|  |
| --- |
| **Multiple Choice** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. What is the molecular formula of limonene, the major volatile compound in orange peel oil?

|  |  |  |
| --- | --- | --- |
|   | a.  | C10H18 |
|   | b.  | C10H20 |
|   | c.  | C10H16 |
|   | d.  | C11H14 |
|   | e.  | C11H18 |

|  |  |
| --- | --- |
| *ANSWER:* | c |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2. Of those indicated, which would be the shortest carbon-carbon bond in -selinene?

|  |  |  |
| --- | --- | --- |
|   | a.  | A |
|   | b.  | B |
|   | c.  | C |
|   | d.  | D |
|   | e.  | E |

|  |  |
| --- | --- |
| *ANSWER:* | b |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3. What would be the ideal value for the indicated bond angle?

|  |  |  |
| --- | --- | --- |
|   | a.  | 120° |
|   | b.  | 90° |
|   | c.  | 104° |
|   | d.  | 180° |
|   | e.  | 109° |

|  |  |
| --- | --- |
| *ANSWER:* | e |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4. Which structure matches the following condensed structure?

|  |  |  |
| --- | --- | --- |
|   | a.  |  |
|   | b.  |  |
|   | c.  |  |
|   | d.  |  |
|   | e.  |  |

|  |  |
| --- | --- |
| *ANSWER:* | a |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5. Which one of the following structures must be incorrect?

|  |  |  |
| --- | --- | --- |
|   | a.  |  |
|   | b.  |  |
|   | c.  |  |
|   | d.  |  |
|   | e.  |  |

|  |  |
| --- | --- |
| *ANSWER:* | c |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 6. Which of the following is **not** a resonance structure of the others?

|  |  |  |
| --- | --- | --- |
|   | a.  |  |
|   | b.  |  |
|   | c.  |  |
|   | d.  |  |
|   | e.  |  |

|  |  |
| --- | --- |
| *ANSWER:* | e |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 7. Which one of the resonance structures below would be the most important (i.e., most stable)?

|  |  |  |
| --- | --- | --- |
|   | a.  |  |
|   | b.  |  |
|   | c.  |  |
|   | d.  |  |
|   | e.  |  |

|  |  |
| --- | --- |
| *ANSWER:* | d |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8. How many atoms in ethene are required by *sp*2 bonding to lie in the same plane?

|  |  |  |
| --- | --- | --- |
|   | a.  | 2 |
|   | b.  | 3 |
|   | c.  | 4 |
|   | d.  | 5 |
|   | e.  | 6 |

|  |  |
| --- | --- |
| *ANSWER:* | e |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 9. Which one of the following structures is not chemically identical to the others?

|  |  |  |
| --- | --- | --- |
|   | a.  |  |
|   | b.  |  |
|   | c.  |  |
|   | d.  |  |
|   | e.  |  |

|  |  |
| --- | --- |
| *ANSWER:* | d |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 10. Which of the following pairs are **not** resonance structures of each other?

|  |  |  |
| --- | --- | --- |
|   | a.  |  |
|   | b.  |  |
|   | c.  |  |
|   | d.  |  |
|   | e.  | All are pairs of resonance structures. |

|  |  |
| --- | --- |
| *ANSWER:* | e |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 11. How many hydrogen atoms are part of the following steroid?

|  |  |  |
| --- | --- | --- |
|   | a.  | 18 |
|   | b.  | 20 |
|   | c.  | 21 |
|   | d.  | 22 |
|   | e.  | 24 |

|  |  |
| --- | --- |
| *ANSWER:* | e |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 12. In the following molecule, how many carbon atoms are in the *sp*3 hybridization state?

|  |  |  |
| --- | --- | --- |
|   | a.  | 2 |
|   | b.  | 4 |
|   | c.  | 5 |
|   | d.  | 6 |
|   | e.  | 11 |

|  |  |
| --- | --- |
| *ANSWER:* | d |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 13. In the following molecule, how many carbon atoms are in the *sp*2 hybridization state?

|  |  |  |
| --- | --- | --- |
|   | a.  | 0 |
|   | b.  | 1 |
|   | c.  | 2 |
|   | d.  | 4 |
|   | e.  | 6 |

|  |  |
| --- | --- |
| *ANSWER:* | d |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 14. In the following molecule, how many carbon atoms are in the *sp* hybridization state?

|  |  |  |
| --- | --- | --- |
|   | a.  | 2 |
|   | b.  | 4 |
|   | c.  | 6 |
|   | d.  | 12 |
|   | e.  | None of the above. |

|  |  |
| --- | --- |
| *ANSWER:* | e |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 15. The lone-pair of electrons on nitrogen in the following molecule reside in what type of orbital?

|  |  |  |
| --- | --- | --- |
|   | a.  | *sp*3​ |
|   | b.  | *sp*2​ |
|   | c.  | *sp* |
|   | d.  | 2*p* |
|   | e.  | 2*s* |

|  |  |
| --- | --- |
| *ANSWER:* | b |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 16. In the following molecule, how many carbon atoms are in the *sp*2 hybridization state?

|  |  |  |
| --- | --- | --- |
|   | a.  | 1 |
|   | b.  | 3 |
|   | c.  | 7 |
|   | d.  | 8 |
|   | e.  | 9 |

|  |  |
| --- | --- |
| *ANSWER:* | e |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 17. The boxed item most likely represents what?

|  |  |  |
| --- | --- | --- |
|   | a.  | *s* orbital |
|   | b.  | *sp*3 orbital |
|   | c.  | *p* orbital |
|   | d.  | could be any of A–C |
|   | e.  | None of the above. |

|  |  |
| --- | --- |
| *ANSWER:* | b |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 18. The following molecule contains how many carbon atoms in the *sp* hybridization state?

|  |  |  |
| --- | --- | --- |
|   | a.  | 1 |
|   | b.  | 3 |
|   | c.  | 8 |
|   | d.  | 13 |
|   | e.  | 16 |

|  |  |
| --- | --- |
| *ANSWER:* | a |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 19. The nitrogen of trimethylamine [(CH3)3N] contains how many lone pairs of electrons?

|  |  |  |
| --- | --- | --- |
|   | a.  | none |
|   | b.  | one |
|   | c.  | two |
|   | d.  | three |
|   | e.  | there is no nitrogen in this molecule |

|  |  |
| --- | --- |
| *ANSWER:* | b |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 20. A positive charge on oxygen generally occurs when:

|  |  |  |
| --- | --- | --- |
|   | a.  | oxygen has too many electrons. |
|   | b.  | oxygen has too few electrons. |
|   | c.  | oxygen is sharing one of its non-bonding electron pairs. |
|   | d.  | oxygen has too many non-bonding electron pairs. |
|   | e.  | oxygen is borrowing electrons from another atom. |

|  |  |
| --- | --- |
| *ANSWER:* | c |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 21. The carbon atom in CH2Cl2 has what hybridization?

|  |  |  |
| --- | --- | --- |
|   | a.  | *sp* |
|   | b.  | *sp*2 |
|   | c.  | *sp*3 |
|   | d.  | *sp*4 |
|   | e.  | they are not hybridized |

|  |  |
| --- | --- |
| *ANSWER:* | c |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 22. The molecular formula for piperitone is

|  |  |  |
| --- | --- | --- |
|   | a.  | C9H16O |
|   | b.  | C10H18O |
|   | c.  | C9H18O |
|   | d.  | C10H14O |
|   | e.  | C10H16O |

|  |  |
| --- | --- |
| *ANSWER:* | e |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 23. Which structure is different from the others?

|  |  |  |
| --- | --- | --- |
|   | a.  |  |
|   | b.  | CH3CHClCH(CH3)2​ |
|   | c.  |  |
|   | d.  |  |
|   | e.  | All are identical. |

|  |  |
| --- | --- |
| *ANSWER:* | e |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 24. A fairly common algal metabolite is the compound (-)-geosmin, which imparts a musty odor to water even at concentrations in the ppb range. What is the molecular formula of geosmin?

|  |  |  |
| --- | --- | --- |
|   | a.  | C11H20O |
|   | b.  | C12H22O |
|   | c.  | C11H21O |
|   | d.  | C12H20O |
|   | e.  | C12H21O |

|  |  |
| --- | --- |
| *ANSWER:* | b |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 25. Which of the carbon-carbon bonds indicated would you expect to be the **longest** in stilbene?

|  |  |  |
| --- | --- | --- |
|   | a.  | A |
|   | b.  | B |
|   | c.  | C |
|   | d.  | D |
|   | e.  | E |

|  |  |
| --- | --- |
| *ANSWER:* | d |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 26. Which of the following pairs are **not** resonance structures of each other?

|  |  |  |
| --- | --- | --- |
|   | a.  |  |
|   | b.  |  |
|   | c.  |  |
|   | d.  |  |
|   | e.  | All are pairs of resonance structures. |

|  |  |
| --- | --- |
| *ANSWER:* | a |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 27. The following molecule has what molecular formula?

|  |  |  |
| --- | --- | --- |
|   | a.  | C39H58O |
|   | b.  | C40H58O |
|   | c.  | C39H60O |
|   | d.  | C44H44O |
|   | e.  | None of the above. |

|  |  |
| --- | --- |
| *ANSWER:* | a |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 28. What is the molecular formula of carvone, the major volatile compound in caraway oil?

|  |  |  |
| --- | --- | --- |
|   | a.  | C10H18O |
|   | b.  | C10H17O |
|   | c.  | C10H16O |
|   | d.  | C10H14O |
|   | e.  | C10H15O |

|  |  |
| --- | --- |
| *ANSWER:* | d |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 29. Of those indicated, which would be the shortest carbon-carbon bond in -cadinene?

|  |  |  |
| --- | --- | --- |
|   | a.  | A |
|   | b.  | B |
|   | c.  | C |
|   | d.  | D |
|   | e.  | E |

|  |  |
| --- | --- |
| *ANSWER:* | a |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 30. What would be the ideal value for the indicated bond angle?

|  |  |  |
| --- | --- | --- |
|   | a.  | 120° |
|   | b.  | 90° |
|   | c.  | 104° |
|   | d.  | 180° |
|   | e.  | 109° |

|  |  |
| --- | --- |
| *ANSWER:* | a |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 31. Which structure matches the following condensed structure?

|  |  |  |
| --- | --- | --- |
|   | a.  |  |
|   | b.  |  |
|   | c.  |  |
|   | d.  |  |
|   | e.  |  |

|  |  |
| --- | --- |
| *ANSWER:* | d |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 32. Which one of the following structures must be incorrect?

|  |  |  |
| --- | --- | --- |
|   | a.  |  |
|   | b.  |  |
|   | c.  |  |
|   | d.  |  |
|   | e.  |  |

|  |  |
| --- | --- |
| *ANSWER:* | b |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 33. How many *sp2* hybridized carbon atoms are in the potent anticancer compound hydroxymethylacylfulvene?

|  |  |  |
| --- | --- | --- |
|   | a.  | 2 |
|   | b.  | 4 |
|   | c.  | 6 |
|   | d.  | 8 |
|   | e.  | None of the above. |

|  |  |
| --- | --- |
| *ANSWER:* | e |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 34. In the following molecule, how many carbon atoms are in the *sp*3 hybridization state?

|  |  |  |
| --- | --- | --- |
|   | a.  | 2 |
|   | b.  | 4 |
|   | c.  | 5 |
|   | d.  | 6 |
|   | e.  | 9 |

|  |  |
| --- | --- |
| *ANSWER:* | a |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 35. Which of the following statements are true of sp orbitals?

|  |  |  |
| --- | --- | --- |
|   | a.  | Orbitals of the *sp* type are 50% *s* and 50% *p* character. |
|   | b.  | They are hybrid orbitals. |
|   | c.  | They are linear. |
|   | d.  | They result when one *s* orbital and one *p* orbital are mixed. |
|   | e.  | All are correct. |

|  |  |
| --- | --- |
| *ANSWER:* | e |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 36. Which of the following molecules are most likely to be held together by a purely covalent bond?

|  |  |  |
| --- | --- | --- |
|   | a.  | NaCl |
|   | b.  | H2 |
|   | c.  | HF |
|   | d.  | BH3 |
|   | e.  | KI |

|  |  |
| --- | --- |
| *ANSWER:* | b |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 37. What is the molecular formula of camphor?

|  |  |  |
| --- | --- | --- |
|   | a.  | C10H15O |
|   | b.  | C10H16O |
|   | c.  | C10H17O |
|   | d.  | C11H18O |
|   | e.  | C11H16O |

|  |  |
| --- | --- |
| *ANSWER:* | b |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 38. Camptothecin is an important anticancer compound; how many carbons are in the *sp* hybridization state?

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

|  |  |
| --- | --- |
| *ANSWER:* | a |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 39. How many *sp*3 carbons are in the following molecule?

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

|  |  |
| --- | --- |
| *ANSWER:* | c |

 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 40. The process of adding electrons one by one to atomic orbitals beginning with the lowest energy is described by:

|  |  |  |
| --- | --- | --- |
|   | a.  | the Aufbau Principle. |
|   | b.  | Hund's Rule. |
|   | c.  | the de Broglie Relation. |
|   | d.  | the Pauli Exclusion Principle. |
|   | e.  | Coulomb's Law. |

|  |  |
| --- | --- |
| *ANSWER:* | a |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 41. Which of the following cannot be a correct Lewis structure?

|  |  |  |
| --- | --- | --- |
|   | a.  |  |
|   | b.  |  |
|   | c.  |  |
|   | d.  |  |
|   | e.  | All are correct. |

|  |  |
| --- | --- |
| *ANSWER:* | c |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 42. How many different resonance structures can be drawn for the benzyl cation (shown below) which place the plus charge on a carbon atom in the ring?

|  |  |  |
| --- | --- | --- |
|   | a.  | 1 |
|   | b.  | 2 |
|   | c.  | 3 |
|   | d.  | 5 |
|   | e.  | 6 |

|  |  |
| --- | --- |
| *ANSWER:* | c |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 43. Which of the following represent resonance contributing Lewis structures for CH2N2?

|  |  |  |
| --- | --- | --- |
|   | a.  |  |
|   | b.  |  |
|   | c.  |  |
|   | d.  |  |
|   | e.  | both A and B are correct |

|  |  |
| --- | --- |
| *ANSWER:* | e |

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|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 44. The following molecule belongs to a class of compounds known as allenes. Based on your knowledge of bonding, predict the hybridization of the carbon atom indicated by the arrow.

|  |  |  |
| --- | --- | --- |
|   | a.  | *sp* |
|   | b.  | *sp*2 |
|   | c.  | *sp*3 |
|   | d.  | *p*-*p* pi |
|   | e.  | a hypervalent carbon |

|  |  |
| --- | --- |
| *ANSWER:* | a |

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|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 45. How many isomers of C4H9Br are possible?

|  |  |  |
| --- | --- | --- |
|   | a.  | two |
|   | b.  | three |
|   | c.  | four |
|   | d.  | five |
|   | e.  | six |

|  |  |
| --- | --- |
| *ANSWER:* | c |

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|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 46. How many isomers of C5H12 are possible?

|  |  |  |
| --- | --- | --- |
|   | a.  | two |
|   | b.  | three |
|   | c.  | four |
|   | d.  | five |
|   | e.  | six |

|  |  |
| --- | --- |
| *ANSWER:* | b |

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|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 47. Which of the following most correctly defines "structural isomers"?

|  |  |  |
| --- | --- | --- |
|   | a.  | molecules with different molecular formulas but the same connectivity |
|   | b.  | compounds that are not constitutional isomers |
|   | c.  | molecules with the same molecular formula but different connectivity |
|   | d.  | *Anti* and *gauche* conformers |
|   | e.  | both B and C |

|  |  |
| --- | --- |
| *ANSWER:* | c |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 48. How many structural isomers exist for the formula C6H14?

|  |  |  |
| --- | --- | --- |
|   | a.  | 3 |
|   | b.  | 4 |
|   | c.  | 5 |
|   | d.  | 6 |
|   | e.  | 7 |

|  |  |
| --- | --- |
| *ANSWER:* | c |

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|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 49. A hydrocarbon with a double bond and a ring will have the general formula?

|  |  |  |
| --- | --- | --- |
|   | a.  | C*n*H2*n*+2 |
|   | b.  | C*n*H2*n* |
|   | c.  | C*n*H2*n*-2 |
|   | d.  | C*n*H2*n*-4 |
|   | e.  | C2*n*H2*n* |

|  |  |
| --- | --- |
| *ANSWER:* | c |

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|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 50. What is the hybridization of the each of the labeled atoms for the potent neurotoxin (-)-gephyrotoxin?

|  |  |  |
| --- | --- | --- |
|   | a.  | A = *sp*2, B = *sp*, C = *sp*2, D = *sp*3, E = *sp*3 |
|   | b.  | A = *sp*2, B = *sp*, C = *sp*3, D = *sp*3, E = *sp*2 |
|   | c.  | A = *sp*2, B = *sp*, C = *sp*2, D = *sp*3, E = *sp*2 |
|   | d.  | A = *sp*2, B = *sp*, C = *sp*3, D = *sp*3, E = *sp*3 |
|   | e.  | A = *sp*, B = *sp*, C = *sp*3, D = *sp*3, E = *sp*3 |

|  |  |
| --- | --- |
| *ANSWER:* | d |

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