

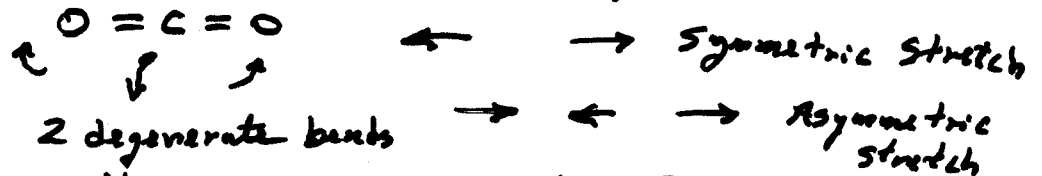
# Quiz # 7

1) Consider  $\text{CO}_2$

(a) specify the number of vibrational modes and show your reasoning.

$$3N - 3 \text{ trans} - 2 \text{ rot} = 4$$

(b) show them with a rough sketch



(c) Are they all i.r. active?

Why/why not?

No

Sym. stretch - no change in dipole moment.

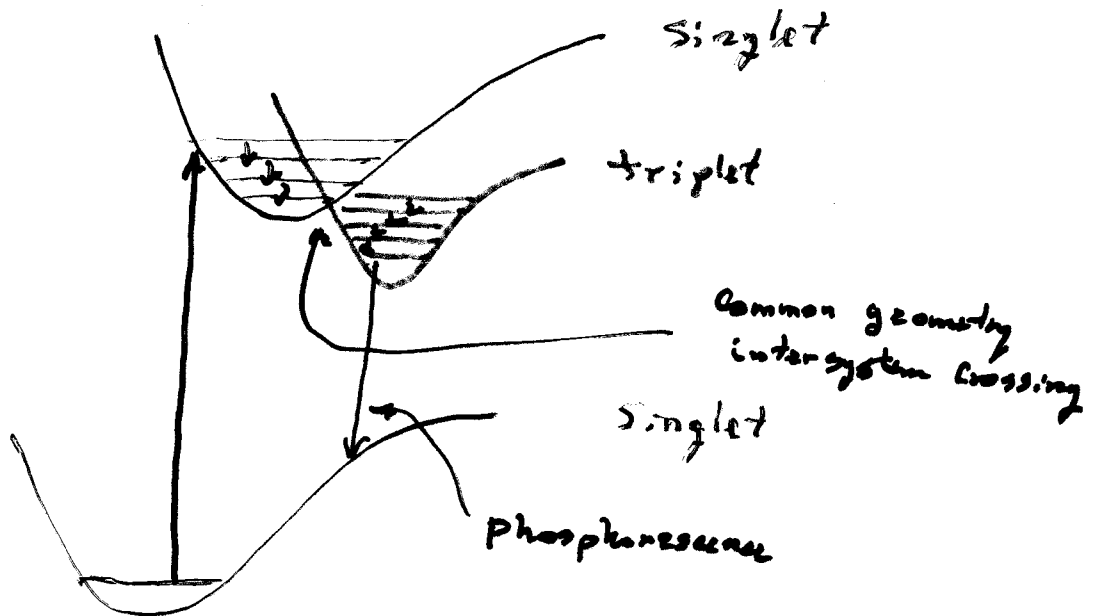
(d) Would the symmetric stretch be vibrationally Raman active?

Why? Yes

Change in polarizability upon vibration

## Quiz #7 (Continued)

- 2) Sketch a group of potential curves that displays the idea of phosphorescence phenomena



spin-orbit coupling  
breaks the selection rule