Group Meeting Problems

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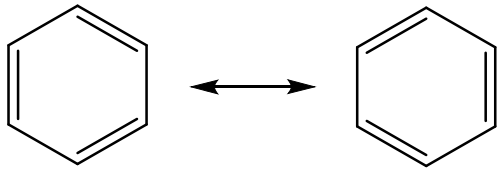
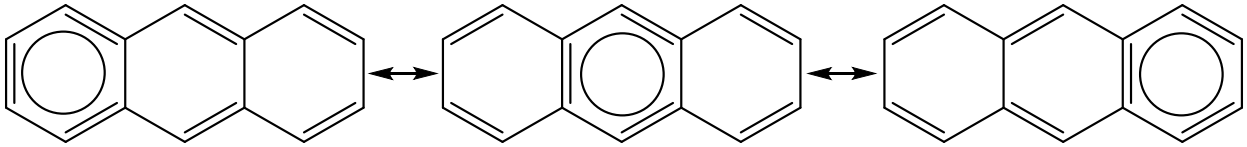
A:

Benzene is often depicted as two resonating Kekule structures. While this model has been disputed, it serves well to explain the reactivity and stability of benzenoids. Such a localized system is termed an “aromatic sextet”.

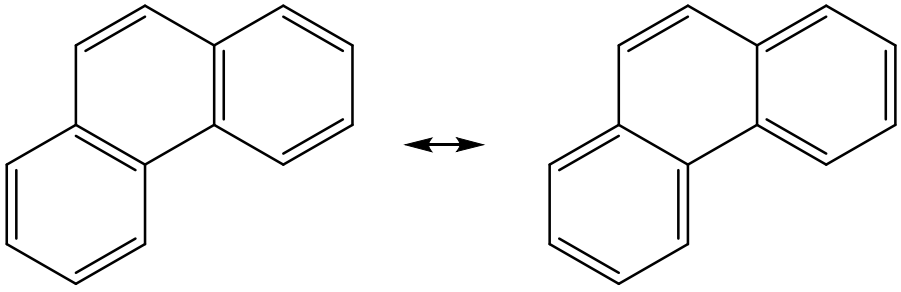


More complicated polycyclic aromatic hydrocarbons can also be described by such resonating structures (see anthracene below). However, it was suggested that these structures have a decreased aromatic stability because the “aromatic sextet” cannot exist for all rings at once.

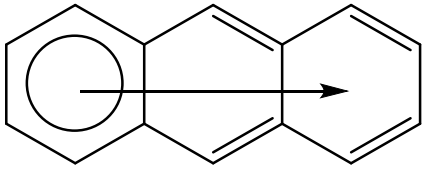


○ = aromatic sextet

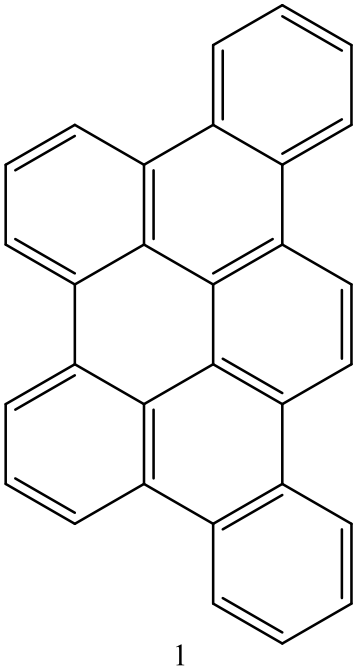
A closer look at resonance structures of anthracene shows that only one benzene-like aromatic sextet can exist at one time. On the other hand, phenanthrene shows two resonance structures where the sextet is localized to the flanking rings. Thus, the presence of two complete sextets in phenanthrene and only one in anthracene has been used to explain the higher reactivity of anthracene.



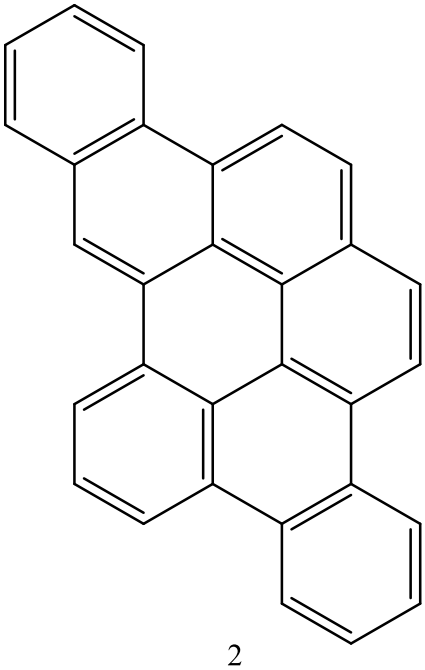
A simple way to represent the moving aromatic sextet in anthracene is depicted below:



1. Do you expect the resonance energy of naphthalene to be more or less than that of benzene?
2. Draw the product of bromine addition to anthracene and phenanthrene.
3. Using the above information, explain which of the following structures (**1** or **2**) is more likely to react with maleic anhydride



1



2

B:

Examine the structure below. What are the relationships between the functional groups? What would happen to the molecule upon heating?
Design a synthesis for the following molecule (cis-fused). Can it be done enantioselectively? What are the challenges? Can you make a trans-fused structure?