14 AROMATIC COMPOUNDS

SOLUTIONS TO PROBLEMS

14.1 (a) 4-Bromobenzoic acid (or *p*-bromobenzoic acid)

(b) 2-Benzyl-1.3-cyclohexadiene

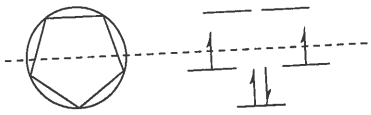
(c) 2-Chloro-2-phenylpentane

(d) Phenyl propyl ether

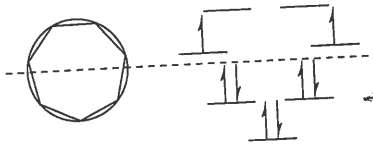
14.2 Compounds (a) and (b) would yield only one monosubstitution product.

14.3 Resonance structures are defined as being structures that differ *only* in the positions of the electrons. In the two 1,3,5-cyclohexatrienes shown, the carbon atoms are in different positions; therefore, they cannot be resonance structures.

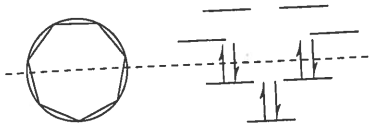
14.4 The cyclopentadienyl cation would be a diradical. We would not expect it to be aromatic.



14.5 (a) No, the cycloheptatrienyl anion (below) would be a diradical.

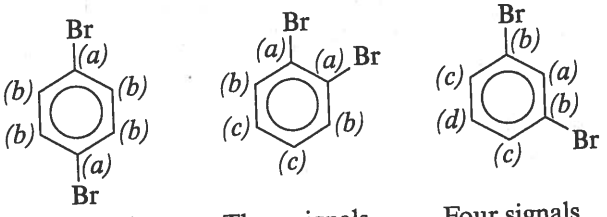


(b) The cycloheptatrienyl cation (below) would be aromatic because it would have a closed bonding shell of delocalized π electrons.



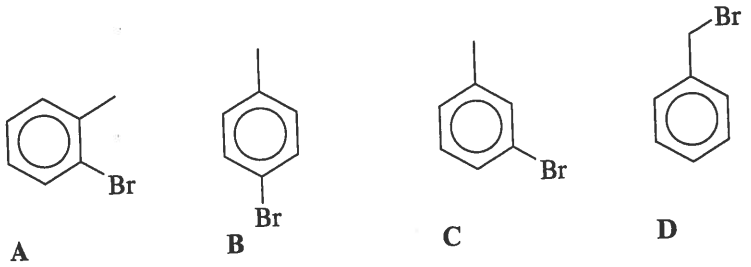
14.6 If the 1,3,5-cycloheptatrienyl anion *were* aromatic, we would expect it to be unusually stable. This would mean that 1,3,5-cycloheptatriene should be unusually acidic. The fact that 1,3,5-cycloheptatriene is not unusually acidic (it is less acidic than 1,3,5-heptatriene) confirms the prediction made in the previous problem, that the 1,3,5-cycloheptatrienyl anion should not be aromatic.

14.14 Because of their symmetries, *p*-dibromobenzene would give two ^{13}C signals, *o*-dibromobenzene would give three, and *m*-dibromobenzene would give four.



Two signals Three signals Four signals

14.15



A **B** **C** **D**

A. Strong absorption at 740 cm^{-1} is characteristic of ortho substitution.

B. A very strong absorption peak at 800 cm^{-1} is characteristic of para substitution.

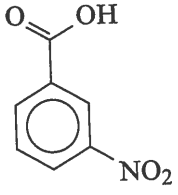
C. Strong absorption peaks at 680 and 760 cm^{-1} are characteristic of meta substitution.

D. Very strong absorption peaks at 693 and 765 cm^{-1} are characteristic of a monosubstituted benzene ring.

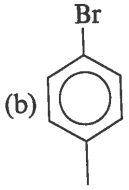
Problems

Nomenclature

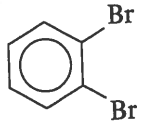
14.16 (a)



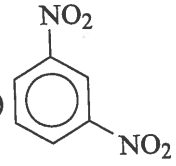
(b)



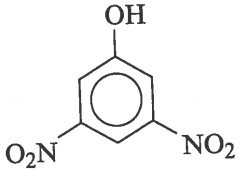
(c)



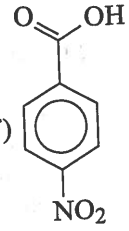
(d)

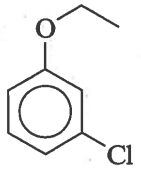


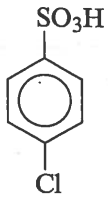
(e)

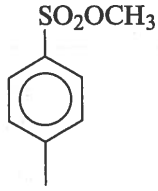


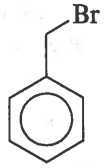
(f)

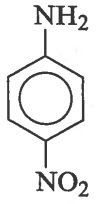


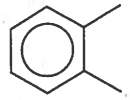
(g) 

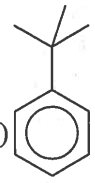
(h) 

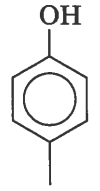
(i) 

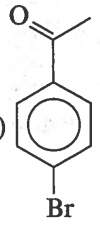
(j) 

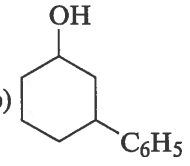
(k) 

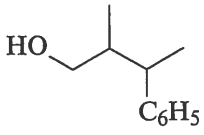
(l) 

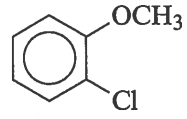
(m) 

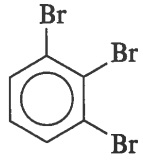
(n) 

(o) 

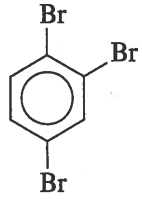
(p) 

(q) 

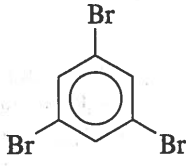
(r) 

14.17 (a) 

1,2,3-Tribromo-benzene



1,2,4-Tribromo-benzene



1,3,5-Tribromo-benzene