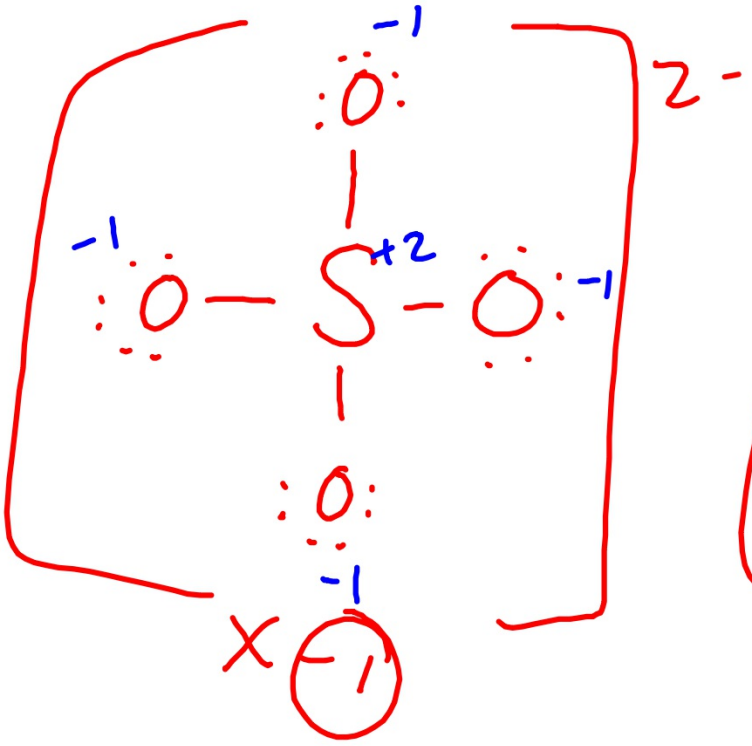
Structure 2

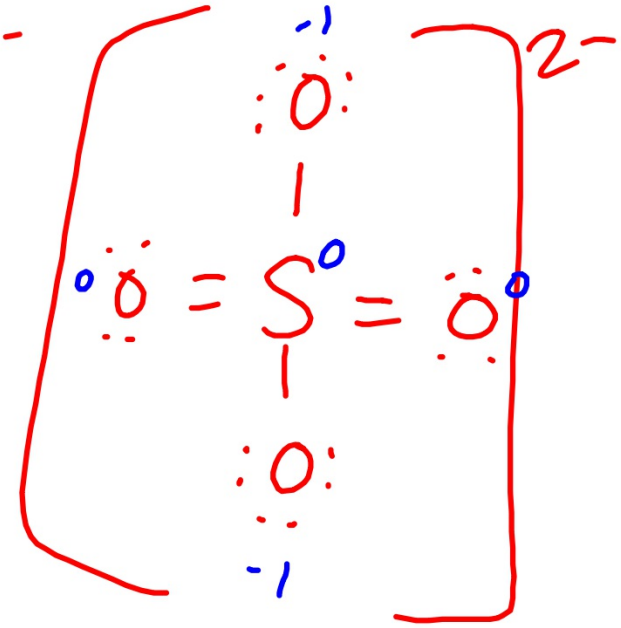
(i) How many sigma bonds and how many pi bonds are in structure 1?

4 sigma & 1 pi

(ii) Which one of the two structures best represents a molecule of OPF_3? Justify your answer in terms of formal charge.

Structure 1 b/c all formal charges are zero.


-1
-1
+2
-1
-1
X
-1
2-


-1
0
0
0
-1
2-