

#5) CCSD EQUATIONS: (ASSUME NOT BRILLOUIN)

double amplitudes:

$$t_{ab}^{ij} \phi_{ab}^{ij} = \langle \Phi_{ij}^{ab} | V_0 (1 + T_1 + T_2 + \frac{1}{2} T_1^2 + \frac{1}{3!} T_1^3 + \frac{1}{4!} T_1^4 + T_1 T_2 + \frac{1}{2} T_1^2 T_2 + \frac{1}{2} T_2^2) | \Phi \rangle$$

$(x+)$ (0) (1) (0) $(y+)$ $(x+)$ $(2y+)$ $(3y+)$ $(4y+)$ $(y++x+)$ $(2y++x+)$ $(2x+)$

\uparrow leading order x \uparrow leading order $1 \Rightarrow \boxed{x=1}$

singles amplitudes:

$$t_a^i \phi_a^i = \langle \Phi_i^a | V_0 (1 + T_1 + T_2 + \frac{1}{2} T_1^2 + \frac{1}{3!} T_1^3 + T_1 T_2) | \Phi \rangle$$

$(y+)$ 0 (1) (0) $(y+)$ $(1+)$ $(2y+)$ $(3y+)$ $(x++y+)$

\uparrow leading order y \uparrow leading order $1 \Rightarrow \boxed{y=1}$

CCSD ENERGY

$$E_C = \langle \Phi | V_0 (1 + T_1 + T_2 + \frac{1}{2} T_1^2) | \Phi \rangle$$

$(z+)$ (1) (1) (1) (2)

\uparrow leading order z \uparrow leading order $2 \Rightarrow \boxed{z=2}$

#5) USD doubles equations: (ASSUME BRILLIOVIN)

$$t_{ab}^{ij} e_{ab}^{ij} = \langle \Phi_{ij}^{ab} | V_0 (1 + T_1 + T_2 + \frac{1}{3} T_1^2 + \frac{1}{4} T_1^4 + \frac{1}{2} T_1^2 + T_1 T_2 + \frac{1}{2} T_2^2 + \frac{1}{2} T_1^2 T_2) | \Phi \rangle_0$$

(x+) (0)
(1) (0) (y+) (x+)
(2y+) (y++x+) (x+)

↑
leading
order x

↑
leading
order 1 $\Rightarrow x=1$

USD singles equations:

$$t_{a_i}^i e_{a_i}^i = \langle \Phi_i^a | V_0 (T_1 + T_2 + \frac{1}{2} T_1^2 + T_1 T_2) | \Phi \rangle_0$$

(y+) (0)
(1) (y+) (1+) (2y+) (1+y+)

↑
leading
order y

↑
leading
order 2 $\Rightarrow y=2$

USD energy expression

$$E_0 = \langle \Phi | V_0 (T_1 + T_2 + \frac{1}{2} T_1^2) | \Phi \rangle_0$$

(2+)
(1) (2+) (1+) (4+)

↑ L.H.S. must have leading order 2 \leftarrow R.H.S. has leading order 2