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| 1. In a given period this group has the element with the largest atomic radius.   |  |  |  | | --- | --- | --- | |  | a. | Group 1A | |  | b. | Group 2A | |  | c. | Group 3A | |  | d. | Group 4A | |  | e. | Group 5A |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group I alkali metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 2. Which of the following is a metalloid?   |  |  |  | | --- | --- | --- | |  | a. | carbon | |  | b. | oxygen | |  | c. | hydrogen | |  | d. | copper | |  | e. | silicon |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 3. Which of the following exhibits the greatest metallic character?   |  |  |  | | --- | --- | --- | |  | a. | Cs | |  | b. | Rb | |  | c. | K | |  | d. | Na | |  | e. | All are equally metallic. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group I alkali metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 4. What is the most abundant element found in the human body?   |  |  |  | | --- | --- | --- | |  | a. | carbon | |  | b. | hydrogen | |  | c. | calcium | |  | d. | oxygen | |  | e. | water |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 5. Hydrogen and lithium react very differently, although they are both members of Group 1. What is the primary reason for this difference?   |  |  |  | | --- | --- | --- | |  | a. | The metallic character increases going down a group. | |  | b. | The ionization energy increases going down a group. | |  | c. | Electron affinity increases going down a group. | |  | d. | Electronegativity increases going down a group. | |  | e. | There is a very large difference in the atomic radii of H and Li. |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group I alkali metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 6. All of the following are semimetals except   |  |  |  | | --- | --- | --- | |  | a. | At | |  | b. | Ge | |  | c. | Al | |  | d. | Sb | |  | e. | Si |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 7. Which oxide of a Group 2A element is amphoteric?   |  |  |  | | --- | --- | --- | |  | a. | Be | |  | b. | Mg | |  | c. | Ca | |  | d. | Sr | |  | e. | Ba |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIA alkaline earth metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 8. Which oxide of a Group 2A element is not highly ionic?   |  |  |  | | --- | --- | --- | |  | a. | Be | |  | b. | Mg | |  | c. | Ca | |  | d. | Sr | |  | e. | Ba |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIA alkaline earth metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 9. Choose the metal with the largest first ionization energy.   |  |  |  | | --- | --- | --- | |  | a. | Na | |  | b. | Mg | |  | c. | Al | |  | d. | K | |  | e. | Ca |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 10. Which group shows the correct order of first ionization energy?   |  |  |  | | --- | --- | --- | |  | a. | Na > P > Cl | |  | b. | Cs > Na > K | |  | c. | K > Ca > Ge | |  | d. | Cs < Rb < Na | |  | e. | Al > Si > P |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 11. Which element of Group 3A behaves as a nonmetal or semimetal?   |  |  |  | | --- | --- | --- | |  | a. | B | |  | b. | Al | |  | c. | Ga | |  | d. | In | |  | e. | B and Al |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 12. What reason is given for the stability of C–C, N–N, and O–O bonds, compared to the instability of Si–Si, P–P, and S–S bonds?   |  |  |  | | --- | --- | --- | |  | a. | Their metallic character varies greatly. | |  | b. | Large differences in their ionization energies. | |  | c. | Large differences in their electronegativities. | |  | d. | Large differences in their abilities to form strong pi bonds. | |  | e. | None of these. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 13. What are the most abundant metals in the earth's crust, oceans, and atmosphere?   |  |  |  | | --- | --- | --- | |  | a. | titanium and silicon | |  | b. | aluminum and iron | |  | c. | manganese and nickel | |  | d. | tin and lead | |  | e. | iron and lead |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 14. Which of the following oxides is amphoteric?   |  |  |  | | --- | --- | --- | |  | a. | BeO | |  | b. | MgO | |  | c. | CaO | |  | d. | SrO | |  | e. | BaO |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIA alkaline earth metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 15. True or false: Hydrogen is a nonmetal while lithium is an active metal, even though they are in the same group.   |  |  |  | | --- | --- | --- | |  | a. | True. Such differences are common for elements in the same group. | |  | b. | False. Because the elements are in the same group, they have similar metallic qualities. | |  | c. | True. This can be explained because of the very large difference in atomic radii between hydrogen and lithium. | |  | d. | False. Both hydrogen and lithium are nonmetals | |  | e. | None of these. |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group I alkali metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 16. Choose the metal with the smallest radius.   |  |  |  | | --- | --- | --- | |  | a. | Ca | |  | b. | Na | |  | c. | K | |  | d. | Mg | |  | e. | Al |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 17. Within a group, as the atomic numbers of the elements increase, the   |  |  |  | | --- | --- | --- | |  | a. | ionization energies decrease | |  | b. | atomic masses decrease | |  | c. | elements become less metallic | |  | d. | atomic radii decrease | |  | e. | metallic character decreases |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 18. Choose the element with the largest atomic radius.   |  |  |  | | --- | --- | --- | |  | a. | Li | |  | b. | B | |  | c. | N | |  | d. | O | |  | e. | Ne |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 19. Choose the element with the smallest atomic radius.   |  |  |  | | --- | --- | --- | |  | a. | Li | |  | b. | Na | |  | c. | K | |  | d. | Rb | |  | e. | Cs |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 20. Choose the element obtained from liquification of air.   |  |  |  | | --- | --- | --- | |  | a. | N | |  | b. | P | |  | c. | As | |  | d. | Sb | |  | e. | Bi |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 21. Which of the following is the second most abundant (by mass) element in the earth's crust, oceans, and atmosphere?   |  |  |  | | --- | --- | --- | |  | a. | hydrogen | |  | b. | oxygen | |  | c. | carbon | |  | d. | aluminum | |  | e. | silicon |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 22. The compound SiO2 does not exist as a discrete molecule while CO2 does. This can be explained because:   |  |  |  | | --- | --- | --- | |  | a. | The Si—O bond is unstable. | |  | b. | The Lewis structure of SiO2 has an even number of electrons. | |  | c. | The SiO2 is a solid while CO2 is a gas. | |  | d. | The 3p orbital of the Si has little overlap with the 2p of the O. | |  | e. | None of these. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IV nonmetal | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 23. Both CO2 and SiO2 appear to have valid Lewis structures. Using the molecular orbital model, why then are CO2 molecules stable and SiO2 molecules not stable?   |  |  |  | | --- | --- | --- | |  | a. | CO2 is able to form sigma bonds and SiO2 is not. | |  | b. | The silicon 3p valence orbitals do not overlap very effectively with the smaller oxygen 2p orbitals. | |  | c. | The carbon atom is larger than the silicon atom, giving carbon a higher electron density and thus better pi bonding. | |  | d. | Silicon prefers to bond to other silicon atoms over oxygen atoms. | |  | e. | At least two of the above are correct. |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 24. The elements in this group are termed alkali metals.   |  |  |  | | --- | --- | --- | |  | a. | Group 1A | |  | b. | Group 2A | |  | c. | Group 3A | |  | d. | Group 4A | |  | e. | Group 5A |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group I alkali metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 25. Which group contains the most active metals?   |  |  |  | | --- | --- | --- | |  | a. | Group 1A | |  | b. | Group 3A | |  | c. | Group 2A | |  | d. | Group 4A | |  | e. | Group 7A |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group I alkali metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 26. Choose the element that is the strongest reducing agent.   |  |  |  | | --- | --- | --- | |  | a. | Li | |  | b. | Na | |  | c. | K | |  | d. | Rb | |  | e. | Cs |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group I alkali metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 27. Choose the element with the highest melting point.   |  |  |  | | --- | --- | --- | |  | a. | Li | |  | b. | Na | |  | c. | K | |  | d. | Rb | |  | e. | Cs |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group I alkali metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 28. Choose the element whose ion has the largest concentration *inside* a human cell.   |  |  |  | | --- | --- | --- | |  | a. | Li | |  | b. | Na | |  | c. | K | |  | d. | Rb | |  | e. | Cs |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group I alkali metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 29. Choose the metal with the lowest melting point.   |  |  |  | | --- | --- | --- | |  | a. | Li | |  | b. | Na | |  | c. | K | |  | d. | Rb | |  | e. | Cs |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 20.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group I alkali metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 30. What ions are very important for the proper functioning of biologic systems, such as nerves and muscles?   |  |  |  | | --- | --- | --- | |  | a. | alkaline earth metal ions | |  | b. | alkali metal ions | |  | c. | oxygen ions | |  | d. | hydrogen ions | |  | e. | nitrogen ions |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group I alkali metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 31. The strongest reducing agent in the alkali metals is:   |  |  |  | | --- | --- | --- | |  | a. | K | |  | b. | Na | |  | c. | Cs | |  | d. | Fr | |  | e. | Li |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group I alkali metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 32. Which of the following is the best explanation as to why lithium is the strongest reducing agent of the alkali metals?   |  |  |  | | --- | --- | --- | |  | a. | The ionization energy of lithium is the highest of the alkali metals. | |  | b. | The ionization energy of lithium is the lowest of the alkali metals. | |  | c. | The standard reduction potential of lithium is the most positive of the alkali metals. | |  | d. | The relatively high charge density of lithium compared to the other alkali metals. | |  | e. | None of these. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group I alkali metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 33. Because Li is the strongest reducing agent of the alkali metals, it reacts most quickly with water of the alkali metals.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.2 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group I alkali metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 34. Ionic hydrides are formed when hydrogen combines with elements from:   |  |  | | --- | --- | | I. | Group 1A | | II. | Group 2A | | III | Group 3A |   ​   |  |  |  | | --- | --- | --- | |  | a. | I, II, and III | |  | b. | I and II | |  | c. | I and III | |  | d. | II and III | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.3 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | hydrogen | main group chemistry | main-group nonmetal | reactions and compounds | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/3/2017 7:47 AM | |

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| 35. \_\_\_\_\_\_\_\_\_\_ are formed when hydrogen combines with other nonmetals.   |  |  |  | | --- | --- | --- | |  | a. | Covalent hydrides | |  | b. | Nonmetallic hydrides | |  | c. | Active hydrides | |  | d. | Interstitial hydrides | |  | e. | Ionic hydrides |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.3 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | hydrogen | main group chemistry | main-group nonmetal | reactions and compounds | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 36. \_\_\_\_\_\_\_\_\_\_ are formed when transition metal crystals are treated with hydrogen gas.   |  |  |  | | --- | --- | --- | |  | a. | Covalent hydrides | |  | b. | Metallic hydrides | |  | c. | Active hydrides | |  | d. | Saltlike hydrides | |  | e. | Ionic hydrides |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.3 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | hydrogen | main group chemistry | main-group nonmetal | reactions and compounds | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 37. Ionic hydrides are formed with hydrogen combined with elements from   |  |  |  | | --- | --- | --- | |  | a. | group 1A | |  | b. | group 2A | |  | c. | group 3A | |  | d. | all of the above | |  | e. | two of the above |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.3 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | hydrogen | main group chemistry | main-group nonmetal | reactions and compounds | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 38. The major industrial source of hydrogen gas is the reaction of methane and water at high temperatures (800 – 1000°C) and high pressures (10 – 15 atm) with nickel as a catalyst. CH4(*g*) + H2O(*g*) CO2(*g*) + 3H2(*g*)      If 138.0 g of CH4 and 138.0 g of H2O are reacted at 975°C and 12.0 atm, how much hydrogen should be available for industrial use?   |  |  |  | | --- | --- | --- | |  | a. | 153 L | |  | b. | 220 L | |  | c. | 196 L | |  | d. | 21.8 L | |  | e. | 65.4 L |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.3 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | hydrogen | main group chemistry | main-group nonmetal | preparation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 39. Which statements about hydrogen are true?   |  |  | | --- | --- | | I. | H has a lower ionization energy than He. | | II. | H– is smaller than H. | | III. | H bonds with the halogens to form polar covalent compounds. | | IV. | H is always a metal. | | V. | H does not have a second ionization energy. |   ​   |  |  |  | | --- | --- | --- | |  | a. | I, V | |  | b. | II, IV | |  | c. | I, III, V | |  | d. | II, IV, V | |  | e. | I, III, IV, V |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.3 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | hydrogen | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/6/2017 1:28 AM | |

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| 40. Salts can consist of hydrogen.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | True | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.3 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | hydrogen | main group chemistry | main-group nonmetal | reactions and compounds | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 41. Choose the metal that reacts least vigorously with water.   |  |  |  | | --- | --- | --- | |  | a. | Mg | |  | b. | Ca | |  | c. | Sr | |  | d. | Ba | |  | e. | All of these react equally vigorously with water. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.4 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIA alkaline earth metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 42. Choose the metal that is produced by electrolysis of its molten chloride salt.   |  |  |  | | --- | --- | --- | |  | a. | Mg | |  | b. | Ca | |  | c. | Sr | |  | d. | Ba | |  | e. | all of these |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.4 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIA alkaline earth metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 43. Choose the group that matches the following description: reacts with H2 to form compounds with the general formula MH2.   |  |  |  | | --- | --- | --- | |  | a. | Group 1A | |  | b. | Group 2A | |  | c. | Group 3A | |  | d. | Group 4A | |  | e. | Group 5A |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.4 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIA alkaline earth metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 44. Choose the group that matches the following description: reacts with F2 to form compounds with the general formula MF2.   |  |  |  | | --- | --- | --- | |  | a. | Group 1A | |  | b. | Group 2A | |  | c. | Group 3A | |  | d. | Group 4A | |  | e. | Group 5A |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.4 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIA alkaline earth metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 45. Elements in this group lose two valence electrons to non-metals to form ionic compounds.   |  |  |  | | --- | --- | --- | |  | a. | Group 1A | |  | b. | Group 2A | |  | c. | Group 3A | |  | d. | Group 4A | |  | e. | Group 5A |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIA alkaline earth metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 46. Choose the solid that has the smallest ionization energy.   |  |  |  | | --- | --- | --- | |  | a. | Be | |  | b. | Mg | |  | c. | Ca | |  | d. | Sr | |  | e. | Ba |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.4 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIA alkaline earth metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 47. Which of the following ions interferes with the action of detergents in hard water?   |  |  |  | | --- | --- | --- | |  | a. | Na+ | |  | b. | Ca2+ | |  | c. | Mg2+ | |  | d. | Ca2+ and Mg2+ | |  | e. | Na+, Ca2+, and Mg2+ |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.4 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIA alkaline earth metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 48. What element is found in the structural minerals that make up our bones and teeth?   |  |  |  | | --- | --- | --- | |  | a. | strontium | |  | b. | barium | |  | c. | calcium | |  | d. | silicon | |  | e. | magnesium |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | calcium | Chemistry | general chemistry | group IIA alkaline earth metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 49. In cation-exchange resins, what ion replaces Ca2+ and Mg2+ in the hard water that is passed over the resin?   |  |  |  | | --- | --- | --- | |  | a. | H+ | |  | b. | Li+ | |  | c. | Na+ | |  | d. | K+ | |  | e. | Ba2+ |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 50. Arrange the following Group 2A elements (in their ionic form) from *largest to smallest* atomic radius.   |  |  |  | | --- | --- | --- | |  | a. | Ra2+  >  Ba2+  >  Sr2+  >  Ca2+  >  Mg2+ | |  | b. | Sr2+  >  Ca2+  >  Ba2+  >  Mg2+  >  Ra2+ | |  | c. | Ba2+  >  Ra2+  >  Ca2+  >  Sr2+  >  Mg2+ | |  | d. | Mg2+  >  Ca2+  >  Sr2+  >  Ba2+  >  Ra2+ | |  | e. | Ra2+  >  Mg2+  >  Ba2+  >  Ca2+  >  Sr2+ |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIA alkaline earth metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 51. Which of the following is the *best* explanation for how a water softener works?   |  |  |  | | --- | --- | --- | |  | a. | When hard water passes over a resin in the softener, the Ca2+ and Mg2+ ions in the water bind to the resin in place of Na+ ions. | |  | b. | The softener releases an acid to interact with the Ca2+ and Mg2+ ions in the hard water to neutralize them. | |  | c. | When hard water passes through the softener, the Ca2+ and Mg2+ ions are removed through electrolysis. | |  | d. | The softener releases K+ ions to counteract the Ca2+ and Mg2+ ions in the hard water. | |  | e. | When hard water passes through the softener, the Ca2+ and Mg2+ ions precipitate out as Mg(OH)2 and Ca(OH)2. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.4 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIA alkaline earth metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 52. Alkaline earth metals react less vigorously with water than do the alkali metals.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | True | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.4 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIA alkaline earth metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 53. Which of these Group 2A elements reacts least vigorously with water?   |  |  |  | | --- | --- | --- | |  | a. | Mg | |  | b. | Sr | |  | c. | Ca | |  | d. | Ba | |  | e. | All of these react in the same manner. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIA alkaline earth metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 54. The element with the lowest melting point is:   |  |  |  | | --- | --- | --- | |  | a. | B | |  | b. | Al | |  | c. | Ga | |  | d. | Tl | |  | e. | All have the same melting point. |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.5 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIIA metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 55. The element with the widest liquid range is:   |  |  |  | | --- | --- | --- | |  | a. | B | |  | b. | Al | |  | c. | Ga | |  | d. | Tl | |  | e. | All are the same. |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.5 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIIA metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 56. The ion that aluminum is most likely to form is isoelectronic with:   |  |  |  | | --- | --- | --- | |  | a. | Ar | |  | b. | Na | |  | c. | Ne | |  | d. | Mg | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.5 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | aluminum | Chemistry | general chemistry | group IIIA metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 57. Which of the following metals has the highest melting point?   |  |  |  | | --- | --- | --- | |  | a. | Na | |  | b. | Mg | |  | c. | Al | |  | d. | Ca | |  | e. | K |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.5 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 58. An element that exhibits the oxidation states +1 and +3 is:   |  |  |  | | --- | --- | --- | |  | a. | B | |  | b. | Al | |  | c. | Ga | |  | d. | In | |  | e. | all of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.5 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIIA metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 59. The Group 3A element with the highest ionization energy is:   |  |  |  | | --- | --- | --- | |  | a. | B | |  | b. | Al | |  | c. | Ga | |  | d. | Tl | |  | e. | All are the same. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIIA metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 60. The element found in bauxite is:   |  |  |  | | --- | --- | --- | |  | a. | B | |  | b. | Al | |  | c. | Ga | |  | d. | Tl | |  | e. | all of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | aluminum | Chemistry | general chemistry | group IIIA metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 61. The element that reacts with N2 to form a compound of the general formula MN is:   |  |  |  | | --- | --- | --- | |  | a. | B | |  | b. | Al | |  | c. | Ga | |  | d. | Tl | |  | e. | all of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | aluminum | Chemistry | general chemistry | group IIIA metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 62. The Group 3A elements are all metals.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.5 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIIA metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 63. Choose the group that matches the following description: contains two of the most important elements found on earth.   |  |  |  | | --- | --- | --- | |  | a. | Group 1A | |  | b. | Group 2A | |  | c. | Group 3A | |  | d. | Group 4A | |  | e. | Group 5A |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.6 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 64. Order the following bonds from highest to lowest bond energy: carbon–carbon, silicon–silicon, silicon–oxygen.   |  |  |  | | --- | --- | --- | |  | a. | C—C, Si—Si, S—O | |  | b. | Si—O, C—C, Si—Si | |  | c. | Si—Si, Si—O, C—C | |  | d. | Si—O, Si—Si, C—C | |  | e. | C—C, Si—O, Si—Si |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 65. Which group contains two elements that exhibit +2 and +4 oxidation states?   |  |  |  | | --- | --- | --- | |  | a. | Group 1A | |  | b. | Group 3A | |  | c. | Group 4A | |  | d. | Group 5A | |  | e. | Group 7A |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IVA metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 66. What are the forms of elemental carbon?   |  |  |  | | --- | --- | --- | |  | a. | graphite and diamond | |  | b. | graphite, diamond, and fullerenes | |  | c. | graphite and fullerenes | |  | d. | diamond and fullerenes | |  | e. | diamond, graphite, and carbonite |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | carbon | Chemistry | general chemistry | group IV nonmetal | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 67. The solid substance with the empirical formula SiO2 is commonly called:   |  |  |  | | --- | --- | --- | |  | a. | silicon | |  | b. | silica | |  | c. | silicate | |  | d. | silicone | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IV nonmetal | main group chemistry | main-group nonmetal | silicon | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 68. How many of the following statements are false?   |  |  | | --- | --- | | I. | The group 3A elements are all metals. | | II | Alkaline earth metals react less vigorously with water than do the alkali metals. | | III. | Salts can consist of hydrogen. | | IV. | Because Li is the strongest reducing agent of the alkali metals, it reacts most quickly with water of the alkali metals. |   ​   |  |  |  | | --- | --- | --- | |  | a. | 0 | |  | b. | 1 | |  | c. | 2 | |  | d. | 3 | |  | e. | 4 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/6/2017 1:23 AM | |

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| 69. Which of the following is the most abundant metal on earth?   |  |  |  | | --- | --- | --- | |  | a. | calcium | |  | b. | iron | |  | c. | copper | |  | d. | aluminum | |  | e. | zinc |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.5 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | aluminum | Chemistry | general chemistry | group IIIA metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 70. Which element is found in the ore galena?   |  |  |  | | --- | --- | --- | |  | a. | tin | |  | b. | lead | |  | c. | aluminum | |  | d. | silicon | |  | e. | germanium |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.6 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IVA metal | lead | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 71. The largest commercial use of lead is in   |  |  |  | | --- | --- | --- | |  | a. | gasoline | |  | b. | protective coatings for steel | |  | c. | semiconductors | |  | d. | paints | |  | e. | batteries used in automobiles |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IVA metal | lead | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 72. With which of the following elements does silicon form the strongest bonds?   |  |  |  | | --- | --- | --- | |  | a. | Si | |  | b. | C | |  | c. | H | |  | d. | O | |  | e. | B |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.6 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IV nonmetal | main group chemistry | main-group metal | silicon | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 73. The chemistry of silicon is dominated by its bonding with   |  |  |  | | --- | --- | --- | |  | a. | Cl | |  | b. | S | |  | c. | Al | |  | d. | F | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IV nonmetal | main group chemistry | main-group metal | silicon | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 74. Which element in Group 4A has the strongest metallic character?   |  |  |  | | --- | --- | --- | |  | a. | Pb | |  | b. | C | |  | c. | Si | |  | d. | Ge | |  | e. | None of these are metals. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.6 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IVA metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 75. Choose the element with the largest electronegativity.   |  |  |  | | --- | --- | --- | |  | a. | N | |  | b. | P | |  | c. | As | |  | d. | Sb | |  | e. | Bi |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.7 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 76. Choose the most metallic element.   |  |  |  | | --- | --- | --- | |  | a. | N | |  | b. | P | |  | c. | As | |  | d. | Sb | |  | e. | Bi |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.7 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 77. Choose the element with the largest ionization energy.   |  |  |  | | --- | --- | --- | |  | a. | N | |  | b. | P | |  | c. | As | |  | d. | Sb | |  | e. | Bi |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.7 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 78. Which Group 5A element cannot form molecules with five covalent bonds?   |  |  |  | | --- | --- | --- | |  | a. | N | |  | b. | P | |  | c. | As | |  | d. | Sb | |  | e. | Bi |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 79. Why is nitrogen *not* able to form molecules with five covalent bonds?   |  |  |  | | --- | --- | --- | |  | a. | Because nitrogen can only form a trigonal bipyramidal shape when it bonds with other elements. | |  | b. | Because nitrogen has such a high ionization energy that having five covalent bonds is not possible. | |  | c. | Because nitrogen only exists as N2 gas at room temperature. | |  | d. | Because of nitrogen's small size and lack of available d orbitals for electrons. | |  | e. | At least two of the above are correct. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 80. The ability of the Group 5A elements to form \_\_\_\_\_\_\_\_\_\_ greatly decreases after nitrogen.   |  |  |  | | --- | --- | --- | |  | a. | molecules with five covalent bonds | |  | b. | pi bonds | |  | c. | larger molecules with single bonds | |  | d. | molecules with four covalent bonds | |  | e. | all of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.7 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 81. Compounds containing bismuth in the +5 oxidation state tend to be \_\_\_\_\_\_\_\_, and compounds containing bismuth in the +3 oxidation state tend to be \_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | ionic, ionic | |  | b. | ionic, molecular | |  | c. | molecular, molecular | |  | d. | molecular, ionic | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 82. Choose the correct molecular structure for AsCl5.   |  |  |  | | --- | --- | --- | |  | a. | trigonal bipyramidal | |  | b. | trigonal planar | |  | c. | tetrahedral | |  | d. | octahedral | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.7 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 83. Choose the correct molecular structure for PCl3.   |  |  |  | | --- | --- | --- | |  | a. | trigonal bipyramidal | |  | b. | trigonal planar | |  | c. | tetrahedral | |  | d. | octahedral | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.7 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 84. Pi bonding tends to be important in all elements of Group 5A.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.7 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 85. Choose the correct molecular structure for NH4+.   |  |  |  | | --- | --- | --- | |  | a. | trigonal bipyramidal | |  | b. | trigonal planar | |  | c. | tetrahedral | |  | d. | octahedral | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 86. The strength of the N≡N bond in nitrogen is important   |  |  |  | | --- | --- | --- | |  | a. | Because it allows N2 gas to serve as a medium for experiments involving oxygen or water. | |  | b. | Both thermodynamically and kinetically. | |  | c. | In the use of nitrogen-based explosives. | |  | d. | In the exothermic decomposition of binary compounds containing nitrogen. | |  | e. | All of these. |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 87. The process of transforming N2 to a form usable by animals and plants is called   |  |  |  | | --- | --- | --- | |  | a. | nitrogen fixation | |  | b. | fertilization | |  | c. | denitrification | |  | d. | the Ostwald process | |  | e. | nitrogenation |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 88. In which of the following compounds does N have its maximum oxidation state?   |  |  |  | | --- | --- | --- | |  | a. | N2O5 | |  | b. | N2O | |  | c. | NO | |  | d. | N2O3 | |  | e. | NO2 |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 89. The strength of the triple bond in the N2 molecule is important   |  |  |  | | --- | --- | --- | |  | a. | both kinetically and thermodynamically | |  | b. | kinetically but not thermodynamically | |  | c. | thermodynamically but not kinetically | |  | d. | neither thermodynamically nor kinetically | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 90. Which of the following is not a possible oxidation state of nitrogen?   |  |  |  | | --- | --- | --- | |  | a. | +2 | |  | b. | +1 | |  | c. | 0 | |  | d. | -2 | |  | e. | -4 |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 91. The Ostwald process   |  |  |  | | --- | --- | --- | |  | a. | is used to manufacture ammonia | |  | b. | transforms nitrogen to other nitrogen-containing compounds | |  | c. | is used to recover sulfur from underground deposits | |  | d. | is used to produce nitric acid | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 92. The Haber process   |  |  |  | | --- | --- | --- | |  | a. | is used to manufacture ammonia | |  | b. | transforms nitrogen to other nitrogen-containing compounds | |  | c. | is used to recover sulfur from underground deposits | |  | d. | is used to produce nitric acid | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 93. All of the following contribute to nitrogen-fixation except   |  |  |  | | --- | --- | --- | |  | a. | lightning | |  | b. | bacteria on the roots of legumes | |  | c. | the combustion process in car engines | |  | d. | the Haber process | |  | e. | the Ostwald process |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 94. Recent studies indicate that lightning may be responsible for as much as \_\_\_\_\_% of the total fixed nitrogen available on earth.   |  |  |  | | --- | --- | --- | |  | a. | 5 | |  | b. | 25 | |  | c. | 50 | |  | d. | 75 | |  | e. | 95 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 95. The most important hydride of nitrogen is   |  |  |  | | --- | --- | --- | |  | a. | ammonia | |  | b. | hydrazine | |  | c. | styrofoam | |  | d. | agricultural pesticides | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 96. What nitrogen-containing compound is used as rocket fuel?   |  |  |  | | --- | --- | --- | |  | a. | nitrous oxide | |  | b. | ammonia | |  | c. | nitric oxide | |  | d. | hydrazine | |  | e. | nitrogen dioxide |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 97. Which of the following is not a use of hydrazine?   |  |  |  | | --- | --- | --- | |  | a. | Blowing agent. | |  | b. | Fungicides. | |  | c. | Herbicides. | |  | d. | Insecticides. | |  | e. | All are uses of hydrazine. |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 98. Dinitrogen monoxide is more commonly known as   |  |  |  | | --- | --- | --- | |  | a. | nitric oxide | |  | b. | laughing gas | |  | c. | hydrazine | |  | d. | nitrous oxide | |  | e. | two of these |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 99. What nitrogen-containing compound has a role in controlling the earth's temperature?   |  |  |  | | --- | --- | --- | |  | a. | N2O | |  | b. | nitric oxide | |  | c. | nitrogen oxide | |  | d. | ammonia | |  | e. | N2 |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 100. What nitrogen-containing compound is produced commercially in the Ostwald process?   |  |  |  | | --- | --- | --- | |  | a. | hydrazine | |  | b. | nitric acid | |  | c. | nitrous acid | |  | d. | ammonia | |  | e. | nitrous oxide |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 101. Nitroglycerin, the main component of dynamite, decomposes very rapidly and exothermically according to the equation:       4C3H5N3O9(*l*) → 6N2(*g*) + 12CO2(*g*) + 10H2O(*g*) + O2(*g*) + energy What is the total volume of products that would be produced from 553 g of nitroglycerin? Assume the heat released caused the temperature to become 233°C and the pressure to be 10.0 atm.   |  |  |  | | --- | --- | --- | |  | a. | 33.8 L | |  | b. | 73.3 L | |  | c. | 15.2 L | |  | d. | 54.6 L | |  | e. | 88.3 L |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 102. Which of the following are reasons why the chemical properties of phosphorus are quite different from those of nitrogen, even though they are located very closely on the periodic table?   |  |  | | --- | --- | | I. | the greater electronegativity of nitrogen | | II. | the larger size of the phosphorus atom | | III. | nitrogen's ability to form stronger pi bonds | | IV. | the empty valence d orbitals on phosphorus |   ​   |  |  |  | | --- | --- | --- | |  | a. | I, II | |  | b. | I, II, IV | |  | c. | II only | |  | d. | III, IV | |  | e. | I, II, III, IV |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/6/2017 12:22 AM | |

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| 103. Which of the following titration curves best represents phosphorous acid, H3PO3, being titrated with a strong base?   |  |  |  | | --- | --- | --- | |  | a. |  | |  | b. |  | |  | c. |  | |  | d. |  | |  | e. |  |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.9 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | phosphorus | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 104. Which is the most reactive form of phosphorus?   |  |  |  | | --- | --- | --- | |  | a. | Black phosphorus. | |  | b. | White phosphorus. | |  | c. | Red phosphorus. | |  | d. | Two of these are equally reactive. | |  | e. | All of these (A-C) are equally reactive. |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.9 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | phosphorus | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 105. Which form of phosphorus is highly toxic?   |  |  |  | | --- | --- | --- | |  | a. | white phosphorus | |  | b. | red phosphorus | |  | c. | black phosphorus | |  | d. | tetraphosphorus decaoxide | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.9 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | phosphorus | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 106. Phosphorus is found in nature   |  |  |  | | --- | --- | --- | |  | a. | as white phosphorus | |  | b. | as red phosphorus | |  | c. | as black phosphorus | |  | d. | usually as the PO43– ion in phosphate rock | |  | e. | in gypsum |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.9 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | phosphorus | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 107. Why is phosphorus added to soil as a fertilizer?   |  |  |  | | --- | --- | --- | |  | a. | It is essential for plant growth. | |  | b. | It is often found in an inaccessible form in the soil. | |  | c. | Most soils do not have large amounts of phosphorus. | |  | d. | Two of these. | |  | e. | All of these. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.9 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | phosphorus | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 108. What Group 6A element has been studied for its ability to protect against cancer?   |  |  |  | | --- | --- | --- | |  | a. | sulfur | |  | b. | polonium | |  | c. | selenium | |  | d. | tellurium | |  | e. | oxygen |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIA | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 109. What Group 6A element was discovered in pitchblende by the Curies?   |  |  |  | | --- | --- | --- | |  | a. | sulfur | |  | b. | polonium | |  | c. | selenium | |  | d. | tellurium | |  | e. | oxygen |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIA | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 110. What Group 6A element has 27 isotopes and is highly toxic and very radioactive?   |  |  |  | | --- | --- | --- | |  | a. | sulfur | |  | b. | polonium | |  | c. | selenium | |  | d. | tellurium | |  | e. | oxygen |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIA | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 111. What Group 6A elements are semiconductors?   |  |  |  | | --- | --- | --- | |  | a. | selenium and polonium | |  | b. | tellurium and polonium | |  | c. | sulfur and selenium | |  | d. | selenium and tellurium | |  | e. | sulfur and tellurium |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIA | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 112. Choose the correct molecular structure for SeBr4.   |  |  |  | | --- | --- | --- | |  | a. | trigonal bipyramidal | |  | b. | trigonal planar | |  | c. | tetrahedral | |  | d. | octahedral | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIA | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 113. Choose the correct molecular structure for SeF6.   |  |  |  | | --- | --- | --- | |  | a. | trigonal bipyramidal | |  | b. | trigonal planar | |  | c. | tetrahedral | |  | d. | octahedral | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIA | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 114. All of the following are true about ozone *except*:   |  |  |  | | --- | --- | --- | |  | a. | It causes skin cancer. | |  | b. | It is formed in the pollution from car exhaust. | |  | c. | It can be used to purify water. | |  | d. | It exists naturally in the upper atmosphere. | |  | e. | It prevents UV light from reaching the earth. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.11 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIA | main group chemistry | main-group nonmetal | oxygen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 115. What process is used to recover sulfur?   |  |  |  | | --- | --- | --- | |  | a. | the Haber process | |  | b. | the Ostwald process | |  | c. | the Frasch process | |  | d. | the contact process | |  | e. | the wet process |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.12 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIA | main group chemistry | main-group nonmetal | sulfur | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 116. The fact that the SO molecule is very unstable while O2 is stable can be best explained because:   |  |  |  | | --- | --- | --- | |  | a. | The S-O bond is inherently unstable. | |  | b. | Sulfur lacks the ability to form double bonds. | |  | c. | The difference in electronegativity between the sulfur atom and the oxygen atom makes it unlikely for the S-O bond to form. | |  | d. | There exists much stronger pi bonding between oxygen atoms than between a sulfur atom and oxygen atom. | |  | e. | None of these. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.12 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIA | main group chemistry | main-group nonmetal | sulfur | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 117. Choose the species with the largest bond strength.   |  |  |  | | --- | --- | --- | |  | a. | F2 | |  | b. | Cl2 | |  | c. | Br2 | |  | d. | I2 | |  | e. | All are the same. |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIIA: halogen | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 118. Choose the species with the largest ionization energy.   |  |  |  | | --- | --- | --- | |  | a. | F | |  | b. | Cl | |  | c. | Br | |  | d. | I | |  | e. | All are the same. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIIA: halogen | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 119. Choose the species with the largest radius.   |  |  |  | | --- | --- | --- | |  | a. | F | |  | b. | F– | |  | c. | Cl | |  | d. | Cl– | |  | e. | All are the same. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIIA: halogen | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 120. Of F, Cl, Br, and I, which of the following correctly lists the largest radius of the anion, the element with the highest electronegativity, and the highest bond energy of the diatomic molecule, respectively?   |  |  |  | | --- | --- | --- | |  | a. | I–, Cl, F2 | |  | b. | I–, F, Br2 | |  | c. | Br–, Br, I2 | |  | d. | I–, F, Cl2 | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIIA: halogen | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 121. Choose the species with the smallest hydration energy (absolute value).   |  |  |  | | --- | --- | --- | |  | a. | F– | |  | b. | Cl– | |  | c. | Br– | |  | d. | I– | |  | e. | all the same |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIIA: halogen | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 122. Choose the species that is the most reactive.   |  |  |  | | --- | --- | --- | |  | a. | F2 | |  | b. | Cl2 | |  | c. | Br2 | |  | d. | I2 | |  | e. | all are the same. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIIA: halogen | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 123. Choose the correct molecular structure for ClO2–.   |  |  |  | | --- | --- | --- | |  | a. | trigonal bipyramidal | |  | b. | trigonal planar | |  | c. | tetrahedral | |  | d. | octahedral | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIIA: halogen | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 124. Choose the correct molecular structure for ClO4–.   |  |  |  | | --- | --- | --- | |  | a. | trigonal bipyramidal | |  | b. | trigonal planar | |  | c. | tetrahedral | |  | d. | octahedral | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIIA: halogen | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 125. Choose the group containing the most reactive nonmetals.   |  |  |  | | --- | --- | --- | |  | a. | Group 1A | |  | b. | Group 3A | |  | c. | Group 5A | |  | d. | Group 7A | |  | e. | Group 8A |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.13 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIIA: halogen | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 126. For the process X–(*g*) → X–(*aq*), select the ion with the most negative value of Δ*H*.   |  |  |  | | --- | --- | --- | |  | a. | F– | |  | b. | Cl– | |  | c. | Br– | |  | d. | I– | |  | e. | all the same |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIIA: halogen | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 127. For the process X–(*g*) → X–(*aq*), select the ion with the most negative value of Δ*S*.   |  |  |  | | --- | --- | --- | |  | a. | F– | |  | b. | Cl– | |  | c. | Br– | |  | d. | I– | |  | e. | all the same |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIIA: halogen | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 128. Within the halogen family, as atomic number increases:   |  |  |  | | --- | --- | --- | |  | a. | Covalent radius decreases. | |  | b. | Ionic radius increases. | |  | c. | Melting point decreases. | |  | d. | Electronegativity increases. | |  | e. | None of these. |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.13 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIIA: halogen | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 129. The bond strength of HCl is greater than that of HF.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.13 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIIA: halogen | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 130. The acid HClO4 is a stronger acid than HClO2.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | True | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.13 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIIA: halogen | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 131. All of the following statements about helium are true *except*:   |  |  |  | | --- | --- | --- | |  | a. | It forms no compounds. | |  | b. | It is used as a coolant. | |  | c. | The major sources on earth are natural gas deposits. | |  | d. | It is used in luminescent lighting. | |  | e. | It is a component of the sun. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.14 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIIIA: noble gas | helium | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 132. Of the following, which form compounds?   |  |  | | --- | --- | | I. | Ne | | II. | Kr | | III. | Xe | | IV. | Rn |   ​   |  |  |  | | --- | --- | --- | |  | a. | I, II | |  | b. | II, III | |  | c. | I, II, III | |  | d. | II, III, IV | |  | e. | III, IV |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.14 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIIIA: noble gas | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/6/2017 12:55 AM | |

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| 133. Choose the correct molecular structure for XeF4.   |  |  |  | | --- | --- | --- | |  | a. | trigonal bipyramidal | |  | b. | trigonal planar | |  | c. | tetrahedral | |  | d. | square planar | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.14 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIIIA: noble gas | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 134. Which of the following noble gases have been observed to form compounds?   |  |  |  | | --- | --- | --- | |  | a. | He and Ar | |  | b. | Kr and Xe | |  | c. | Xe | |  | d. | Ar, Kr, and Xe | |  | e. | The noble gases never form compounds since they have filled outer shells. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.14 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIIIA: noble gas | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 135. Which of the following is *not* a known compound?   |  |  |  | | --- | --- | --- | |  | a. | XeF4 | |  | b. | KrF2 | |  | c. | ArBr4 | |  | d. | XeO3 | |  | e. | At least two of the above are not compounds. |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.14 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VIIIA: noble gas | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| Write a balanced equation for each of the following reactions: |

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| 136. Lithium metal with excess O2(*g*).   |  |  | | --- | --- | | *ANSWER:* | 4Li(*s*) + O2(*g*) → 2Li2O(*s*) | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.2 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-1 | | *KEYWORDS:* | Chemistry | general chemistry | group I alkali metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 137. Rubidium metal with O2(*g*).   |  |  | | --- | --- | | *ANSWER:* | Rb(*s*) + O2(*g*) → RbO2(*s*) | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.2 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-1 | | *KEYWORDS:* | Chemistry | general chemistry | group I alkali metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 138. Cesium metal with Cl2(*g*).   |  |  | | --- | --- | | *ANSWER:* | 2Cs(*s*) + Cl2(*g*) → 2CsCl(*s*) | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.2 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-1 | | *KEYWORDS:* | Chemistry | general chemistry | group I alkali metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 139. Sodium metal with H2(*g*).   |  |  | | --- | --- | | *ANSWER:* | 2Na(*s*) + H2(*g*) → 2NaH(*s*) | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.2 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-1 | | *KEYWORDS:* | Chemistry | general chemistry | group I alkali metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 140. Lithium metal with H2O(*l*).   |  |  | | --- | --- | | *ANSWER:* | 2Li(*s*) + 2H2O(*l*) → 2Li+(*aq*) + 2OH–(*aq*) + H2(*g*) | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.2 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-1 | | *KEYWORDS:* | Chemistry | general chemistry | group I alkali metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 141. Magnesium metal with O2(*g*).   |  |  | | --- | --- | | *ANSWER:* | 2Mg(*s*) + O2(*g*) → 2MgO(*s*) | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.4 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-1 | | *KEYWORDS:* | Chemistry | general chemistry | group IIA alkaline earth metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 142. Strontium metal with Br2(*l*).   |  |  | | --- | --- | | *ANSWER:* | Sr(*s*) + Br2(*l*) → SrBr2(*s*) | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.4 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-1 | | *KEYWORDS:* | Chemistry | general chemistry | group IIA alkaline earth metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 143. Aluminum metal with O2(*g*) at high temperatures.   |  |  | | --- | --- | | *ANSWER:* | 2Al + 3O2 → 2Al2O3 | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.5 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-1 | | *KEYWORDS:* | Chemistry | general chemistry | group IIIA metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 144. Gallium metal with I2(*s*).   |  |  | | --- | --- | | *ANSWER:* | 2Ga(*s*) + 3I2(*s*) → 2GaI3(*s*) | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.5 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-1 | | *KEYWORDS:* | Chemistry | general chemistry | group IIIA metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 145. Tin metal with O2(*g*).   |  |  | | --- | --- | | *ANSWER:* | Sn(*s*) + O2(*g*) → SnO2(*s*) | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.6 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-1 | | *KEYWORDS:* | Chemistry | general chemistry | group IVA metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 146. Lead metal with Br2(*l*).   |  |  | | --- | --- | | *ANSWER:* | Pb(*s*) + Br2(*l*) → PbBr2(*s*) | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.6 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-1 | | *KEYWORDS:* | Chemistry | general chemistry | group IVA metal | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| Write a balanced equation for each of the following: |

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| 147. The reaction of hydrazine with O2(*g*)   |  |  | | --- | --- | | *ANSWER:* | N2H4(*l*) + O2(*g*) → N2(*g*) + 2H2O(*g*) | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-2 | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 148. The oxidation of copper metal by 6 *M* nitric acid   |  |  | | --- | --- | | *ANSWER:* | 8H+(*aq*) + 2NO3–(*aq*) + 3Cu(*s*) → 3Cu2+(*aq*) + 4H2O(*l*) + 2NO(*g*) | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-2 | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 149. The thermal decomposition of NO(*g*)   |  |  | | --- | --- | | *ANSWER:* | 3NO(*g*) → N2O(*g*) + NO2(*g*) | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-2 | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 150. The decomposition of nitric acid in sunlight   |  |  | | --- | --- | | *ANSWER:* | 4HNO3(*aq*) → 4NO2(*aq*) + 2H2O(*l*) + O2(*g*) | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-2 | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 151. The reaction of sodium phosphide with water   |  |  | | --- | --- | | *ANSWER:* | 2Na3P(*s*) + 6H2O(*l*) → 2PH3(*g*) + 6Na+(*aq*) + 6OH–(*aq*) | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.9 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-2 | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | phosphorus | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 152. The reaction of P4O10(*s*) with water   |  |  | | --- | --- | | *ANSWER:* | P4O10(*s*) + 6H2O(*l*) → 4H3PO4(*aq*) | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.9 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-2 | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | main-group nonmetal | phosphorus | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 153. The oxidation of sulfur dioxide by oxygen gas   |  |  | | --- | --- | | *ANSWER:* | 2SO2(*g*) + O2(*g*) → 2SO3(*g*) | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.12 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-2 | | *KEYWORDS:* | Chemistry | general chemistry | group VIA | main group chemistry | main-group nonmetal | sulfur | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 154. The reaction of chlorine gas with cold water   |  |  | | --- | --- | | *ANSWER:* | Cl2(*g*) + H2O(*l*) → HOCl(*aq*) + H+(*aq*) + Cl–(*aq*) | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.13 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-2 | | *KEYWORDS:* | Chemistry | general chemistry | group VIIA: halogen | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 155. The reaction of xenon hexafluoride with *excess* water   |  |  | | --- | --- | | *ANSWER:* | XeF6(*s*) + 3H2O(*l*) → XeO3(*aq*) + 6HF(*aq*) | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.14 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 20-2 | | *KEYWORDS:* | Chemistry | general chemistry | group VIIIA: noble gas | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 156. The smallest ionization energies are found in the \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ region of the periodic table.   |  |  |  | | --- | --- | --- | |  | a. | upper left | |  | b. | upper right | |  | c. | lower left | |  | d. | lower right | |  | e. | impossible to tell |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 157. The largest electron affinities are found in the \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ region of the periodic table.   |  |  |  | | --- | --- | --- | |  | a. | upper left | |  | b. | upper right | |  | c. | lower left | |  | d. | lower right | |  | e. | impossible to tell |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 158. All of the following are semimetals except   |  |  |  | | --- | --- | --- | |  | a. | B | |  | b. | Ge | |  | c. | Se | |  | d. | Sb | |  | e. | Si |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 159. Which of the following elements has the highest electronegativity?   |  |  |  | | --- | --- | --- | |  | a. | Al | |  | b. | In | |  | c. | S | |  | d. | Ba | |  | e. | O |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 160. Bromine will form compounds with each of the other elements in Period 4 of the periodic table. How does the type of bonding in the compounds change as one moves from potassium bromide to selenium bromide?   |  |  |  | | --- | --- | --- | |  | a. | polar covalent to ionic | |  | b. | ionic to polar covalent | |  | c. | polar covalent to non-polar covalent | |  | d. | coordinate covalent to polar covalent | |  | e. | all are polar covalent |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 161. What is the overall reaction for the production of hydrogen from methane and water?   |  |  |  | | --- | --- | --- | |  | a. | CH4(g) + H2O(g) → CO(g) + 3 H2(g) | |  | b. | CO(g) + H2O(g) → CO2(g) + H2(g) | |  | c. | CH4(g) + 2 H2O(g) → CO2(g) + 4 H2(g) | |  | d. | 2 CH4(g) + 3 H2O(g) → CO(g) + CO2(g) + 5 H2(g) | |  | e. | 2 H2O(g) → O2(g) + 2 H2(g) |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.3 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | hydrogen | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/6/2017 12:50 AM | |

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| 162. The alkali metal hydrides are excellent \_\_\_\_\_\_\_\_   |  |  |  | | --- | --- | --- | |  | a. | oxidizing agents | |  | b. | reducing agents | |  | c. | oxidants | |  | d. | acids | |  | e. | energy sources |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.3 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | hydrogen | main group chemistry | main-group nonmetal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 163. Which of the following oxides will give the most basic solution when dissolved in water?   |  |  |  | | --- | --- | --- | |  | a. | SO2 | |  | b. | CO2 | |  | c. | K2O | |  | d. | P4O10 | |  | e. | BeO |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | main group chemistry | main-group metal | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 164. Borane, B2H6, forms dimers in which 2 hydrogen atoms bridge between the boron atoms forming 3-center bonds.  How many electrons are shared in such a 3-center bond?   |  |  |  | | --- | --- | --- | |  | a. | 1 | |  | b. | 2 | |  | c. | 3 | |  | d. | 4 | |  | e. | 6 |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.5 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIIA | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/20/2017 2:27 AM | |

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| 165. Which Group 3A element has the most stable +1 oxidation state?   |  |  |  | | --- | --- | --- | |  | a. | B | |  | b. | Al | |  | c. | Ga | |  | d. | In | |  | e. | Tl |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 20.5 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group IIIA metal | main group chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |

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| 166. In which of the following compounds does N have its maximum oxidation state?   |  |  |  | | --- | --- | --- | |  | a. | NH3 | |  | b. | N2O | |  | c. | N2 | |  | d. | NaNO3 | |  | e. | HN3 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 20.8 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | group VA | main group chemistry | nitrogen | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:32 PM | | *DATE MODIFIED:* | 3/4/2016 4:32 PM | |