Exercise 10.2
Lewis Acids and Lewis Bases

1. Define the terms Lewis acid and Lewis base.

2. A Lewis acid typically meets one of the following descriptions:

   i. a monoatomic cation
   ii. an electron-deficient species (one atom has less than a complete octet)
   iii. a co-ordinatively unsaturated species (contains a large partially positive atom where the total number of lone pairs + atoms attached to it is less than six; "large" = Period 3 or lower)
   iv. a molecule or cation in which an atom has at least one double or triple bond to a more electronegative atom

   Decide whether or not each of the molecules/ions below is a Lewis acid. If it is, identify what makes it a Lewis acid.

(a) CO_2 (b) NO_2^+ (c) NO_2^-

(d) BCl_3 (e) BH_3 (f) PH_3

(g) SO_3 (h) SO_3^{2-} (i) N_2

(j) CH_4 (k) CCl_4 (l) $SnCl_4$

3. $P(CH_3)_3$ is a good Lewis base. PCl_3 is not. Why?