Problem 1:

Draw the type of overlaps between

(a) s and p_x (b) p_x and p_x (c) p_y and p_y (d) p_z and p_z

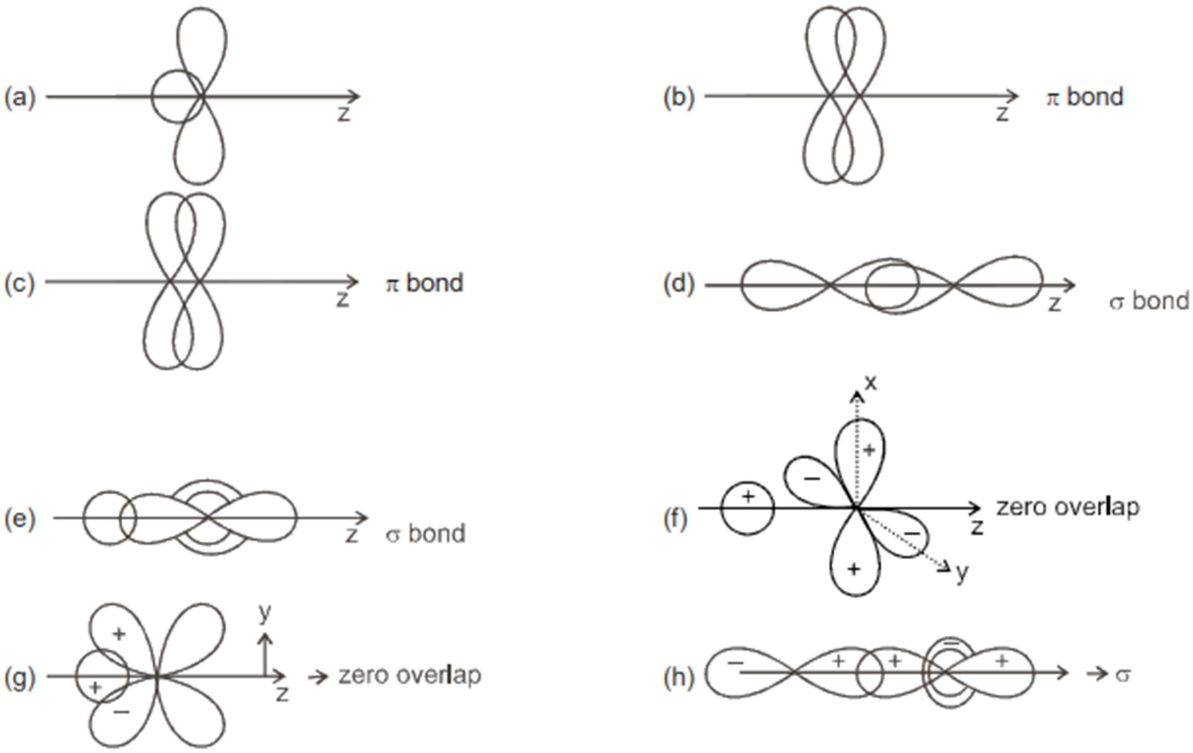
(e) s and d_{z^2} (f) s and $d_{x^2-y^2}$ (g) s and d_{yz} (h) p_z and d_{z^2}

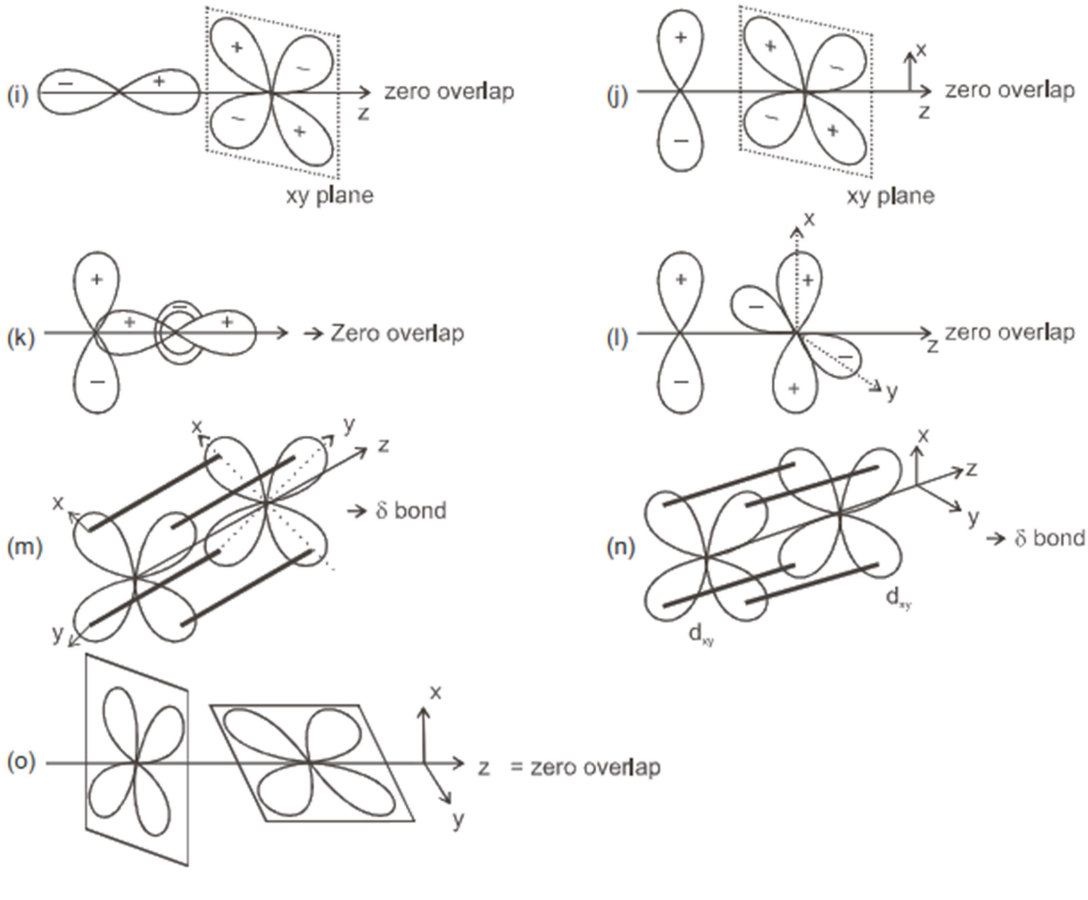
(i) p_z and d_{xy} (j) p_x and d_{xy} (k) p_x and d_{z^2} (l) p_x and $d_{x^2-y^2}$

(m) $d_{x^2-y^2}$ and $d_{x^2-y^2}$ (n) d_{xy} and d_{xy} (o) d_{xy} and d_{yz}

if internuclear axis is z-axis. Identify them as σ, π, δ bond wherever bond is formed.

Solution:


(a)
z
(b)
z
π bond
(c)
z
π bond
(d)
z
σ bond
(e)
z
σ bond
(f)
x
z
y
zero overlap
(g)
y
z
zero overlap
(h)
σ


(i)
z
zero overlap
xy plane
(j)
x
z
zero overlap
xy plane
(k)
Zero overlap
(l)
x
z
y
zero overlap
(m)
x
y
z
x
y
δ bond
(n)
x
z
y
δ bond
d_{xy}
d_{xy}
(o)
x
z
y
= zero overlap