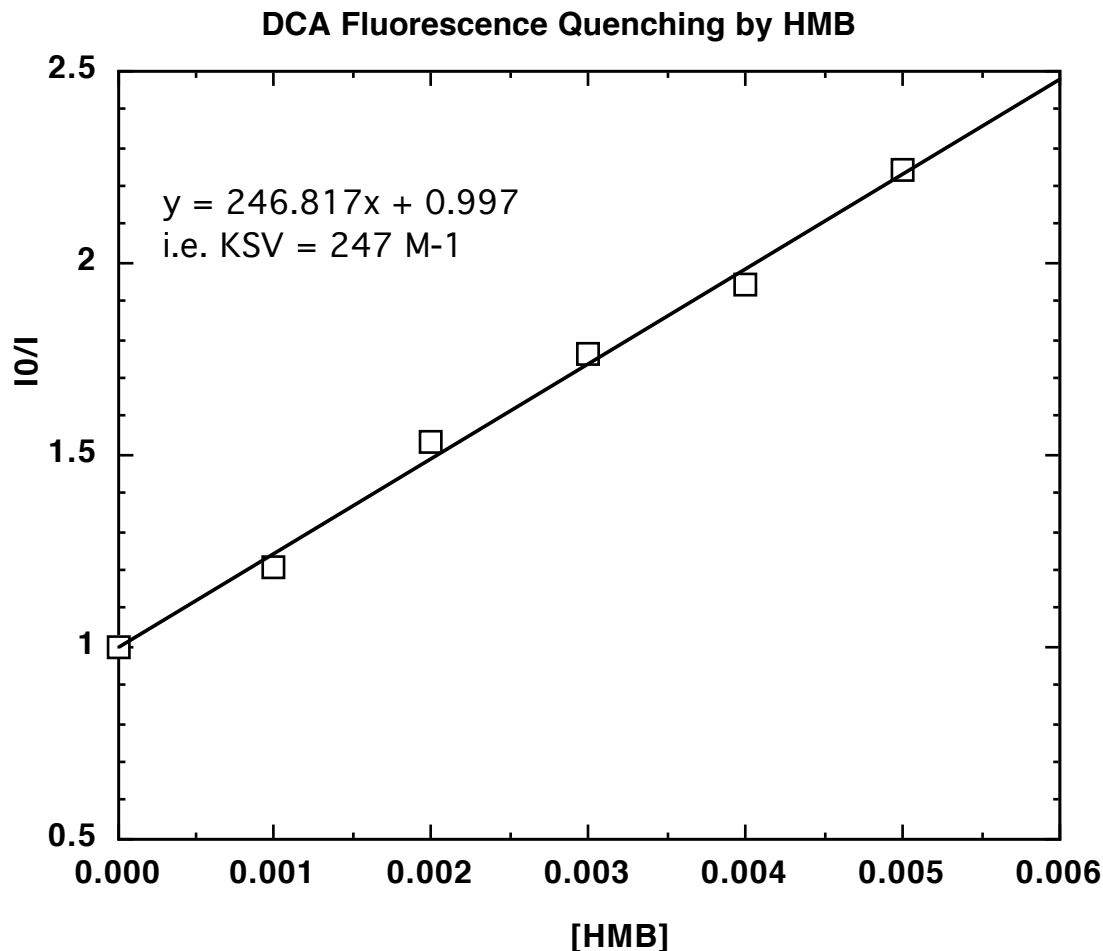
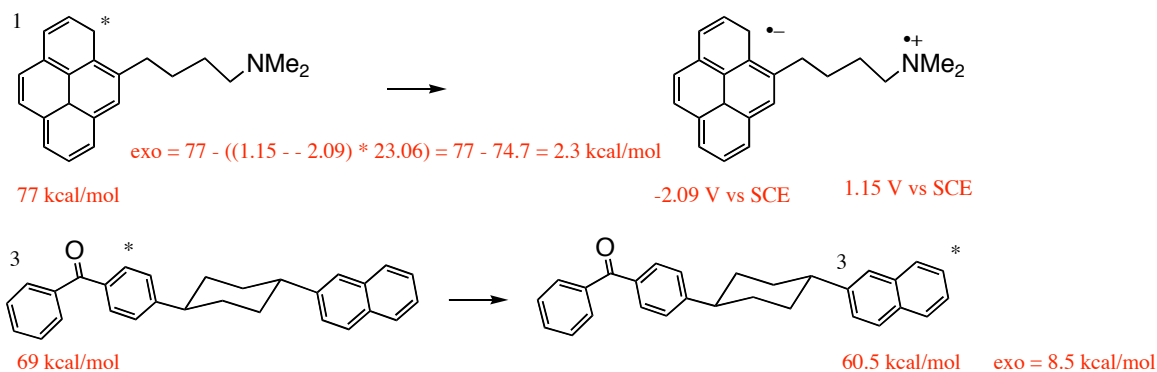


**Question 1.**

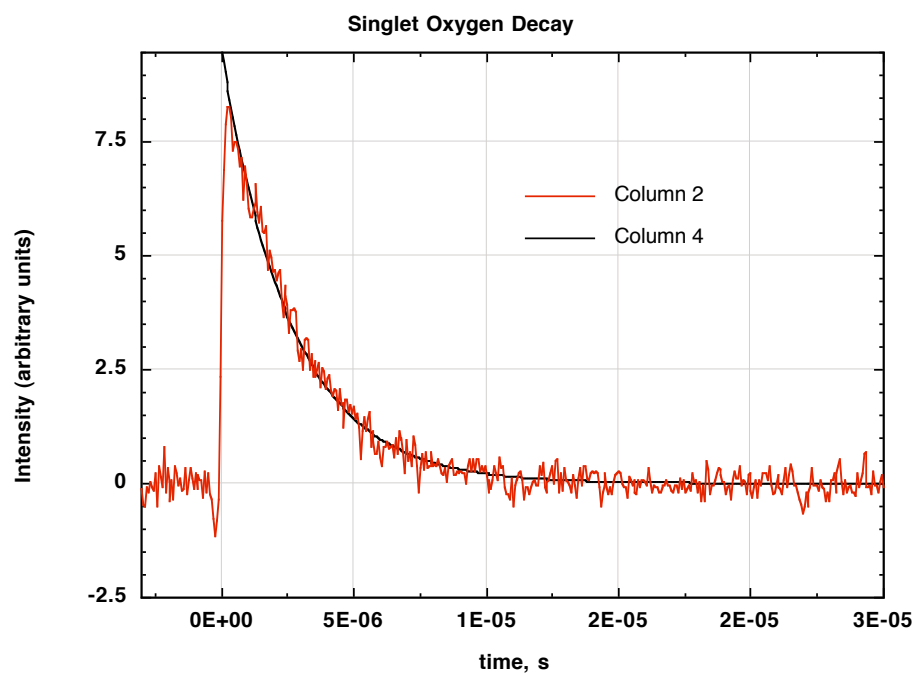


$K_{SV} = 247 \text{ M}^{-1}$   
 $k_{diff} \sim 1.0 \times 10^{10} \text{ M}^{-1} \text{ s}^{-1}$   
 Therefore,  $k_d = 1.0 \times 10^{10} / 247 = 4.04 \times 10^7 \text{ s}^{-1}$   
 Therefore lifetime =  $1 / 4.04 \times 10^7 = 24.7 \text{ ns}$ .

**Question 2.**

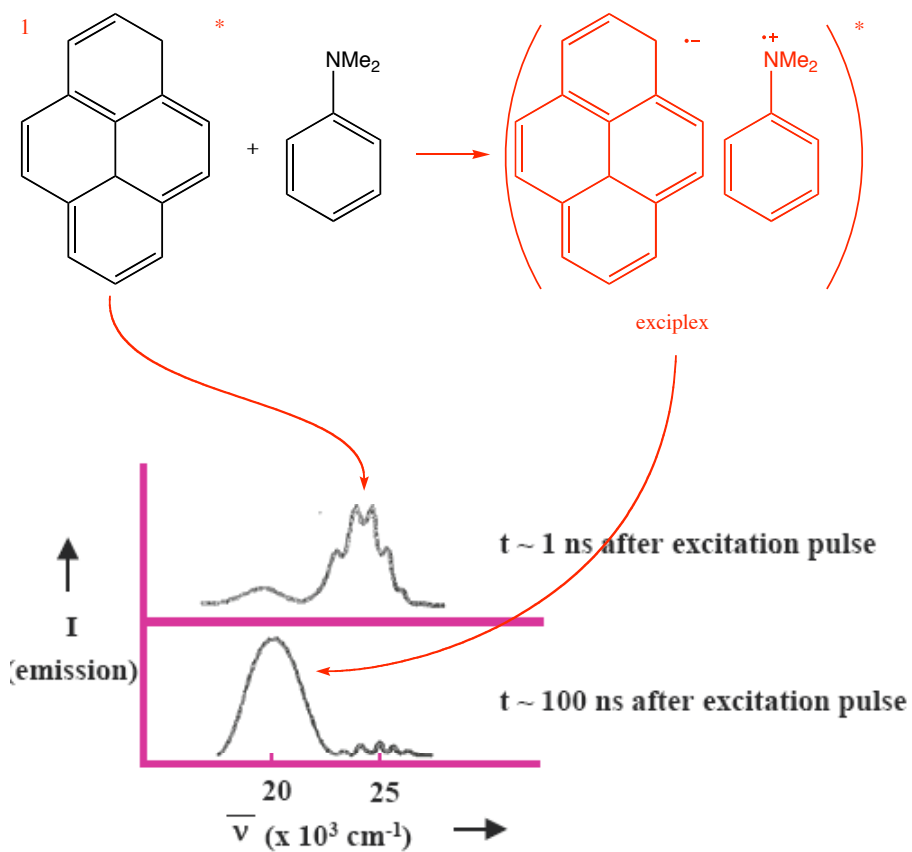


### Question 3.

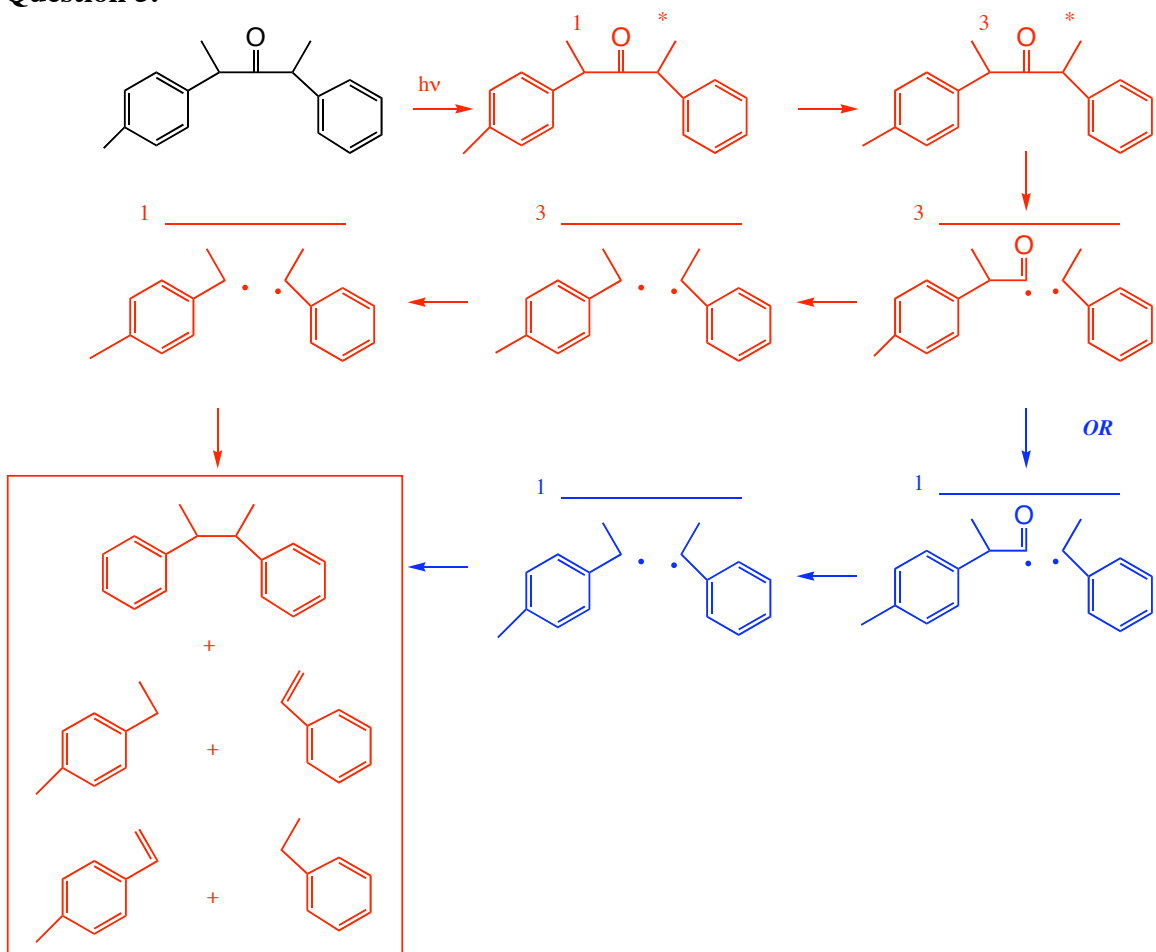


$k(\text{obs}) = 3.8 \times 10^5 \text{ s}^{-1}$ , lifetime =  $1/k(\text{obs}) = 2.6$  microseconds

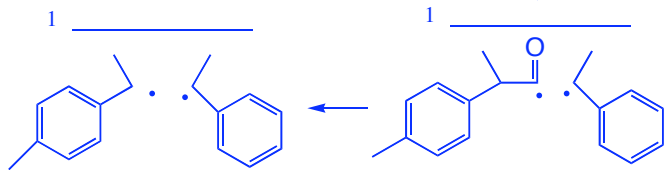
### Question 4.



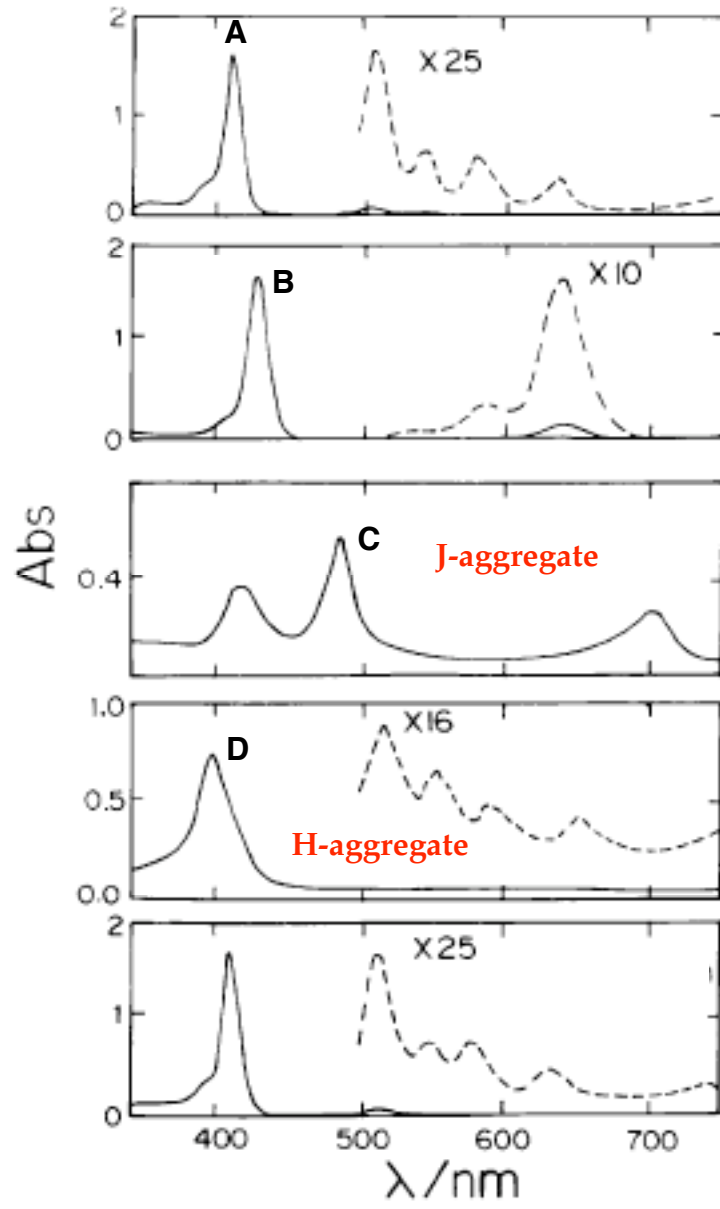
**Question 5.**



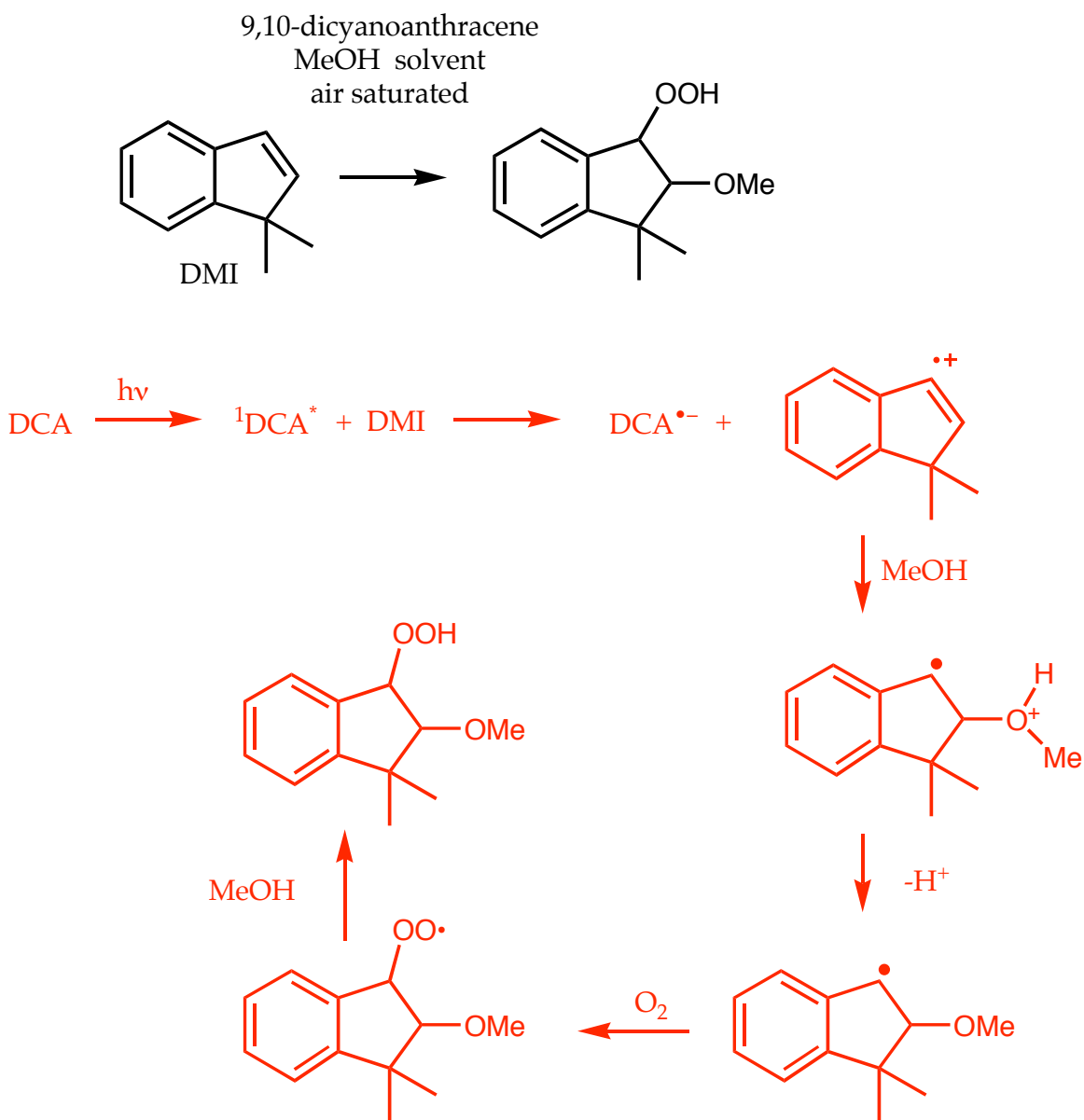
OR



Question 6.



### Question 7.



### Question 8.

The crossing point of the spectra for perylene is  $22800 \text{ cm}^{-1} = 65 \text{ kcal/mol}$   
The crossing point of the spectra for quinine is  $25050 \text{ cm}^{-1} = 71.5 \text{ kcal/mol}$