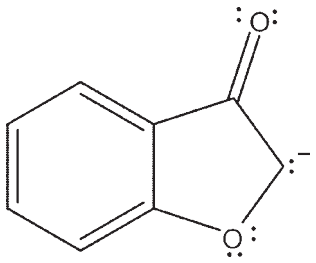
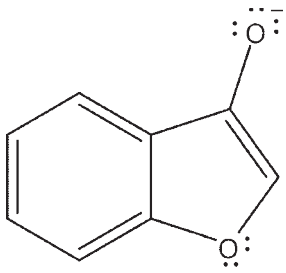
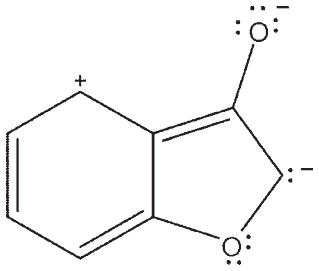
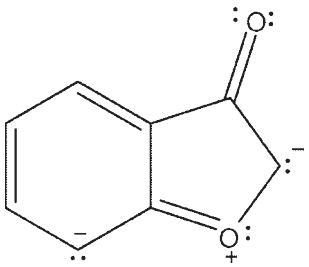
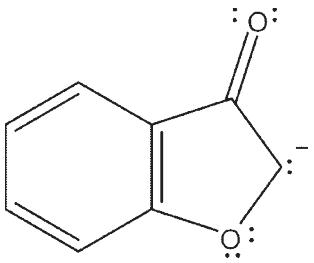
19. Which of the following resonance forms would be expected to be the most important contributor for the anionic species?

a. 

b. 

c. 

d. 

e. 

ANS: B DIF: Medium REF: 1.4
OBJ: Analyze resonance forms for stability MSC: Analyzing

20. Which of the following arrow conventions is used to show the relationship of two chemical species as resonance structures?

a. 

b. 

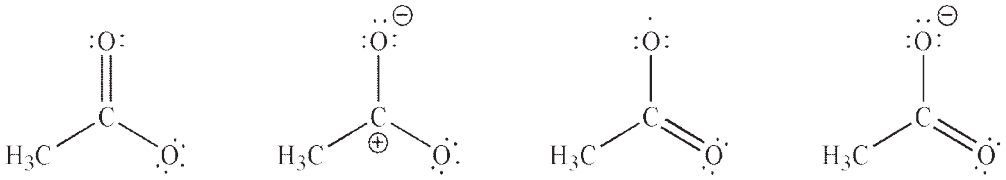
c. 

d. 

e. Both a and b

ANS: A DIF: Easy REF: 1.4
OBJ: Identify resonance structures MSC: Remembering

21. Which two of the following structures are *equivalent* resonance contributors?



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

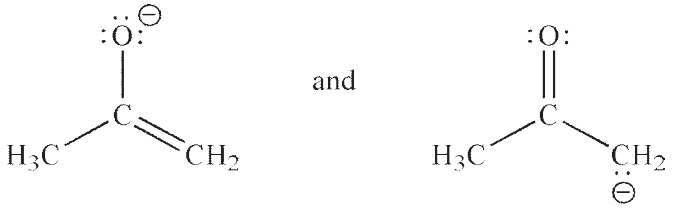
a. **A** and **B**
b. **A** and **C**
c. **B** and **C**
d. **A** and **D**
e. All the structures are equivalent.

ANS: B DIF: Easy REF: 1.4
OBJ: Identify resonance structures MSC: Analyzing

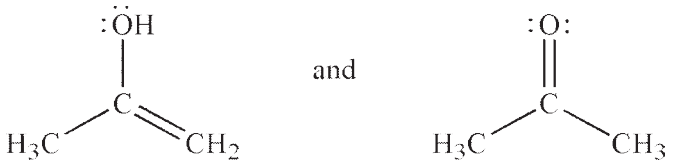
22. Which of the following pairs are *not* related as resonance structures?

a.

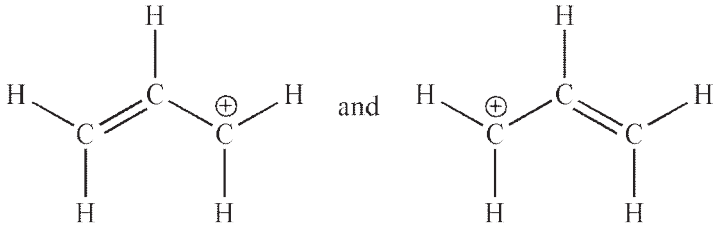
b.



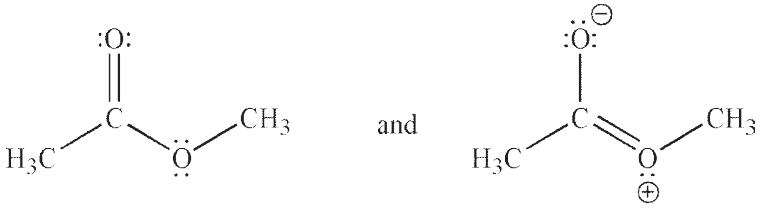
c.



d.

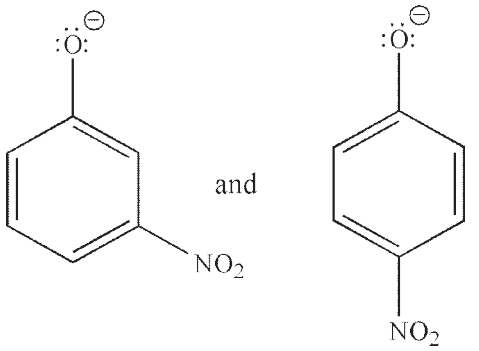


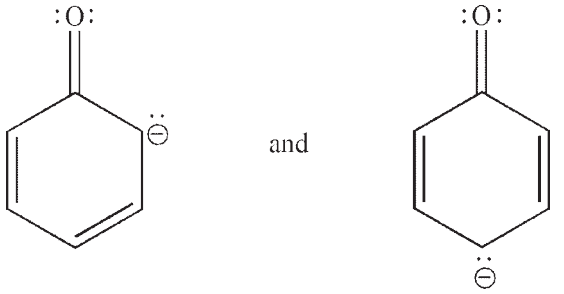
e.



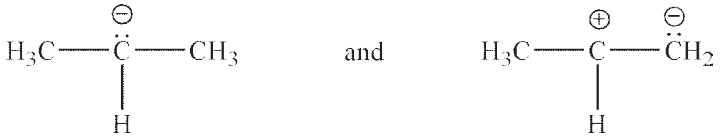
ANS: C DIF: Medium REF: 1.4
OBJ: Identify resonance structures MSC: Analyzing

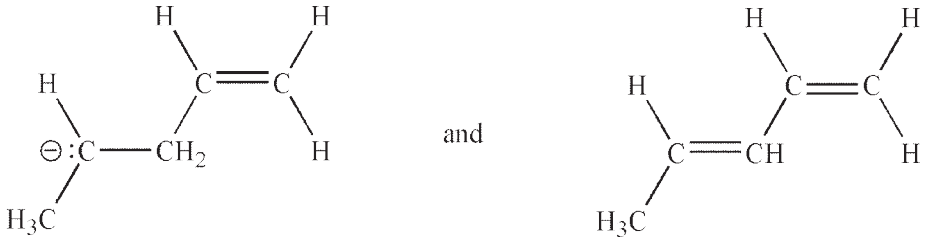
23. Which of the following pairs are related as resonance structures? All nonzero formal charges are shown.

a. 


b. 

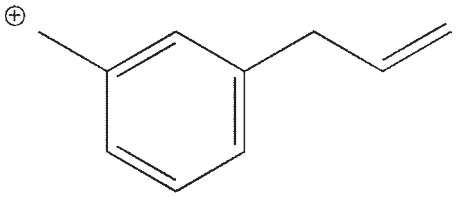

c. 


d. 

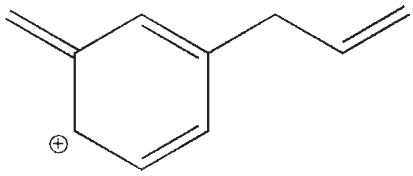

e. 

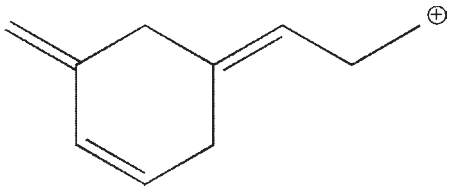

ANS: B DIF: Medium REF: 1.4
OBJ: Identify resonance structures MSC: Analyzing

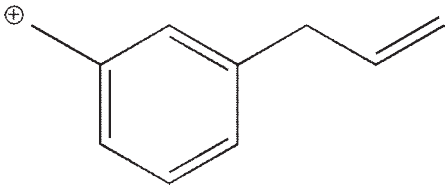
24. Which of the structures shown is *not* related to Structure **A** as a resonance contributor?

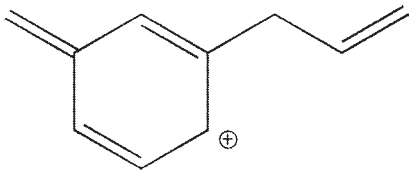


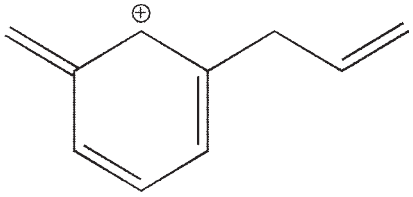
**Structure A**

a. 

b. 

c. 

d. 

e. 

ANS: B DIF: Medium REF: 1.4
OBJ: Identify resonance structures MSC: Analyzing

25. In the orbital interaction diagram for ground state $H_2$, how many electrons occupy the antibonding molecular orbital?

a. 0
b. 1
c. 2
d. 3
e. 4

ANS: A DIF: Easy REF: 1.5
OBJ: Construct molecular orbital diagrams MSC: Applying

26. How many molecular orbitals are generated from combining one 2*p* orbital on carbon and one 2*p* orbital on oxygen?

a. 0
b. 1
c. 2
d. 3
e. 4

ANS: C DIF: Easy REF: 1.5
OBJ: Apply rules for molecular orbital construction MSC: Applying

27. How many antibonding molecular orbitals are generated from combining one 2*p* orbital on nitrogen and one 2*p* orbital on carbon?

a. 0
b. 1
c. 2
d. 3
e. 4

ANS: B DIF: Easy REF: 1.5
OBJ: Apply rules for molecular orbital construction MSC: Applying

28. A certain orbital interaction diagram has four bonding molecular orbitals and four antibonding molecular orbitals. How many atomic orbitals were mixed to create all these orbitals?

a. 2
b. 4
c. 8
d. 16
e. It cannot be determined from the information given.

ANS: C DIF: Easy REF: 1.5
OBJ: Apply rules for molecular orbital construction MSC: Applying

29. Which of the following statements about the molecular orbital diagram for $H_2^-$ is *false*?

a. There are two atomic orbitals that mix to produce molecular orbitals.
b. There is one bonding molecular orbital.
c. There is one antibonding molecular orbital.
d. All bonding orbitals are occupied.
e. All antibonding orbitals are unoccupied.

ANS: E DIF: Medium REF: 1.5
OBJ: Apply rules for molecular orbital construction MSC: Applying

30. Which of the following molecular orbitals is the highest in energy? (All were generated by the mixing of four 2*p* orbitals.)

a. 
b. 
c. 
d. 
e. All four orbitals shown are equal in energy.

ANS: C DIF: Difficult REF: 1.5
OBJ: Apply rules for molecular orbital construction MSC: Applying