Quiz (Non-Octet Structure)

1. The boron atom in boron trifluoride is 'electron deficient'. Boron trifluoride has a high tendency to get two more electrons in order to attain the octet structure. When boron trifluoride and ammonia react, a dative covalent bond forms between them. A white solid with the formula NH_3BF_3 is produced.
   (a) Explain why ammonia can form a dative covalent bond with boron trifluoride.

   (b) Using electron diagrams, show how NH_3 and BF_3 react to form NH_3BF_3.

2. For the following simple molecular substances:
   $BeCl_2$, NCl_3, Cl_2O, IF_3

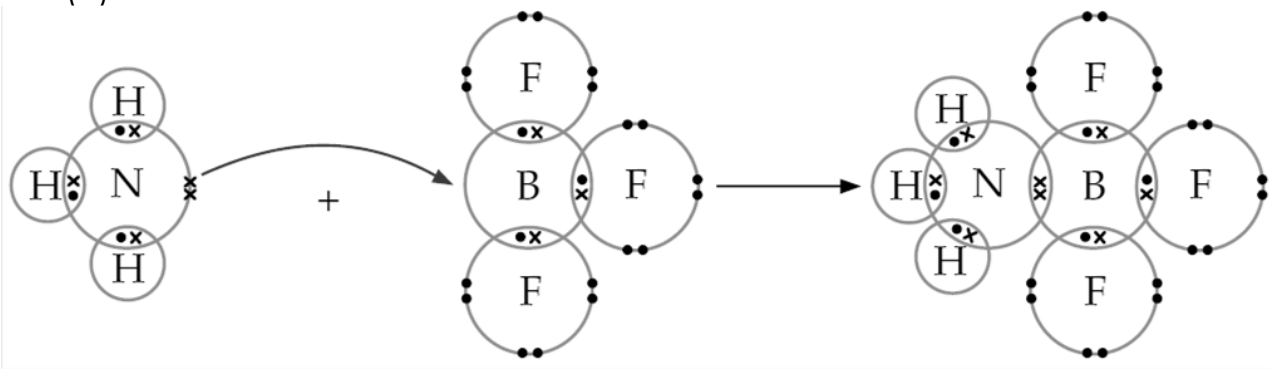
   (a) Draw an electron diagram for each of them.

   (b) Hence, deduce which of them does/do not follow the octet rule.

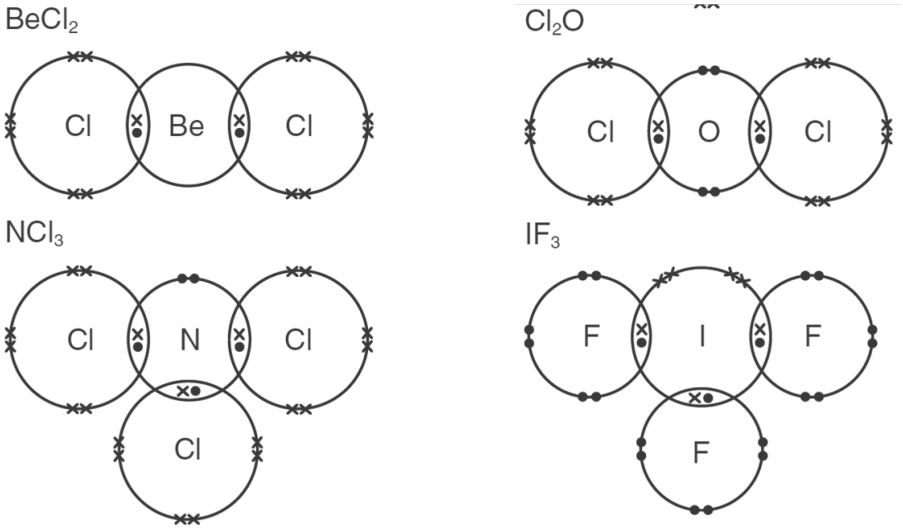
Suggested Answer

1. (a) The nitrogen atom in ammonia molecule has a lone pair of electrons. It contributes the lone pair of electrons to share with the boron atom. As a result, a dative covalent bond forms.

(b)



2. (a)



(b) $BeCl_2$ and IF_3. The central beryllium atom in $BeCl_2$ has only **four** outermost shell electrons. The central iodine atom in IF_3 has **10** outermost shell electrons.