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| 1. The force between two bodies having identical electric charges   |  |  |  | | --- | --- | --- | |  | a. | is a force of repulsion | |  | b. | is a force of repulsion if the charges are negative, and one of attraction if they are positive | |  | c. | increases as the bodies are moved further apart | |  | d. | is independent of the distance between them | |  | e. | is directly proportional to the distance between them |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 2. Which of the following groups contains no ionic compounds?   |  |  |  | | --- | --- | --- | |  | a. | HCN, NO2, Ca(NO3)2 | |  | b. | PCl5, LiBr, Zn(OH)2 | |  | c. | KOH, CCl4, SF4 | |  | d. | NaH, CaF2, NaNH2 | |  | e. | CH2O, H2S, NH3 |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | ionic bonding | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 3. In which pair do both compounds exhibit predominantly ionic bonding?   |  |  |  | | --- | --- | --- | |  | a. | SCl4 and HF | |  | b. | Na2SO3 and NH3 | |  | c. | KI and O3 | |  | d. | BaF and H2O | |  | e. | RbCl and MgS |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | True | | *KEYWORDS:* | bonding | Chemistry | general chemistry | ionic bonding | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 4. When a metal reacts with a nonmetal a covalent bond is formed.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | ionic bonding | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 5. A nonpolar covalent bond results from the unequal sharing of a pair of electrons between atoms in a molecule.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 6. Atoms having equal or nearly equal electronegativities are expected to form   |  |  |  | | --- | --- | --- | |  | a. | no bonds | |  | b. | polar covalent bonds | |  | c. | nonpolar covalent bonds | |  | d. | ionic bonds | |  | e. | covalent bonds |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 7. Choose the compound with the most ionic bond.   |  |  |  | | --- | --- | --- | |  | a. | LiCl | |  | b. | KF | |  | c. | NaCl | |  | d. | LiF | |  | e. | KCl |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 8. Atoms with greatly different electronegativity values are expected to form   |  |  |  | | --- | --- | --- | |  | a. | no bonds | |  | b. | covalent bonds | |  | c. | triple bonds | |  | d. | ionic bonds | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 9. Which of the following bonds is least polar?   |  |  |  | | --- | --- | --- | |  | a. | C—O | |  | b. | H—C | |  | c. | S—Cl | |  | d. | Br—Br | |  | e. | They are all nonpolar. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 10. For the elements Ba, F, and P, the order of increasing electronegativity is:   |  |  |  | | --- | --- | --- | |  | a. | Ba < F < P | |  | b. | Ba < P < F | |  | c. | P < F < Ba | |  | d. | F < Ba < P | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 11. For the elements Cs, F, and Cl, the order of increasing electronegativity is:   |  |  |  | | --- | --- | --- | |  | a. | F < Cl < Cs | |  | b. | Cs < Cl < F | |  | c. | Cl < Cs < F | |  | d. | F < Cs < Cl | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 12. In the gaseous phase, which of the following diatomic molecules would be the most polar?   |  |  |  | | --- | --- | --- | |  | a. | CsF | |  | b. | CsCl | |  | c. | NaCl | |  | d. | NaF | |  | e. | LiF |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 13. Based on electronegativities, which of the following would you expect to be most ionic?   |  |  |  | | --- | --- | --- | |  | a. | N2 | |  | b. | CaF2 | |  | c. | CO2 | |  | d. | CH4 | |  | e. | CF4 |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 14. In which case is the bond polarity *incorrect?*   |  |  |  | | --- | --- | --- | |  | a. | δ+H–Fδ– | |  | b. | δ+K–Oδ– | |  | c. | δ+Mg–Hδ– | |  | d. | δ+Cl–Iδ– | |  | e. | δ+Si–Sδ– |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 15. Metals typically have \_\_\_\_\_\_\_ electronegativity values.   |  |  |  | | --- | --- | --- | |  | a. | high | |  | b. | low | |  | c. | negative | |  | d. | no | |  | e. | two of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 16. The electron pair in a C-F bond could be considered   |  |  |  | | --- | --- | --- | |  | a. | closer to C because carbon has a larger radius and thus exerts greater control over the shared electron pair | |  | b. | closer to F because fluorine has a higher electronegativity than carbon | |  | c. | closer to C because carbon has a lower electronegativity than fluorine | |  | d. | an inadequate model since the bond is ionic | |  | e. | centrally located directly between the C and F |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 17. Based on electronegativity differences, which of the following is most likely to be ionic?   |  |  |  | | --- | --- | --- | |  | a. | CaF2 | |  | b. | Cl2 | |  | c. | NH3 | |  | d. | NO | |  | e. | CI4 |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | True | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 18. What is the correct order of the following bonds in terms of decreasing polarity?   |  |  |  | | --- | --- | --- | |  | a. | N-Cl, P-Cl, As-Cl | |  | b. | P-Cl, N-Cl, As-Cl | |  | c. | As-Cl, N-Cl, P-Cl | |  | d. | P-Cl, As-Cl, N-Cl | |  | e. | As-Cl, P-Cl, N-Cl |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | polar covalent bond | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 19. Which of the following bonds would be the most polar without being considered ionic?   |  |  |  | | --- | --- | --- | |  | a. | Mg-O | |  | b. | C-O | |  | c. | O-O | |  | d. | Si-O | |  | e. | N-O |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | polar covalent bond | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 20. Which of the following bonds would be the least polar, yet still be considered polar covalent?   |  |  |  | | --- | --- | --- | |  | a. | Mg-O | |  | b. | C-O | |  | c. | O-O | |  | d. | Si-O | |  | e. | N-O |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | polar covalent bond | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 21. In which of the following compounds does the bond between the central atom and bromine have the greatest ionic character?   |  |  |  | | --- | --- | --- | |  | a. | LiBr | |  | b. | KBr | |  | c. | SeBr2 | |  | d. | AsBr3 | |  | e. | CaBr2 |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 22. Which of the following statements is *incorrect*?   |  |  |  | | --- | --- | --- | |  | a. | Ionic bonding results from the transfer of electrons from one atom to another. | |  | b. | Dipole moments result from the unequal distribution of electrons in a molecule. | |  | c. | The electrons in a polar bond are found nearer to the more electronegative element. | |  | d. | A molecule with very polar bonds can be nonpolar. | |  | e. | Linear molecules cannot have a net dipole moment. |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.3 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | dipole moment | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 23. Which of the following molecules has no dipole moment?   |  |  |  | | --- | --- | --- | |  | a. | CO2 | |  | b. | NH3 | |  | c. | H2O | |  | d. | all | |  | e. | none |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.3 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | dipole moment | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 24. Which of the following has the smallest radius?   |  |  |  | | --- | --- | --- | |  | a. | Br– | |  | b. | S2– | |  | c. | Xe | |  | d. | Ca2+ | |  | e. | Kr |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.4 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | ionic bonding | ionic radii | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 25. Which of these is an isoelectronic series?   |  |  |  | | --- | --- | --- | |  | a. | Na+, K+, Rb+, Cs+ | |  | b. | K+, Ca2+, Ar, S2– | |  | c. | Na+, Mg2+, S2–, Cl– | |  | d. | Li, Be, B, C | |  | e. | none of these (A-D) |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.4 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | ionic bonding | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 26. Which of the following has the smallest radius?   |  |  |  | | --- | --- | --- | |  | a. | K+ | |  | b. | Cl– | |  | c. | Rb+ | |  | d. | S2– | |  | e. | Ar |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.4 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | ionic bonding | ionic radii | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 27. Which of the following has the smallest radius?   |  |  |  | | --- | --- | --- | |  | a. | F– | |  | b. | Ne | |  | c. | O2– | |  | d. | Mg2+ | |  | e. | Na+ |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.4 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | ionic bonding | ionic radii | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 28. Which of the following pairs is isoelectronic?   |  |  |  | | --- | --- | --- | |  | a. | Li+ and K+ | |  | b. | Na+ and Ne | |  | c. | I– and Cl– | |  | d. | S2– and Ne | |  | e. | Al3+ and B3+ |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.4 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | ionic bonding | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 29. Which of the following arrangements is in order of increasing size?   |  |  |  | | --- | --- | --- | |  | a. | Ga3+ > Ca2+ > K+ > Cl– > S2– | |  | b. | S2– > Cl– > K+ > Ca2+ > Ga3+ | |  | c. | Ga3+ > S2– > Ca2+ > Cl– > K+ | |  | d. | Ga3+ > Ca2+ > S2– > Cl– > K+ | |  | e. | Ga3+ > Ca2+ > S2– > K+ > Cl– |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.4 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | ionic bonding | ionic radii | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 30. The size in a series of isoelectronic ions increases as the nuclear charge increases.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.4 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | ionic bonding | ionic radii | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 31. Which of the following species would be expected to have the lowest ionization energy?   |  |  |  | | --- | --- | --- | |  | a. | F– | |  | b. | Ne | |  | c. | O2– | |  | d. | Mg2+ | |  | e. | Na+ |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.5 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Born-Haber cycle | Chemistry | general chemistry | ionic bonding | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 32. Which of the following ionic compounds has the largest lattice energy (i.e., the lattice energy most favorable to a stable lattice)?   |  |  |  | | --- | --- | --- | |  | a. | BaO | |  | b. | BeO | |  | c. | CsI | |  | d. | NaBr | |  | e. | BaS |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.5 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Born-Haber cycle | Chemistry | general chemistry | ionic bonding | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 33. Which of the following ionic compounds has the smallest lattice energy (i.e., the lattice energy least favorable to a stable lattice)?   |  |  |  | | --- | --- | --- | |  | a. | LiF | |  | b. | CsI | |  | c. | NaCl | |  | d. | BaO | |  | e. | MgO |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.5 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Born-Haber cycle | Chemistry | general chemistry | ionic bonding | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 34. Calculate the lattice energy for LiBr(*s*) given the following:   |  |  | | --- | --- | | sublimation energy for Li(*s*) | +166 kJ/mol | | Δ*Hf* for Br(*g*) | +97 kJ/mol | | first ionization energy of Li(*g*) | +520. kJ/mol | | electron affinity of Br(*g*) | –325 kJ/mol | | enthalpy of formation of LiBr(*s*) | –351 kJ/mol |  |  |  |  | | --- | --- | --- | |  | a. | 107 kJ/mol | |  | b. | 195 kJ/mol | |  | c. | –546 kJ/mol | |  | d. | –809 kJ/mol | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 8.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | bonding | Born-Haber cycle | Chemistry | general chemistry | ionic bonding | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 2/9/2017 1:54 AM | |

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| 35. Which of the following statements are *true* concerning ionic bonding?   |  |  |  | | --- | --- | --- | |  | a. | Ionic bonding occurs between a metal, which has a high affinity for electrons, and a nonmetal, which loses electrons relatively easy. | |  | b. | CaCl2 forms because Ca2+ is always a more stable species than the calcium atom alone. | |  | c. | Compounds with ionic bonds tend to have low melting points. | |  | d. | The electronegativity difference between the bonding atoms of ionic compounds is small since the electrons are not shared but rather held together by electrostatic forces. | |  | e. | All of the above statements are false. |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.5 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | ionic bonding | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 36. Which of the following statements concerning lattice energy is *false*?   |  |  |  | | --- | --- | --- | |  | a. | It is often defined as the energy released when an ionic solid forms from its ions. | |  | b. | MgO has a larger lattice energy than NaF. | |  | c. | The lattice energy for a solid with 2+ and 2– ions should be two times that for a solid with 1+ and 1– ions. | |  | d. | MgO has a larger lattice energy than LiF. | |  | e. | All of these are true. |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.5 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Born-Haber cycle | Chemistry | general chemistry | ionic bonding | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 37. Given the following information:   |  |  |  | | --- | --- | --- | |  | Li(*s*) → Li(*g*) | enthalpy of sublimation of Li(*s*) = 166 kJ/mol | |  | HI(*g*) → H(*g*) + I(*g*) | bond energy of HI = 295 kJ/mol | |  | Li(*g*) → Li+(*g*) + e– | ionization energy of Li(*g*) = 520. kJ/mol | |  | I(*g*) + e– → I–(*g*) | electron affinity of I(*g*) = –295 kJ/mol | |  | Li+(*g*) + I–(*g*) → LiI(*s*) | lattice energy of LiI(*s*) = –737 kJ/mol | |  | H2(*g*) → 2H(*g*) | bond energy of H2 = 432 kJ/mol |   Calculate the change in enthalpy for: 2Li(*s*) + 2HI(*g*) → H2(*g*) + 2LiI(*s*)   |  |  |  | | --- | --- | --- | |  | a. | 330 kJ | |  | b. | –534 kJ | |  | c. | –483 kJ | |  | d. | –984 kJ | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 8.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | bonding | Born-Haber cycle | Chemistry | general chemistry | ionic bonding | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 38. The first electron affinity value for oxygen is \_\_\_\_\_\_\_ and the second electron affinity value is \_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | unfavorable (endothermic), favorable (exothermic) | |  | b. | unfavorable (endothermic), unfavorable (endothermic) | |  | c. | favorable (exothermic), favorable (exothermic) | |  | d. | favorable (exothermic), unfavorable (endothermic) | |  | e. | More information is needed. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Born-Haber cycle | Chemistry | general chemistry | ionic bonding | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 39. In the reaction between magnesium and sulfur, the magnesium atoms   |  |  |  | | --- | --- | --- | |  | a. | become anions | |  | b. | become cations | |  | c. | become part of polyatomic ions | |  | d. | share electrons with sulfur | |  | e. | crystallize |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Born-Haber cycle | Chemistry | general chemistry | ionic bonding | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 40. When electrons in a molecule are not found between a pair of atoms but move throughout the molecule, this is called   |  |  |  | | --- | --- | --- | |  | a. | ionic bonding | |  | b. | covalent bonding | |  | c. | polar covalent bonding | |  | d. | delocalization of the electrons | |  | e. | a dipole moment |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | delocalization | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 41. Which of the following statements is *false*?   |  |  |  | | --- | --- | --- | |  | a. | Models are human interpretations, not the same as reality. | |  | b. | Models are often wrong. | |  | c. | Models usually start out simple and become more complex over time. | |  | d. | We often learn more when a model is wrong than when it is right. | |  | e. | A model should be discarded when any exception to it is found. |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.7 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 42. Choose the molecule with the strongest bond.   |  |  |  | | --- | --- | --- | |  | a. | F2 | |  | b. | Cl2 | |  | c. | Br2 | |  | d. | I2 | |  | e. | All are equal. |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.8 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bond energy | bonding | Chemistry | covalent bonding | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 43. Choose the molecule with the strongest bond.   |  |  |  | | --- | --- | --- | |  | a. | HF | |  | b. | HCl | |  | c. | HBr | |  | d. | HI | |  | e. | All are equal. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.8 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bond energy | bonding | Chemistry | covalent bonding | general chemist | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 44. Choose the molecule with the strongest bond.   |  |  |  | | --- | --- | --- | |  | a. | CH4 | |  | b. | H2O | |  | c. | NH3 | |  | d. | HF | |  | e. | All are equal |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.8 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bond energy | bonding | Chemistry | covalent bonding | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 45. Which of the following molecules exhibits the greatest bond energy?   |  |  |  | | --- | --- | --- | |  | a. | F2 | |  | b. | Cl2 | |  | c. | Br2 | |  | d. | I2 | |  | e. | all the same |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.8 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bond energy | bonding | Chemistry | covalent bonding | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 46. As the number of bonds between two carbon atoms increases, which one of the following decreases?   |  |  |  | | --- | --- | --- | |  | a. | number of electrons between the carbon atoms | |  | b. | bond energy | |  | c. | bond length | |  | d. | all of these | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.8 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 47. Using the following bond energies:   |  |  |  |  | | --- | --- | --- | --- | |  | Bond |  | Bond Energy (kJ/mol) | |  | C≡C |  | 839 | |  | C–H |  | 413 | |  | O=O |  | 495 | |  | C=O |  | 799 | |  | O–H |  | 467 |   estimate the heat of combustion for one mole of acetylene:  C2H2(g) + O2(g) → 2CO2(g) + H2O(g)   |  |  |  | | --- | --- | --- | |  | a. | 1228 kJ | |  | b. | –1228 kJ | |  | c. | –447 kJ | |  | d. | +447 kJ | |  | e. | +365 kJ |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.8 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bond energy | bonding | Chemistry | covalent bonding | general chemistry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/1/2017 7:42 AM | |

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| 48. Using the following data reactions:   |  |  | | --- | --- | |  | Δ*H*° (kJ) | | H2(*g*) + Br2(*g*) → 2HBr(*g*) | –103 | | H2(*g*) → 2H(*g*) | 432 | | Br2(*g*) → 2Br(*g*) | 193 |   calculate the energy of an H-Br bond.   |  |  |  | | --- | --- | --- | |  | a. | 728 kJ | |  | b. | 261 kJ | |  | c. | 522 kJ | |  | d. | 52 kJ | |  | e. | 364 kJ |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.8 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | bond energy | bonding | Chemistry | covalent bonding | general chemistry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 49. Given the following bond energies:   |  |  | | --- | --- | | C–C | 347 kJ/mol | | C=C | 614 kJ/mol | | C–O | 358 kJ/mol | | C=O | 799 kJ/mol | | C–H | 413 kJ/mol | | O–H | 463 kJ/mol | | O–O | 146 kJ/mol |   estimate Δ*H* for the reaction H2O2 + CH3OH → H2CO + 2H2O.   |  |  |  | | --- | --- | --- | |  | a. | –345 kJ | |  | b. | –199 kJ | |  | c. | –105 kJ | |  | d. | +199 kJ | |  | e. | +345 kJ |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.8 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bond energy | bonding | Chemistry | covalent bonding | general chemistry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 50. Given the following information:   |  |  |  | | --- | --- | --- | |  | Cl2 bond energy = 239 kJ/mol |  | |  | F2 bond energy = 154 kJ/mol |  | |  | Cl2(*g*) + F2(*g*) → ClF3(*g*) | Δ*H*° = –409 kJ/mol |   calculate the Cl-F bond energy.   |  |  |  | | --- | --- | --- | |  | a. | 267 kJ/mol | |  | b. | 253 kJ/mol | |  | c. | 760 kJ/mol | |  | d. | 136 kJ/mol | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.8 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | bond energy | bonding | Chemistry | covalent bonding | general chemistry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 51. Consider the following reaction: A2 + B2 → 2AB          ΔH = –325 kJ The bond energy for A2 is half the amount of AB. The bond energy of B2 = 415 kJ/mol. What is the bond energy of A2?   |  |  |  | | --- | --- | --- | |  | a. | 740 kJ/mol | |  | b. | 578 kJ/mol | |  | c. | 247 kJ/mol | |  | d. | –163 kJ/mol | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 8.8 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | bond energy | bonding | Chemistry | covalent bonding | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 52. A double bond occurs when two atoms share two pairs of electrons.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | True | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.8 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | multiple bonds | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 53. As indicated by Lewis structures, which of the following would probably not exist as a stable molecule?   |  |  |  | | --- | --- | --- | |  | a. | CH3OH | |  | b. | CH2O | |  | c. | CH3O | |  | d. | C2H2 | |  | e. | C3H4 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | Lewis dot formula | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 54. In the Lewis structure for elemental nitrogen there is (are)   |  |  |  | | --- | --- | --- | |  | a. | a single bond between the nitrogens | |  | b. | a double bond between the nitrogens | |  | c. | a triple bond between the nitrogens | |  | d. | three unpaired electrons | |  | e. | none of the above |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | Lewis dot formula | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 55. Complete the Lewis structure for the molecule:                 This molecule has \_\_\_\_\_\_\_\_\_\_ single bonds and \_\_\_\_\_\_\_\_\_\_ multiple bonds.   |  |  |  | | --- | --- | --- | |  | a. | 4, 2 | |  | b. | 6, 3 | |  | c. | 11, 5 | |  | d. | 11, 2 | |  | e. | 13, 0 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | multiple bonds | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| Draw the Lewis structures of the molecules below and use them to answer the following questions:   |  |  | | --- | --- | | I. | BH3 | | II. | NO2 | | III. | SF6 | | IV. | O3 | | V. | PCl5 | |

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| 56. Which of the molecules obeys the octet rule?   |  |  |  | | --- | --- | --- | |  | a. | I | |  | b. | II | |  | c. | III | |  | d. | IV | |  | e. | V |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-2 | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | octet rule | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 57. How many of the molecules have no dipole moment?   |  |  |  | | --- | --- | --- | |  | a. | 1 | |  | b. | 2 | |  | c. | 3 | |  | d. | 4 | |  | e. | They are all polar. |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-2 | | *KEYWORDS:* | bonding | Chemistry | dipole moment | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 58. Which of these molecules show resonance?   |  |  |  | | --- | --- | --- | |  | a. | I, II | |  | b. | II, IV | |  | c. | II, V | |  | d. | III, IV | |  | e. | III, V |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.12 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-2 | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | resonance | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| Using the following electronegativity values:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | C |  | 2.5 |  | Cl | 3.0 | |  | H |  | 2.1 |  | O | 3.5 |   select from the following group the molecule that fits the given statement:   |  |  |  | | --- | --- | --- | | a) | CH3CHO | | | b) | CO2 | | | c) | CH3Cl | | | d) | C2H6 | | | e) | none |  | |

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| 59. This molecule contains a carbon atom with trigonal planar geometry.   |  |  |  | | --- | --- | --- | |  | a. | CH3CHO | |  | b. | CO2 | |  | c. | CH3Cl | |  | d. | C2H6 | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-1 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 60. This molecule is the most polar.   |  |  |  | | --- | --- | --- | |  | a. | CH3CHO | |  | b. | CO2 | |  | c. | CH3Cl | |  | d. | C2H6 | |  | e. | All are nonpolar. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-1 | | *KEYWORDS:* | bonding | Chemistry | dipole moment | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 61. This molecule shows the smallest number of lone pairs in its Lewis structure.   |  |  |  | | --- | --- | --- | |  | a. | CH3CHO | |  | b. | CO2 | |  | c. | CH3Cl | |  | d. | C2H6 | |  | e. | All have zero lone pairs. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-1 | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | Lewis dot formula | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| |  |  | | --- | --- | |  | Consider the compound crotonaldehyde, whose skeleton is: | |  |  | |

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| 62. How many electrons must be shown (as bonding or nonbonding electrons) in the Lewis structure of this molecule?   |  |  |  | | --- | --- | --- | |  | a. | 12 | |  | b. | 18 | |  | c. | 24 | |  | d. | 28 | |  | e. | 32 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-3 | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | Lewis dot formula | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 63. How many nonbonding electrons appear in the Lewis structure of this molecule?   |  |  |  | | --- | --- | --- | |  | a. | 2 | |  | b. | 4 | |  | c. | 6 | |  | d. | 8 | |  | e. | 10 |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-3 | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | Lewis dot formula | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 64. Which carbon in this molecule has tetrahedral bonding?   |  |  |  | | --- | --- | --- | |  | a. | 1 | |  | b. | 2 | |  | c. | 3 | |  | d. | 4 | |  | e. | all |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-3 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 65. Which of the following molecules contains a double bond?   |  |  |  | | --- | --- | --- | |  | a. | CO2 | |  | b. | NH3 | |  | c. | H2O | |  | d. | all | |  | e. | none |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | multiple bonds | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 66. When molten sulfur reacts with chlorine gas, a vile-smelling orange liquid forms that is found to have the empirical formula SCl. Which of the following could be the correct Lewis structure for this compound?   |  |  |  | | --- | --- | --- | |  | a. |  | |  | b. |  | |  | c. |  | |  | d. |  | |  | e. | : |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | Lewis dot formula | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| Given the following Lewis structure: |

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| 67. How many unshared pairs of electrons are present in this molecule?   |  |  |  | | --- | --- | --- | |  | a. | 0 | |  | b. | 1 | |  | c. | 2 | |  | d. | 3 | |  | e. | 4 |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-4 | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | Lewis dot formula | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 68. How many electrons are shared between carbons 1 and 2?   |  |  |  | | --- | --- | --- | |  | a. | 0 | |  | b. | 2 | |  | c. | 4 | |  | d. | 6 | |  | e. | 8 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-4 | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | Lewis dot formula | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 69. Which of the following compounds contains only one unshared pair of valence electrons?   |  |  |  | | --- | --- | --- | |  | a. | NH3 | |  | b. | H2O | |  | c. | CH4 | |  | d. | NaCl | |  | e. | BF3 |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | Lewis dot formula | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 70. The Lewis structure for CHCl3 has nine lone electron pairs.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | True | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | Lewis dot formula | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 71. Which of the following atoms cannot exceed the octet rule in a molecule?   |  |  |  | | --- | --- | --- | |  | a. | N | |  | b. | S | |  | c. | P | |  | d. | I | |  | e. | All of the atoms (A-D) can exceed the octet rule. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.11 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | exceptions to the octet rule | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 72. As indicated by Lewis structures, which of the following species could probably not exist as a stable molecule?   |  |  |  | | --- | --- | --- | |  | a. | NH3 | |  | b. | N2H2 | |  | c. | N2H4 | |  | d. | N2H6 | |  | e. | N2O4 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.11 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | exceptions to the octet rule | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 73. The Lewis structure for H3BO3 is   |  |  |  | | --- | --- | --- | |  | a. |  | |  | b. |  | |  | c. |  | |  | d. |  | |  | e. |  |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.11 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | exceptions to the octet rule | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 74. In the Lewis structure for ICl2–, how many lone pairs of electrons are around the central iodine atom?   |  |  |  | | --- | --- | --- | |  | a. | 0 | |  | b. | 1 | |  | c. | 2 | |  | d. | 3 | |  | e. | 4 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.11 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | exceptions to the octet rule | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 75. In the Lewis structure for SF6, the central sulfur atom shares \_\_\_\_\_\_\_\_\_\_ electrons.   |  |  |  | | --- | --- | --- | |  | a. | 4 | |  | b. | 8 | |  | c. | 10 | |  | d. | 12 | |  | e. | None of the above, because SF6 is an ionic compound. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.11 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | exceptions to the octet rule | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 76. Which of the following Lewis structures best describes BF3?   |  |  |  | | --- | --- | --- | |  | a. |  | |  | b. |  | |  | c. |  | |  | d. |  | |  | e. |  |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.11 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | exceptions to the octet rule | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 77. Which of the following has an incomplete octet in its Lewis structure?   |  |  |  | | --- | --- | --- | |  | a. | SO2 | |  | b. | ICl | |  | c. | CO2 | |  | d. | F2 | |  | e. | NO |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.11 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | exceptions to the octet rule | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| Consider the following molecules.   |  |  | | --- | --- | | I. | BF3 | | II. | CHBr3 (C is the central atom) | | III. | Br2 | | IV. | XeCl2 | | V. | CO | | VI. | SF4 |   Select the molecule(s) that fit the given statement. |

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| 78. These molecules violate the octet rule.   |  |  |  | | --- | --- | --- | |  | a. | I, II, IV | |  | b. | I, III, IV, VI | |  | c. | III, V, VI | |  | d. | I, IV, VI | |  | e. | I, II, IV, VI |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.11 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-5 | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | exceptions to the octet rule | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 79. These molecules have a zero net dipole moment.   |  |  |  | | --- | --- | --- | |  | a. | III, V | |  | b. | I, III, IV | |  | c. | III, IV, V | |  | d. | I, III, IV, VI | |  | e. | none of them |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-5 | | *KEYWORDS:* | bonding | Chemistry | dipole moment | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 80. These molecules have a trigonal bipyramidal electron pair arrangement.   |  |  |  | | --- | --- | --- | |  | a. | II, IV, VI | |  | b. | I, IV | |  | c. | IV, VI | |  | d. | VI only | |  | e. | none of them |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-5 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | trigonal bipyramidal arrangement | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 81. Select the best Lewis structure for acetone, CH3COCH3.   |  |  |  | | --- | --- | --- | |  | a. |  | |  | b. |  | |  | c. |  | |  | d. |  | |  | e. |  |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.12 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | Lewis dot formula | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 82. Which of the following exhibits resonance?   |  |  |  | | --- | --- | --- | |  | a. | CH4 | |  | b. | PCl5 | |  | c. | H2O | |  | d. | NO2 | |  | e. | At least two of the molecules (A-D) exhibit resonance. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.12 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | True | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | resonance | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 2/9/2017 2:16 AM | |

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| 83. Which of the following species is best described by drawing resonance structures?   |  |  |  | | --- | --- | --- | |  | a. | PH3 | |  | b. | NH4+ | |  | c. | O3 | |  | d. | SO3 | |  | e. | HCN |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.12 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | resonance | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 84. In the cyanide ion (CN–), the nitrogen has a formal charge of   |  |  |  | | --- | --- | --- | |  | a. | -2 | |  | b. | -1 | |  | c. | 0 | |  | d. | 2 | |  | e. | More information is needed. |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.12 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | formal charge | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 85. Which has the greater N–O bond length, NO2– or NO3–?   |  |  |  | | --- | --- | --- | |  | a. | NO2– | |  | b. | NO3– | |  | c. | The bond lengths are the same. | |  | d. | More information is needed. | |  | e. | None of these (A-D). |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.12 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | resonance | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 86. How many resonance structures can be drawn for the molecule O3?   |  |  |  | | --- | --- | --- | |  | a. | 1 | |  | b. | 2 | |  | c. | 3 | |  | d. | 4 | |  | e. | 5 |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.12 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | resonance | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 87. Choose the electron dot formula that most accurately describes the bonding in CS2. (Hint: Consider formal charges.)   |  |  |  | | --- | --- | --- | |  | a. |  | |  | b. |  | |  | c. |  | |  | d. |  | |  | e. |  |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.12 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | formal charge | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 88. Which of the following has a Lewis structure most like that of CO32–?   |  |  |  | | --- | --- | --- | |  | a. | CO2 | |  | b. | SO32– | |  | c. | NO3– | |  | d. | O3 | |  | e. | NO2 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.12 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | resonance | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 89. Which of the following is not a valid resonance structure for N3–?   |  |  |  | | --- | --- | --- | |  | a. |  | |  | b. |  | |  | c. |  | |  | d. |  | |  | e. | all are correct |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.12 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | resonance | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 90. How many of the following molecules possess dipole moments?                BH3, CH4, PCl5, H2O, HF, H2   |  |  |  | | --- | --- | --- | |  | a. | 1 | |  | b. | 2 | |  | c. | 3 | |  | d. | 4 | |  | e. | 5 |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | dipole moment | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 91. Which of the following molecules has a dipole moment?   |  |  |  | | --- | --- | --- | |  | a. | CH4 | |  | b. | CCl4 | |  | c. | CO2 | |  | d. | SO2 | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | dipole moment | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 92. Select the molecule from the following that has a dipole moment.   |  |  |  | | --- | --- | --- | |  | a. | CO2 | |  | b. | SeO3 | |  | c. | XeF4 | |  | d. | SF4 | |  | e. | BeCl2 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | dipole moment | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 93. Which of the following molecules (or ions) has a dipole moment?   |  |  |  | | --- | --- | --- | |  | a. | CO2 | |  | b. | CO32– | |  | c. | NH4+ | |  | d. | PF3 | |  | e. | two of them |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | dipole moment | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 94. Which of the following molecules has a dipole moment?   |  |  |  | | --- | --- | --- | |  | a. | BCl3 | |  | b. | SiH4 | |  | c. | NF3 | |  | d. | F2 | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | True | | *KEYWORDS:* | bonding | Chemistry | dipole moment | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 95. Choose the statement that best describes the PbCl4 molecule in the gas phase.   |  |  |  | | --- | --- | --- | |  | a. | The bond angles are all about 109°. | |  | b. | The molecule is polar. | |  | c. | The molecule has a dipole moment. | |  | d. | The bonds are nonpolar. | |  | e. | More than one of the above. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 96. Which of the following has a zero dipole moment?   |  |  |  | | --- | --- | --- | |  | a. | NH3 | |  | b. | NO2 | |  | c. | PF5 | |  | d. | SO2 | |  | e. | HCN |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | dipole moment | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 97. Which of the following types of molecules always has a dipole moment?   |  |  |  | | --- | --- | --- | |  | a. | Linear molecules with two identical bonds. | |  | b. | Tetrahedral molecules (four identical bonds equally spaced). | |  | c. | Trigonal pyramid molecules (three identical bonds). | |  | d. | Trigonal planar molecules (three identical bonds equally spaced). | |  | e. | None has a dipole moment. |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | dipole moment | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 98. Consider the following drawings:  Which of the following statements are true?   |  |  | | --- | --- | | I. | The electrons in each molecule tend to orient themselves around the most electronegative element. | | II. | Each molecular drawing follows the localized electron model. | | III. | Both HF and CO2 are linear molecules and therefore polar. | | IV. | The bond angles of NH3 are slightly less than 109.5° because the lone pair compresses the angles between the bonding pairs. |  |  |  |  | | --- | --- | --- | |  | a. | I, III, IV | |  | b. | I, II, IV | |  | c. | I, II, III | |  | d. | II, IV | |  | e. | All of the above statements are correct. |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/2/2017 2:39 AM | |

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| 99. If a compound has a number of individual dipoles, then:   |  |  | | --- | --- | | I. | It is polar overall. | | II. | There is an electronegativity difference between the bonded atoms. | | III. | it is ionic. | | IV. | It doesn't have resonance. |  |  |  |  | | --- | --- | --- | |  | a. | II only | |  | b. | II, IV | |  | c. | I, II, IV | |  | d. | I, III | |  | e. | All of the above statements are correct. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | dipole moment | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 100. Of the following, which molecule has the largest bond angle?   |  |  |  | | --- | --- | --- | |  | a. | O3 | |  | b. | OF2 | |  | c. | HCN | |  | d. | H2O | |  | e. | More than one of the above have equally large bond angles. |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bond angle | bonding | Chemistry | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 101. According to the VSEPR model, the arrangement of electron pairs around NH3 and CH4 is   |  |  |  | | --- | --- | --- | |  | a. | different, because in each case there are a different number of atoms around the central atom | |  | b. | different, because in each case there are a different number of electron pairs around the central atom | |  | c. | the same, because both nitrogen and carbon are both in the second period | |  | d. | the same, because in each case there are the same number of electron pairs around the central atom | |  | e. | different or the same, depending on the conditions leading to maximum repulsion |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 102. The Cl–Kr–Cl bond angle in KrCl4 is closest to   |  |  |  | | --- | --- | --- | |  | a. | 90° | |  | b. | 109° | |  | c. | 120° | |  | d. | 150° | |  | e. | 360° |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bond angle | bonding | Chemistry | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 103. How many of the following molecules—SF2, SF4, SF6, SiO2—are polar?   |  |  |  | | --- | --- | --- | |  | a. | 0 | |  | b. | 1 | |  | c. | 2 | |  | d. | 3 | |  | e. | 4 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | dipole moment | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 104. Which of the following molecules is non-polar overall?   |  |  |  | | --- | --- | --- | |  | a. | SF4 | |  | b. | SF2 | |  | c. | CCl4 | |  | d. | H2S | |  | e. | OCl2 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | dipole moment | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 105. Which of the following is the correct order for molecules from most to least polar?   |  |  |  | | --- | --- | --- | |  | a. | CH4 > CF2Cl2 > CF2H2 > CCl4 > CCl2H2 | |  | b. | CH4 > CF2H2 > CF2Cl2 > CCl4 > CCl2H2 | |  | c. | CF2Cl2 > CF2H2 > CCl2H2 > CH4 = CCl4 | |  | d. | CF2H2 > CCl2H2 > CF2Cl2 > CH4 = CCl4 | |  | e. | CF2Cl2 > CF2H2 > CCl4 > CCl2H2 > CH4 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | dipole moment | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 106. Which of the following molecules has a nonlinear structure?   |  |  |  | | --- | --- | --- | |  | a. | XeF2 | |  | b. | BeCl2 | |  | c. | O3 | |  | d. | CO2 | |  | e. | N2O (central atom is N) |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 107. Which of the following molecules are nonlinear?                NO2–,     C2H2,     N3–,     HCN,     CO2,     H2O2   |  |  |  | | --- | --- | --- | |  | a. | C2H2, HCN | |  | b. | CO2, N3– | |  | c. | NO2–, H2O2 | |  | d. | N3–, NO2– | |  | e. | all are linear |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 108. How many of the following molecules or ions are linear?   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | NH3 | OF2 | HCN | CO2 | NO2 |  |  |  |  | | --- | --- | --- | |  | a. | 0 | |  | b. | 1 | |  | c. | 2 | |  | d. | 3 | |  | e. | 4 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | linear arrangement | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 109. The molecular structure of SOCl2 is   |  |  |  | | --- | --- | --- | |  | a. | pyramidal | |  | b. | none of these | |  | c. | octahedral | |  | d. | trigonal planar | |  | e. | bent |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 110. The molecular structure of OF2 is   |  |  |  | | --- | --- | --- | |  | a. | pyramidal | |  | b. | none of these | |  | c. | octahedral | |  | d. | trigonal planar | |  | e. | bent |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 111. The molecular structure of NCl3 is   |  |  |  | | --- | --- | --- | |  | a. | pyramidal | |  | b. | none of these | |  | c. | octahedral | |  | d. | trigonal planar | |  | e. | bent |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 112. The molecular structure of BeF3– is   |  |  |  | | --- | --- | --- | |  | a. | pyramidal | |  | b. | none of these | |  | c. | octahedral | |  | d. | trigonal planar | |  | e. | bent |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 113. The molecular structure of BrF6+ is   |  |  |  | | --- | --- | --- | |  | a. | pyramidal | |  | b. | none of these | |  | c. | octahedral | |  | d. | trigonal planar | |  | e. | bent |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 114. The molecular structure of AsCl5 is   |  |  |  | | --- | --- | --- | |  | a. | trigonal bipyramidal | |  | b. | square pyramidal | |  | c. | distorted tetrahedral | |  | d. | octahedral | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 115. The molecular structure of XeF5+ is   |  |  |  | | --- | --- | --- | |  | a. | trigonal bipyramidal | |  | b. | square pyramidal | |  | c. | distorted tetrahedral | |  | d. | octahedral | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 116. What type of structure does the XeOF2 molecule have?   |  |  |  | | --- | --- | --- | |  | a. | pyramidal | |  | b. | tetrahedral | |  | c. | T-shaped | |  | d. | trigonal planar | |  | e. | octahedral |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 117. The bond angles about the carbon atom in the formaldehyde molecule, H2C=O, are about:   |  |  |  | | --- | --- | --- | |  | a. | 120° | |  | b. | 60° | |  | c. | 109° | |  | d. | 180° | |  | e. | 90° |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bond angle | bonding | Chemistry | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 118. Which of the following species has a trigonal bipyramid structure?   |  |  |  | | --- | --- | --- | |  | a. | NH3 | |  | b. | IF5 | |  | c. | I3– | |  | d. | PCl5 | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | trigonal bipyramidal arrangement | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 119. The bond angle in H2Se is about:   |  |  |  | | --- | --- | --- | |  | a. | 120° | |  | b. | 60° | |  | c. | 180° | |  | d. | 109° | |  | e. | 90° |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bond angle | bonding | Chemistry | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 120. Which ion is planar?   |  |  |  | | --- | --- | --- | |  | a. | NH4+ | |  | b. | CO32– | |  | c. | SO32– | |  | d. | ClO3– | |  | e. | all are planar |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| Select the correct molecular structure for the given species from the choices below: |

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| 121. PF6–   |  |  |  | | --- | --- | --- | |  | a. | pyramidal | |  | b. | tetrahedral | |  | c. | square planar | |  | d. | octahedral | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-6 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 122. PCl4+   |  |  |  | | --- | --- | --- | |  | a. | pyramidal | |  | b. | tetrahedral | |  | c. | square planar | |  | d. | octahedral | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-6 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 123. XeF6   |  |  |  | | --- | --- | --- | |  | a. | pyramidal | |  | b. | tetrahedral | |  | c. | square planar | |  | d. | octahedral | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-6 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 124. NI3   |  |  |  | | --- | --- | --- | |  | a. | pyramidal | |  | b. | tetrahedral | |  | c. | square planar | |  | d. | octahedral | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-6 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 125. SiH4   |  |  |  | | --- | --- | --- | |  | a. | pyramidal | |  | b. | tetrahedral | |  | c. | square planar | |  | d. | octahedral | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-6 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 126. ClO2   |  |  |  | | --- | --- | --- | |  | a. | pyramidal | |  | b. | tetrahedral | |  | c. | square planar | |  | d. | octahedral | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-6 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 127. IF4–   |  |  |  | | --- | --- | --- | |  | a. | pyramidal | |  | b. | tetrahedral | |  | c. | square planar | |  | d. | octahedral | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-6 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 128. SO32–   |  |  |  | | --- | --- | --- | |  | a. | pyramidal | |  | b. | tetrahedral | |  | c. | square planar | |  | d. | octahedral | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-6 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| Select the correct molecular structure for the given species from the choices below: |

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| 129. H2O   |  |  |  | | --- | --- | --- | |  | a. | linear | |  | b. | trigonal planar | |  | c. | tetrahedral | |  | d. | bent | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-7 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 130. CO2   |  |  |  | | --- | --- | --- | |  | a. | linear | |  | b. | trigonal planar | |  | c. | tetrahedral | |  | d. | bent | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-7 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 131. BeCl2   |  |  |  | | --- | --- | --- | |  | a. | linear | |  | b. | trigonal planar | |  | c. | tetrahedral | |  | d. | bent | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-7 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 132. SF4   |  |  |  | | --- | --- | --- | |  | a. | linear | |  | b. | trigonal planar | |  | c. | tetrahedral | |  | d. | bent | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-7 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 133. NO3–   |  |  |  | | --- | --- | --- | |  | a. | linear | |  | b. | trigonal planar | |  | c. | tetrahedral | |  | d. | bent | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-7 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 134. I3–   |  |  |  | | --- | --- | --- | |  | a. | linear | |  | b. | trigonal planar | |  | c. | tetrahedral | |  | d. | bent | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-7 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 135. PF5   |  |  |  | | --- | --- | --- | |  | a. | linear | |  | b. | trigonal planar | |  | c. | tetrahedral | |  | d. | bent | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-7 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 136. ClF2+   |  |  |  | | --- | --- | --- | |  | a. | linear | |  | b. | trigonal planar | |  | c. | tetrahedral | |  | d. | bent | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-7 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 137. In the molecule XeF2, how many pairs of electrons surround Xe and what is the molecular geometry?   |  |  |  | | --- | --- | --- | |  | a. | 4, bent | |  | b. | 4, pyramidal | |  | c. | 5, linear | |  | d. | 5, bent | |  | e. | 6, linear |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 138. According to VSEPR theory, which of the following species has a square planar molecular structure?   |  |  |  | | --- | --- | --- | |  | a. | TeBr4 | |  | b. | BrF3 | |  | c. | IF5 | |  | d. | XeF4 | |  | e. | SCl2 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 139. How many of the following molecules have all of their atoms in the same plane?   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | H2C=CH2 | OF2 | H2CO | NH3 | CO2 | BeCl2 |  |  |  |  | | --- | --- | --- | |  | a. | 3 | |  | b. | 4 | |  | c. | 5 | |  | d. | 6 | |  | e. | 7 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 140. The shape of an ammonia molecule is tetrahedral.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 141. The shape of a carbon dioxide molecule is linear.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | True | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | the valence-shell electron-pair repulsion model | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 142. When nonmetals chemically combine, they tend to form what type of bond?   |  |  | | --- | --- | | *ANSWER:* | covalent | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 143. The ability of an atom in a molecule to attract shared electrons to itself is called \_\_\_\_\_\_\_\_\_\_.   |  |  | | --- | --- | | *ANSWER:* | electronegativity | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 144. A molecule that has a center of positive charge and a center of negative charge is said to be \_\_\_\_\_\_\_\_\_\_.   |  |  | | --- | --- | | *ANSWER:* | polar | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.3 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 145. Match the ions below with the pictures that represent their relative sizes. Justify your answers.  Ions:     Se2–      K+      Ga3+        Br–            Ca2+   |  |  | | --- | --- | | *ANSWER:* | ​     K+       Ca2+    Ga3+ Se2–Br–  ​  Se2– and Br– each have the electron configuration of Kr. K+, Ca2+, and Ga3+ each have the electron configuration of Ar. The Se2– and Br– contain electrons in a higher energy level, therefore making their radii larger than the other three ions. Since Br– has more protons, this will draw the electrons in slightly more than Se2– (due to a slightly higher effective nuclear charge). For the other three ions, Ga3+ will be the smallest because it has the highest number of protons. K+ has the least number of protons and is thus the biggest ion of the three.  See Sec. 8.4 in Zumdahl, *Chemistry*. | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.4 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | ionic bonding | ionic radii | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/2/2017 4:28 AM | |

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| 146. The \_\_\_\_\_\_\_\_\_\_ is the change in energy that takes place when separated gaseous ions are packed together to form an ionic solid.   |  |  | | --- | --- | | *ANSWER:* | lattice energy | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.5 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Born-Haber cycle | Chemistry | general chemistry | ionic bonding | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 147. Stable molecules usually contain atoms that have filled \_\_\_\_\_\_\_\_\_\_ orbitals.   |  |  | | --- | --- | | *ANSWER:* | valence | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.7 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 148. The \_\_\_\_\_\_\_\_\_\_ of a molecule shows how the valence electrons are arranged among the atoms in the molecule.   |  |  | | --- | --- | | *ANSWER:* | Lewis structure | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.1 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | general chemistry | Lewis dot formula | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 149. When several nonequivalent Lewis structures can be drawn for a molecule, \_\_\_\_\_\_\_\_\_\_ is used to determine the most appropriate structure(s).   |  |  | | --- | --- | | *ANSWER:* | formal charge | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.12 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | formal charge | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 150. In spite of larger electronegativity differences between bonded atoms, BeCl2 has no dipole while SCl2 does. Explain fully.   |  |  | | --- | --- | | *ANSWER:* | BeCl2 has a linear electron pair geometry and a linear molecular geometry, so the bond dipoles cancel. SCl2 has a tetrahedral electron pair geometry but a bent molecular geometry, giving it an overall dipole. See Sec. 8.13 of Zumdahl, *Chemistry*. | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | dipole moment | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| For each of the following compounds:   |  |  | | --- | --- | | a) | Draw the Lewis structure. | | b) | Give the shape of the molecule. | | c) | Indicate the polarity of the molecule. | |

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| 151. AlF3   |  |  | | --- | --- | | *ANSWER:* | Part A:  Part B: trigonal planar Part C: nonpolar | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-8 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 152. NH3   |  |  | | --- | --- | | *ANSWER:* | Part A:  Part B: pyramidal Part C: polar | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-8 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 153. ICl4–   |  |  | | --- | --- | | *ANSWER:* | Part A:  Part B: square planar Part C: nonpolar | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-8 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 154. CBrI3   |  |  | | --- | --- | | *ANSWER:* | Part A:  Part B: tetrahedral Part C: polar | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.13 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 8-8 | | *KEYWORDS:* | bonding | Chemistry | general chemistry | molecular geometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 155. Choose the member of each set that best matches the label.  ​  More metallic                            Be or Ba  More covalent                           N2O(g), MgO(s)  Highest electronegativity          O, S, Br   |  |  |  | | --- | --- | --- | |  | a. | Be, N2O, O | |  | b. | Ba, MgO, Br | |  | c. | Ba, N2O, S | |  | d. | Be, MgO, O | |  | e. | Ba, N2O, O |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 2/9/2017 4:31 AM | |

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| 156. Which set contains the atoms listed in order of INCREASING electronegativity?   |  |  |  | | --- | --- | --- | |  | a. | F < N < C < Si | |  | b. | P < N < O < F | |  | c. | N < O < Cl < F | |  | d. | F > O > S > Si | |  | e. | S > O > Cl > F |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 157. Which bond is most polar?   |  |  |  | | --- | --- | --- | |  | a. | C-F | |  | b. | S-F | |  | c. | O-F | |  | d. | Si-F | |  | e. | C-O |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 158. In a phosphorous-chlorine bond, the bond is \_\_\_\_\_ and the \_\_\_\_\_ atoms bears \_\_\_\_\_ charge   |  |  |  | | --- | --- | --- | |  | a. | polar, P, a partial negative | |  | b. | nonpolar, Cl, no partial | |  | c. | polar, P, a partial positive | |  | d. | nonpolar, P, no partial | |  | e. | polar, Cl, a partial positive |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | covalent bonding | electronegativity | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 159. Which ion is larger in each pair?   i) O2- or S2-        ii) Fe2+ or Fe3+        iii) S2- or K+   |  |  |  | | --- | --- | --- | |  | a. | S2-, Fe2+, S2- | |  | b. | S2-, Fe3+, S2- | |  | c. | O2-, Fe3+, K+ | |  | d. | S2-, Fe2+, K+ | |  | e. | O2-, Fe2+, S2- |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.4 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | ionic bonding | ionic radii | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 160. Consider the set of isoelectronic atoms and ions A2-, B-, C, D+ and E2+.  Which arrangement of relative radii is correct?   |  |  |  | | --- | --- | --- | |  | a. | A2- > B-> C < D+ > E2+ | |  | b. | A2- < B-< C > D+ < E2+ | |  | c. | A2- > B-> C > D+ > E2+ | |  | d. | E2+ > D+ > C > B- > A2- | |  | e. | E2+ < D+ < C < B- < A2- |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.4 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Chemistry | general chemistry | ionic bonding | ionic radii | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 161. Calculate the lattice energy of the ionic compound MCl2 given the information below:  ​  ΔH°f MCl2(s) = -342 kJ/mol  IE1 of M = +600 kJ/mol  IE2 of M = +1150 kJ/mol  Cl2(g) => 2 Cl(g) ΔH = +244 kJ  Cl(g) + 1 e- => Cl-(g) ΔH = -349 kJ  M(s) => M(g)  ΔH = +150 kJ   |  |  |  | | --- | --- | --- | |  | a. | -2136 kJ | |  | b. | -2015 kJ | |  | c. | -1446 kJ | |  | d. | -1788 kJ | |  | e. | -1666 kJ |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 8.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Born-Haber cycle | Chemistry | general chemistry | ionic bonding | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 2/9/2017 4:34 AM | |

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| 162. Select the lattice energy for rubidium chloride from the following data [in kJ/mol]  ​  Rb(s) => Rb(g)             ΔH = 85.8  IE1(Rb)                        ΔH = 397.5  BE(Cl2)                        ΔH = 226  ΔHf(RbCl)                   = -431  EA Cl                           = -332   |  |  |  | | --- | --- | --- | |  | a. | -53.7 | |  | b. | +53.7 | |  | c. | -695 | |  | d. | -808 | |  | e. | +808 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 8.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bonding | Born-Haber cycle | Chemistry | general chemistry | ionic bonding | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 2/9/2017 4:43 AM | |

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| 163. Which choice has the bonds listed in the order of INCREASING bond energy?   |  |  |  | | --- | --- | --- | |  | a. | HF < HCl < HBr | |  | b. | C-O < C=O < C≡O | |  | c. | F2 < Cl2 < Br2 | |  | d. | N2 < CC bond in C2H4 < CC Bond in C2H6 | |  | e. | all the same |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 8.8 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bond energy | bonding | Chemistry | covalent bonding | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| 164. Use the bond energies given below to calculate the enthalpy change for the reaction, HCN(g) + 2 H2(g) → CH3NH2(g)  ​  Bond   Bond Energy (kJ/mol)          Bond       Bond Energy (kJ/mol)  H-H          432                                   C-H                413  C-N          305                                   C=N               615  C:N       891                                   N-H               391   |  |  |  | | --- | --- | --- | |  | a. | -590 kJ | |  | b. | -158 kJ | |  | c. | +18 kJ | |  | d. | +133 kJ | |  | e. | +158 kJ |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.8 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bond energy | bonding | Chemistry | covalent bonding | general chemistry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 2/9/2017 4:41 AM | |

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| 165. Calculate the value of ΔH° for the reaction C2H6 + 2 Cl2 → C2H4Cl2 + 2 HCl given the bond energies (kJ/mol):  H-H 432 kJ/mol C-H 314 kJ/mol H-Cl 427 kJ/mol C-C 347 kJ/mol Cl-Cl 243 kJ/mol C-Cl 339 kJ/mol   |  |  |  | | --- | --- | --- | |  | a. | -209 kJ | |  | b. | -418 kJ | |  | c. | +318kJ | |  | d. | -318 kJ | |  | e. | -518 kJ |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 8.8 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | bond energy | bonding | Chemistry | covalent bonding | general chemistry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:36 PM | | *DATE MODIFIED:* | 3/4/2016 4:36 PM | |

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| A student is asked to propose Lewis structures of N2O and draws structures I-V. Use these proposed Lewis structures to answer the next **three (3)** questions. |

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| 166. What is the formal charge on the central atom of structure II?   |  |  |  | | --- | --- | --- | |  | a. | 0 | |  | b. | +1 | |  | c. | -1 | |  | d. | -2 | |  | e. | +2 |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Lewis structures of N2O | | *DATE CREATED:* | 3/7/2017 4:44 AM | | *DATE MODIFIED:* | 3/7/2017 5:04 AM | |

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| 167. Which of the proposed Lewis structures shown, I-V, best reflects the bonding in the N2O molecule?   |  |  |  | | --- | --- | --- | |  | a. | I | |  | b. | II | |  | c. | III | |  | d. | IV | |  | e. | V |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Lewis structures of N2O | | *DATE CREATED:* | 3/7/2017 5:05 AM | | *DATE MODIFIED:* | 3/7/2017 5:07 AM | |

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| 168. Which of the following proposed Lewis structures, I-V, is/are NOT in fact Lewis structures of the N2O molecule?   |  |  |  | | --- | --- | --- | |  | a. | I only | |  | b. | II only | |  | c. | IV and V only | |  | d. | III only | |  | e. | I, IV and V only |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Lewis structures of N2O | | *DATE CREATED:* | 3/7/2017 5:08 AM | | *DATE MODIFIED:* | 3/7/2017 5:10 AM | |

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| A student is asked to propose Lewis structures of NCO- and draws structures I-V below. Use these proposed Lewis structures to answer the next **three (3)** questions. |

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| 169. What is the formal charge on the central atom of structure II?   |  |  |  | | --- | --- | --- | |  | a. | 0 | |  | b. | +1 | |  | c. | -1 | |  | d. | -2 | |  | e. | +2 |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Lewis structures of NCO- | | *DATE CREATED:* | 3/7/2017 5:11 AM | | *DATE MODIFIED:* | 3/7/2017 5:19 AM | |

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| 170. Which of the proposed Lewis structures shown, I-V, **best** reflects the bonding in NCO- ?   |  |  |  | | --- | --- | --- | |  | a. | I | |  | b. | II | |  | c. | III | |  | d. | IV | |  | e. | V |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Lewis structures of NCO- | | *DATE CREATED:* | 3/7/2017 5:19 AM | | *DATE MODIFIED:* | 3/7/2017 5:21 AM | |

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| 171. Which of the following proposed Lewis structures, I-V, is/are **NOT** in fact Lewis structures of the NCO- molecule?   |  |  |  | | --- | --- | --- | |  | a. | IV only | |  | b. | II only | |  | c. | IV and V only | |  | d. | III only | |  | e. | I and V only |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Lewis structures of NCO- | | *DATE CREATED:* | 3/7/2017 5:22 AM | | *DATE MODIFIED:* | 3/7/2017 5:24 AM | |

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| 172. Which of the following ions has the following Lewis structure?     |  |  |  | | --- | --- | --- | |  | a. | B22- | |  | b. | C22- | |  | c. | N22- | |  | d. | O22- | |  | e. | F22- |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *DATE CREATED:* | 3/7/2017 5:25 AM | | *DATE MODIFIED:* | 3/27/2017 12:56 AM | |

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| 173. Which of the following ions has the following Lewis structure?     |  |  |  | | --- | --- | --- | |  | a. | B22- | |  | b. | C22- | |  | c. | N22- | |  | d. | O22- | |  | e. | F22- |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *DATE CREATED:* | 3/7/2017 5:40 AM | | *DATE MODIFIED:* | 3/7/2017 5:43 AM | |

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| 174. Which of the following elements is possibly X in the following Lewis structure?     |  |  |  | | --- | --- | --- | |  | a. | Te | |  | b. | N | |  | c. | Cl | |  | d. | P | |  | e. | O |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *DATE CREATED:* | 3/7/2017 6:52 AM | | *DATE MODIFIED:* | 3/7/2017 7:25 AM | |

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| 175. Given the Lewis structure below, what is the identity of element X?     |  |  |  | | --- | --- | --- | |  | a. | Se | |  | b. | Si | |  | c. | O | |  | d. | N | |  | e. | more than one of these are possible |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *DATE CREATED:* | 3/7/2017 7:20 AM | | *DATE MODIFIED:* | 3/7/2017 7:24 AM | |

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| 176. Valproic acid, used to treat seizures and bipolar disorder, consists of only carbon, hydrogen and oxygen. A 0.165 g sample of valproic acid is analyzed using combustion analysis and 0.166 g of water and 0.403 g of carbon dioxide are collected. Using this information, which of the following skeletal structures is consistent with the molecular formula of valproic acid?   |  |  |  | | --- | --- | --- | |  | a. |  | |  | b. |  | |  | c. |  | |  | d. |  | |  | e. |  |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *DATE CREATED:* | 3/7/2017 7:32 AM | | *DATE MODIFIED:* | 3/7/2017 7:54 AM | |