

## 6.4 Review Questions

1. Consider the following list of elements. Place each in the appropriate column in the table below depending on whether it obeys the octet rule, likely has an incomplete octet, or could potentially have an expanded octet in a Lewis structure.

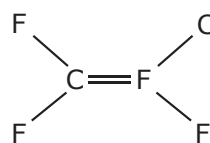
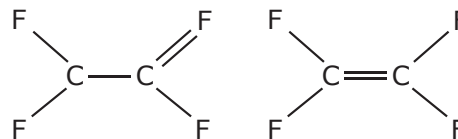
H, Be, B, C, N, O, F, Al, Si, P, S, Cl

Incomplete Valence Octet	Valence Octet	Expanded Valence Octet

2. Helium and neon are in the same chemical family but yet have different numbers of dots in their Lewis structures. What is the reason for this? Explain why neither element ever forms chemical compounds.
3. Consider the following pairs of elements in the table below. If each pair was part of a molecule or polyatomic ion, which of the two would most likely be the central atom and which would be the peripheral or surrounding atom? Place each element of each pair in the appropriate column in the table.

Element Pair	Probable Central Atom	Probable Peripheral Atom
(a) phosphorus and chlorine		
(b) nitrogen and oxygen		
(c) carbon and sulphur		
(d) nitrogen and hydrogen		
(e) oxygen and fluorine		

4. The molecule tetrafluoroethene is a building block of the synthetic material known as Teflon®. Tetrafluoroethene has the formula  $C_2F_4$ . Consider the following molecular skeletons for this molecule. Complete the Lewis structure for the most likely skeleton.



5. Draw Lewis structures for each of the following molecules in the space provided.





6. Draw Lewis structures for each of the polyatomic ions in the space provided.



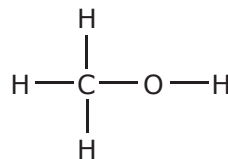
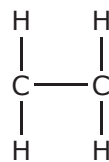
7. Extension: Draw Lewis structures for each of the following. Each central atom in the molecules or ions has an expanded octet.



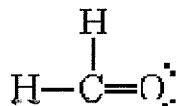
8. Draw Lewis structures for each of the following containing multiple bonds.



9. Convert the following molecular skeletons into complete Lewis structures.



1. Lewis structure for formaldehyde:



2. Lewis structure for carbon monoxide:



3. Lewis structure for bromine trifluoride:



1.

Incomplete Valence Octet	Valence Octet	Expanded Valence Octet
H	C	Si
Be	N	P
B	O	S
Al	F	Cl

2. Helium and neon are both invisible totally unreactive gases whose similar behaviour qualifies each of them as members of the family which includes other unreactive gases. They do have a different number of outer electrons, but the outer electron cloud of each is a particularly stable configuration.

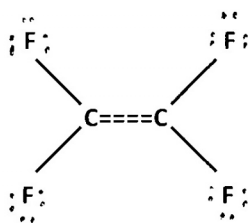
Helium only has 2 electrons, and those are represented by the 2 dots in its Lewis structure. That single pair of outer electrons fills the 1s sublevel and also completes the 1<sup>st</sup> energy level, which explains why helium is unreactive.

Neon has 8 outer electrons represented as 4 pairs of dots. Those 8 electrons fill the 2s and 2p sublevels, complete the 2<sup>nd</sup> energy level, and give neon a stable valence octet consisting of 4 pairs of electrons. As a result, neon is also unreactive.

3.

Element Pair	Probable Central Atom	Probable Peripheral Atom
(a) phosphorus and chlorine	phosphorus	chlorine
(b) nitrogen and oxygen	nitrogen	oxygen
(c) carbon and sulphur	carbon	sulphur
(d) nitrogen and hydrogen	nitrogen	hydrogen
(e) oxygen and fluorine	oxygen	fluorine

4.



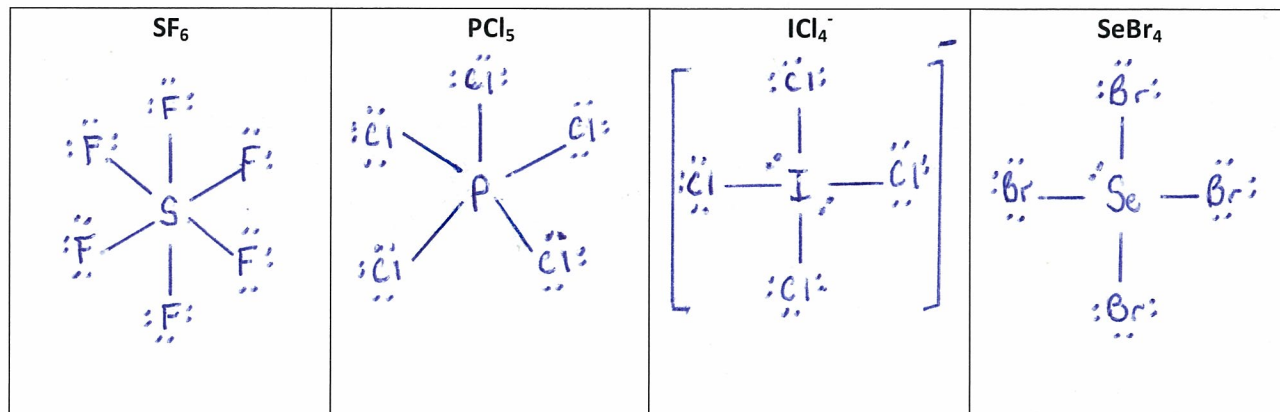
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OF <sub>2</sub>	H <sub>2</sub> S	PCl <sub>3</sub>	CCl <sub>2</sub> F <sub>2</sub>

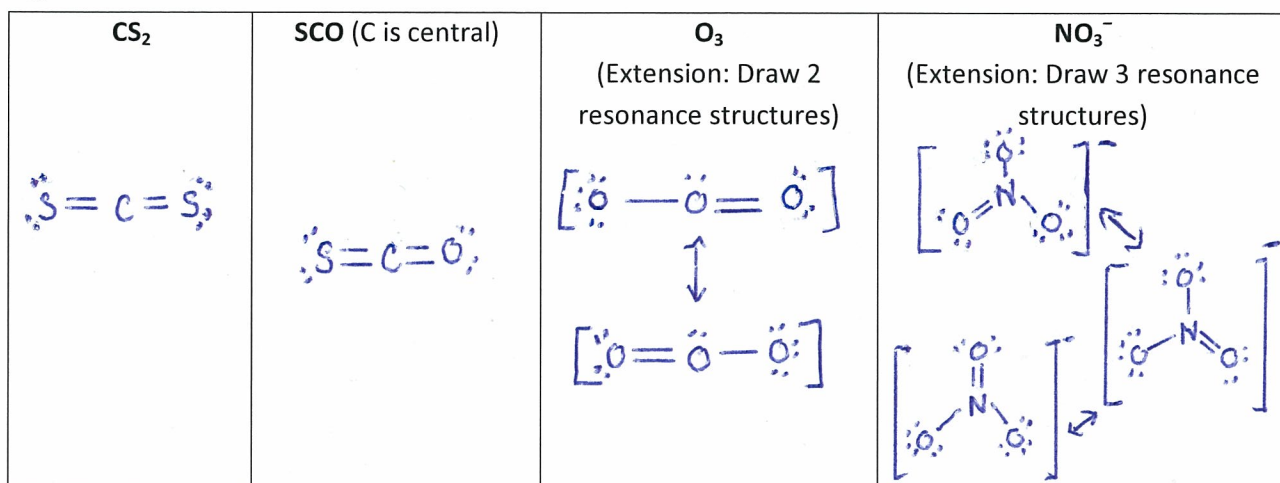
6.

OH <sup>-</sup>	AlH <sub>4</sub> <sup>-</sup>	CN <sup>-</sup>

7.



8.



9.

