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| 1. The atomic mass of rhenium is 186.2. Given that 37.1% of natural rhenium is rhenium-185, what is the other stable isotope?   |  |  |  | | --- | --- | --- | |  | a. |  | |  | b. |  | |  | c. |  | |  | d. |  | |  | e. |  |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | atomic theory of matter | atomic weight | Chemistry | early atomic theory | general chemistry | mass spectroscopy | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 2. Consider the element indium, atomic number 49, atomic mass 114.8 g. The nucleus of an atom of indium-112 contains   |  |  |  | | --- | --- | --- | |  | a. | 49 protons, 63 neutrons, 49 electrons | |  | b. | 49 protons, 49 neutrons | |  | c. | 49 protons, 49 alpha particles | |  | d. | 49 protons, 63 neutrons | |  | e. | 49 protons, 112 neutrons |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | atomic theory of matter | Chemistry | early atomic theory | general chemistry | structure of the atom | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 3. A hypothetical element consists of two isotopes of masses 79.95 amu and 81.95 amu with abundances of 31.3% and 68.7%, respectively. What is the average atomic mass of this element?   |  |  |  | | --- | --- | --- | |  | a. | 80.95 amu | |  | b. | 79.95 amu | |  | c. | 80.6 amu | |  | d. | 81.3 amu | |  | e. | 81.95 amu |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | atomic theory of matter | atomic weight | Chemistry | early atomic theory | general chemistry | mass spectroscopy | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 4. Naturally occurring copper exists in two isotopic forms: 63Cu and 65Cu. The atomic mass of copper is 63.55 amu. What is the approximate natural abundance of 63Cu?   |  |  |  | | --- | --- | --- | |  | a. | 63% | |  | b. | 90% | |  | c. | 70% | |  | d. | 50% | |  | e. | 30% |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | atomic theory of matter | atomic weight | Chemistry | early atomic theory | general chemistry | mass spectroscopy | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 5. Naturally occurring element X exists in three isotopic forms: X-28 (27.977 amu, 92.23% abundance), X-29 (28.976 amu, 4.67% abundance), and X-30 (29.974 amu, 3.10% abundance). Calculate the atomic weight of X.   |  |  |  | | --- | --- | --- | |  | a. | 28.09 amu | |  | b. | 48.63 amu | |  | c. | 27.16 amu | |  | d. | 28.97 amu | |  | e. | 86.93 amu |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | atomic theory of matter | atomic weight | Chemistry | early atomic theory | general chemistry | mass spectroscopy | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 6. Naturally occurring element X exists in three isotopic forms: X-28 (27.977 amu, 92.23% abundance), X-29 (28.976 amu, 4.67% abundance), and X-30 (29.974 amu, 3.10% abundance). What is the identity of element X?   |  |  |  | | --- | --- | --- | |  | a. | Cu | |  | b. | Al | |  | c. | Ni | |  | d. | Si | |  | e. | Sr |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | atomic theory of matter | atomic weight | Chemistry | early atomic theory | general chemistry | mass spectroscopy | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 7. The average mass of a carbon atom is 12.011. Assuming you were able to pick up only one carbon unit, the chances that you would randomly get one with a mass of 12.011 is   |  |  |  | | --- | --- | --- | |  | a. | 0% | |  | b. | 0.011% | |  | c. | about 12% | |  | d. | 12.011% | |  | e. | greater than 50% |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | atomic theory of matter | atomic weight | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 8. What is the mass of 5 atom(s) of copper in grams?   |  |  |  | | --- | --- | --- | |  | a. | 317.8 g | |  | b. | 1.9 × 1021 g | |  | c. | 7.65 × 10–24 g | |  | d. | 6.022 × 1023 g | |  | e. | 5.28 × 10–22 g |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.3 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | mole | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 9. Iron is biologically important in the transport of oxygen by red blood cells from the lungs to the various organs of the body. In the blood of an adult human, there are approximately 2.63 × 1013 red blood cells with a total of 2.90 g of iron. On the average, how many iron atoms are present in each red blood cell? (molar mass Fe = 55.85 g/mol)   |  |  |  | | --- | --- | --- | |  | a. | 8.41 × 10–10 | |  | b. | 1.19 × 109 | |  | c. | 3.13 × 1022 | |  | d. | 2.63 × 1013 | |  | e. | 6.16 × 10–2 |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.3 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | mole | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 10. You have a sample of zinc (Zn) and a sample of aluminum (Al). You have an equal number of atoms in each sample. Which of the following statements concerning the masses of the samples is true?   |  |  |  | | --- | --- | --- | |  | a. | The mass of the zinc sample is more than twice as great as the mass of the aluminum sample. | |  | b. | The mass of the zinc sample is more than the mass of the aluminum sample, but it is not twice as great. | |  | c. | The mass of the aluminum sample is more than twice as great as the mass of the zinc sample. | |  | d. | The mass of the aluminum sample is more than the mass of the zinc sample, but it is not twice as great. | |  | e. | The masses of each sample are equal. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.3 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | mole | stoichiometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 11. A sample of ammonia has a mass of 89.9 g. How many molecules are in this sample?   |  |  |  | | --- | --- | --- | |  | a. | 5.28 molecules | |  | b. | 5.41 × 1025 molecules | |  | c. | 1.14 × 1023 molecules | |  | d. | 3.18 × 1024 molecules | |  | e. | 1.78 × 10–15 molecules |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | mole | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 12. How many moles of hydrogen sulfide are contained in a 44.4-g sample of this gas?   |  |  |  | | --- | --- | --- | |  | a. | 0.768 mol | |  | b. | 1.30 mol | |  | c. | 78.5 mol | |  | d. | 22.0 mol | |  | e. | 2.61 mol |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | mole | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 13. What is the molar mass of butanol (C4H9OH)?   |  |  |  | | --- | --- | --- | |  | a. | 73.11 g/mol | |  | b. | 38.09 g/mol | |  | c. | 74.12 g/mol | |  | d. | 30.03 g/mol | |  | e. | 193.05 g/mol |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | molecular weight | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 14. For which compound does 0.256 mole weigh 12.8 g?   |  |  |  | | --- | --- | --- | |  | a. | C2H4O | |  | b. | CO2 | |  | c. | CH3Cl | |  | d. | C2H6 | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | mole | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 15. Roundup, an herbicide manufactured by Monsanto, has the formula C3H8NO5P. How many moles of molecules are there in a 669.1-g sample of Roundup?   |  |  |  | | --- | --- | --- | |  | a. | 0.2527 | |  | b. | 4.845 | |  | c. | 3.957 | |  | d. | 37.17 | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | mole | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 16. Calculate the molar mass of barium nitrite.   |  |  |  | | --- | --- | --- | |  | a. | 245.35 g/mol | |  | b. | 213.35 g/mol | |  | c. | 366.68 g/mol | |  | d. | 320.67 g/mol | |  | e. | 229.35 g/mol |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | molecular weight | stoichiometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 2/3/2017 4:57 AM | |

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| 17. Phosphorus has the molecular formula P4, and sulfur has the molecular formula S8. How many grams of phosphorus contain the same number of molecules as 7.76 g of sulfur?   |  |  |  | | --- | --- | --- | |  | a. | 3.75 g | |  | b. | 0.267 g | |  | c. | 7.49 g | |  | d. | 7.76 g | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | mole | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 18. A given sample of a xenon fluoride compound contains molecules of a single type XeF*n*, where *n* is some whole number. Given that 8 ×1020 molecules of XeF*n* weigh 0.225g, calculate *n*.   |  |  |  | | --- | --- | --- | |  | a. | 1 | |  | b. | 6 | |  | c. | 4 | |  | d. | 3 | |  | e. | 2 |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | mole | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 2/3/2017 5:19 AM | | *DATE MODIFIED:* | 2/3/2017 5:57 AM | |

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| 19. Phosphoric acid can be prepared by reaction of sulfuric acid with “phosphate rock” according to the equation:           Ca3(PO4)2 + 3H2SO4 → 3CaSO4 + 2H3PO4  What is the molar mass of Ca3(PO4)2?   |  |  |  | | --- | --- | --- | |  | a. | 310.18 g/mol | |  | b. | 87.05 g/mol | |  | c. | 278.18 g/mol | |  | d. | 215.21 g/mol | |  | e. | 166.02 g/mol |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | molecular weight | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 20. Phosphoric acid can be prepared by reaction of sulfuric acid with “phosphate rock” according to the equation:           Ca3(PO4)2 + 3H2SO4 → 3CaSO4 + 2H3PO4  How many oxygen atoms are there in 5.90 ng of Ca3(PO4)2?   |  |  |  | | --- | --- | --- | |  | a. | 1.15 × 1013 | |  | b. | 4.58 × 1013 | |  | c. | 2.84 × 1016 | |  | d. | 9.16 × 1022 | |  | e. | 9.16 × 1013 |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | mole | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 21. What is the mass of a 4.110-mol sample of sodium hydroxide?   |  |  |  | | --- | --- | --- | |  | a. | 40.00 g | |  | b. | 164.4 g | |  | c. | 98.6 g | |  | d. | 9.732 g | |  | e. | 0.1028 g |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | mole | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 22. How many atoms of hydrogen are present in 7.85 g of water?   |  |  |  | | --- | --- | --- | |  | a. | 2.62 × 1023 | |  | b. | 2.34 × 1024 | |  | c. | 9.45 × 1024 | |  | d. | 5.25 × 1023 | |  | e. | 1.21 × 1020 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | mole | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 23. The molar mass of the compound formed by sodium and selenium is   |  |  |  | | --- | --- | --- | |  | a. | 124.9 g/mol | |  | b. | 180.9 g/mol | |  | c. | 101.9 g/mol | |  | d. | 259.9 g/mol | |  | e. | 147.9 g/mol |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | molecular weight | stoichiometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 24. What is the molar mass of cryolite (Na3AlF6)?   |  |  |  | | --- | --- | --- | |  | a. | 209.9 g/mol | |  | b. | 185.3 g/mol | |  | c. | 210.0 g/mol | |  | d. | 104.2 g/mol | |  | e. | 68.97 g/mol |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | molecular weight | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 25. One molecule of a compound weighs 2.50 × 10–22 g. The molar mass of this compound is:   |  |  |  | | --- | --- | --- | |  | a. | 2.41 g/mol | |  | b. | 664 g/mol | |  | c. | 143 g/mol | |  | d. | 151 g/mol | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | mole | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 26. NaHCO3 is the active ingredient in baking soda. How many grams of oxygen are in 0.30 g of NaHCO3?   |  |  |  | | --- | --- | --- | |  | a. | 0.057 g | |  | b. | 0.011 g | |  | c. | 3.57 × 103 g | |  | d. | 0.019 g | |  | e. | 0.17 g |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | mole | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 27. A compound is composed of element X and hydrogen. Analysis shows the compound to be 80% X by mass, with three times as many hydrogen atoms as X atoms per molecule. Which element is element X?   |  |  |  | | --- | --- | --- | |  | a. | He | |  | b. | C | |  | c. | F | |  | d. | S | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 3.6 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | mass percentage | stoichiometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 28. Which compound contains the highest percent by mass of hydrogen?   |  |  |  | | --- | --- | --- | |  | a. | HCl | |  | b. | H2O | |  | c. | H2SO4 | |  | d. | H2S | |  | e. | HF |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.6 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | mass percentage | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 29. A substance contains 35.0 g nitrogen, 5.05 g hydrogen, and 60.0 g of oxygen. How many grams of hydrogen are there in a 137-g sample of this substance?   |  |  |  | | --- | --- | --- | |  | a. | 6.92 g | |  | b. | 686 g | |  | c. | 13.8 g | |  | d. | 5.05 g | |  | e. | 27.1 g |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 30. How many grams of potassium are in 25.3 g of K2CrO7?   |  |  |  | | --- | --- | --- | |  | a. | 4.08 g | |  | b. | 1.294 g | |  | c. | 8.17 g | |  | d. | 78.2 g | |  | e. | 50.6 g |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 31. Chlorous acid, HClO2, contains what percent hydrogen by mass?   |  |  |  | | --- | --- | --- | |  | a. | 1.92% | |  | b. | 25.0% | |  | c. | 23.4% | |  | d. | 1.47% | |  | e. | 5.18% |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 32. A mixture of KCl and KNO3 is 44.20% potassium by mass. The percentage of KCl in the mixture is closest to   |  |  |  | | --- | --- | --- | |  | a. | 40% | |  | b. | 50% | |  | c. | 60% | |  | d. | 70% | |  | e. | 80% |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 3.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | mass percentage | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 33. A substance, A2B, has the composition by mass of 60% A and 40% B. What is the composition of AB2 by mass?   |  |  |  | | --- | --- | --- | |  | a. | 40% A, 60% B | |  | b. | 50% A, 50% B | |  | c. | 27% A, 73% B | |  | d. | 33% A, 67% B | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | mass percentage | stoichiometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 34. Each molecule of lycopene contains 40 atoms of carbon (plus other atoms). The mass percent of carbon in lycopene is 84.49%. What is the molar mass of lycopene?   |  |  |  | | --- | --- | --- | |  | a. | 1137.2 g/mol | |  | b. | 405.9 g/mol | |  | c. | 480.4 g/mol | |  | d. | 473.4 g/mol | |  | e. | 568.6 g/mol |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | mass percentage | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 35. A substance contains 23.0 g sodium, 27.0 g aluminum, and 114 g fluorine. How many grams of sodium are there in a 196-g sample of the substance?   |  |  |  | | --- | --- | --- | |  | a. | 8.52 g | |  | b. | 23.0 g | |  | c. | 27.5 g | |  | d. | 196 g | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | mass percentage | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 36. An oxide of iron has the formula Fe3O4. What mass percent of iron does it contain?   |  |  |  | | --- | --- | --- | |  | a. | 0.72% | |  | b. | 28% | |  | c. | 30% | |  | d. | 70% | |  | e. | 72% |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | mass percentage | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 37. The mineral pyromorphite has the formula Pb5(PO4)3Cl. What mass percent of chlorine does it contain?   |  |  |  | | --- | --- | --- | |  | a. | 7.84 % | |  | b. | 3.13 % | |  | c. | 10.50 % | |  | d. | 2.61 % | |  | e. | 1.18 % |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | mass percentage | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 38. Which of the following compounds has the same percent composition by mass as styrene, C8H8?   |  |  |  | | --- | --- | --- | |  | a. | acetylene, C2H2 | |  | b. | benzene, C6H6 | |  | c. | cyclobutadiene, C4H4 | |  | d. | α-ethyl naphthalene, C12H12 | |  | e. | all of these |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.6 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | stoichiometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 39. The molar mass of an insecticide, dibromoethane, is 187.9 g/mol. Its molecular formula is C2H4Br2. What percent by mass of bromine does dibromoethane contain?   |  |  |  | | --- | --- | --- | |  | a. | 42.52% | |  | b. | 2.14% | |  | c. | 85.05% | |  | d. | 12.78% | |  | e. | 6.39% |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | mass percentage | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 40. Hydrocortisone valerate is an ingredient in hydrocortisone cream, prescribed for skin problems. Its molecular formula is C26H38O6. What is the percent by mass of carbon in hydrocortisone valerate?   |  |  |  | | --- | --- | --- | |  | a. | 69.9% | |  | b. | 43.6% | |  | c. | 54.2% | |  | d. | 76.9% | |  | e. | 60.1% |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | mass percentage | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 41. Ammonium sulfate, (NH4)2SO4, contains what percent nitrogen by mass?   |  |  |  | | --- | --- | --- | |  | a. | 42.4% | |  | b. | 10.6% | |  | c. | 21.2% | |  | d. | 13.7% | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | mass percentage | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 42. You heat 3.874 g of a mixture of Fe3O4 and FeO to form 4.102 g Fe2O3. The mass percent of FeO originally in the mixture was:   |  |  |  | | --- | --- | --- | |  | a. | 94.4% | |  | b. | 32.8% | |  | c. | 67.2% | |  | d. | 22.7% | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 3.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | mass percentage | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 43. You take an aspirin tablet (a compound consisting solely of carbon, hydrogen, and oxygen) with a mass of 1.00 g, burn it in air, and collect 2.20 g of carbon dioxide and 0.400 g water. The molar mass of aspirin is between 170 and 190 g/mol. The molecular formula of aspirin is   |  |  |  | | --- | --- | --- | |  | a. | C6H8O5 | |  | b. | C9H8O4 | |  | c. | C8H10O5 | |  | d. | C10H6O4 | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | elemental analysis | general chemistry | molecular formula | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 44. Suppose you are given the percent by mass of the elements in a compound and you wish to determine the empirical formula. Which of the following is true?   |  |  |  | | --- | --- | --- | |  | a. | You must convert percent by mass to relative numbers of atoms. | |  | b. | You must assume exactly 100.0 g of the compound. | |  | c. | You must divide all of the percent by mass numbers by the smallest percent by mass. | |  | d. | You cannot solve for the empirical formula without the molar mass. | |  | e. | At least two of the above (A-D) are true. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.7 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | empirical formula | general chemistry | stoichiometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 45. A chloride of rhenium contains 63.6% rhenium. What is the formula of this compound?   |  |  |  | | --- | --- | --- | |  | a. | ReCl | |  | b. | ReCl3 | |  | c. | ReCl5 | |  | d. | ReCl7 | |  | e. | Re2Cl3 |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | mass percentage | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 46. A 1.90-g sample of an oxide of bromine is converted to 3.188 g of AgBr. Calculate the empirical formula of the oxide. (molar mass for AgBr = 187.78 g/mol)   |  |  |  | | --- | --- | --- | |  | a. | BrO3 | |  | b. | BrO2 | |  | c. | BrO | |  | d. | Br2O | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 3.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | determining chemical formulas | empirical formula | general chemistry | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 47. A hydrocarbon (a compound consisting solely of carbon and hydrogen) is found to be 85.6% carbon by mass. What is the empirical formula for this compound?   |  |  |  | | --- | --- | --- | |  | a. | CH | |  | b. | CH2 | |  | c. | C2H | |  | d. | C3H | |  | e. | CH4 |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | mass percentage | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 48. The empirical formula of a group of compounds is CHCl. Lindane, a powerful insecticide, is a member of this group. The molar mass of lindane is 290.8 g/mol. How many atoms of carbon does a molecule of lindane contain?   |  |  |  | | --- | --- | --- | |  | a. | 2 | |  | b. | 3 | |  | c. | 4 | |  | d. | 6 | |  | e. | 8 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | molecular formula | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 49. The empirical formula of styrene is CH; its molar mass is 104.1 g/mol. What is the molecular formula of styrene?   |  |  |  | | --- | --- | --- | |  | a. | C2H4 | |  | b. | C8H8 | |  | c. | C10H12 | |  | d. | C6H6 | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | molecular formula | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 50. Adipic acid contains 49.32% C, 43.84% O, and 6.85% H by mass. What is the empirical formula?   |  |  |  | | --- | --- | --- | |  | a. | C3H5O2 | |  | b. | C3H3O4 | |  | c. | C2HO3 | |  | d. | C2H5O4 | |  | e. | C3HO3 |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | empirical formula | general chemistry | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 51. Vitamin C contains the elements C, H, and O. It is known to contain 40.9% C and 4.58% H by mass. The molar mass of vitamin C has been found to be about 180 g/mol. The molecular formula for vitamin C is:   |  |  |  | | --- | --- | --- | |  | a. | C2H3O2 | |  | b. | C3H4O3 | |  | c. | C4H6O4 | |  | d. | C6H8O6 | |  | e. | C14H18 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | molecular formula | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 52. A compound composed of sulfur and fluorine is found to contain 25.24% by mass of sulfur. If the molar mass of the compound is 254.11 g/mol, what is its molecular formula?   |  |  |  | | --- | --- | --- | |  | a. | S3F8 | |  | b. | S2F8 | |  | c. | SF5 | |  | d. | S2F5 | |  | e. | S2F10 |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | molecular formula | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 1/25/2017 1:08 AM | |

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| 53. A 0.3870-g sample of a compound known to contain only carbon, hydrogen, and oxygen was burned in oxygen to yield 0.7191 g of CO2 and 0.1472 g of H2O. What is the empirical formula of the compound?   |  |  |  | | --- | --- | --- | |  | a. | CHO | |  | b. | C2H2O | |  | c. | C3H3O2 | |  | d. | C6H3O2 | |  | e. | C3H6O2 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 3.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | molecular formula | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 54. Oxides of copper include CuO and Cu2O. You heat 1.51 g of one of these copper oxides in the absence of air and obtain 1.21 g of Cu. True or false: You must have had CuO.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | True | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.7 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | mass percentage | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 55. The molecular formula always represents the total number of atoms of each element present in a compound.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | True | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.7 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | molecular formula | stoichiometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 56. How many of the following are true concerning balanced chemical equations?   |  |  | | --- | --- | | I. | The number of molecules is conserved. | | II. | The coefficients for the reactants tell you how much of each reactant you are given. | | III. | Atoms are neither created nor destroyed. | | IV. | The coefficients indicate the mass ratios of the substances used. | | V. | The sum of the coefficients on the reactant side equals the sum of the coefficients on the product side. |  |  |  |  | | --- | --- | --- | |  | a. | 1 | |  | b. | 2 | |  | c. | 3 | |  | d. | 4 | |  | e. | 5 |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.8 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 57. Balanced chemical equations imply which of the following?   |  |  |  | | --- | --- | --- | |  | a. | Numbers of molecules are conserved in chemical change. | |  | b. | Numbers of atoms are conserved in chemical change. | |  | c. | Volume is conserved in chemical change. | |  | d. | A and B | |  | e. | B and C |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 58. In balancing an equation, we change the \_\_\_\_\_\_\_\_\_\_ to make the number of atoms on each side of the equation balance.   |  |  |  | | --- | --- | --- | |  | a. | formulas of compounds in the reactants | |  | b. | coefficients of compounds | |  | c. | formulas of compounds in the products | |  | d. | subscripts of compounds | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 59. What is the coefficient for water when the following equation is balanced?                As(OH)3(*s*) + H2SO4(*aq*) → As2(SO4)3(*aq*) + H2O(*l*)   |  |  |  | | --- | --- | --- | |  | a. | 1 | |  | b. | 2 | |  | c. | 4 | |  | d. | 6 | |  | e. | 12 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 60. Which of the following equations is not balanced?   |  |  |  | | --- | --- | --- | |  | a. | 4Al + 3O2 → 2Al2O3 | |  | b. | C2H6 + O2 → 2CO2 + 3H2O | |  | c. | 2KClO3 → 2KCl + O2 | |  | d. | 4P4 + 5S8 → 4P4S10 | |  | e. | P4 + 5O2 → P4O10 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| Consider a specific chemical reaction represented by the equation aA + bB → cC + dD. In this equation the letters A, B, C, and D represent chemicals, and the letters a, b, c, and d represent coefficients in the balanced equation. |

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| 61. How many possible values are there for the quantity “c/d”?   |  |  |  | | --- | --- | --- | |  | a. | 1 | |  | b. | 2 | |  | c. | 3 | |  | d. | 4 | |  | e. | infinite |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 3-1 | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 62. How many possible values are there for the quantity “c”?   |  |  |  | | --- | --- | --- | |  | a. | 1 | |  | b. | 2 | |  | c. | 3 | |  | d. | 4 | |  | e. | infinite |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 3-1 | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 63. What is the coefficient for oxygen when the following equation is balanced?                NH3(*g*) + O2(*g*) → NO2(*g*) + H2O(*g*)   |  |  |  | | --- | --- | --- | |  | a. | 3 | |  | b. | 6 | |  | c. | 7 | |  | d. | 12 | |  | e. | 14 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 64. How many of the following statements are true concerning chemical equations?   I.          Coefficients can be fractions. II.          Subscripts can be fractions. III.          Coefficients represent the relative masses of the reactants and/or products. IV.          Changing the subscripts to balance an equation can only be done once. V.          Atoms are conserved when balancing chemical equations.   |  |  |  | | --- | --- | --- | |  | a. | 1 | |  | b. | 2 | |  | c. | 3 | |  | d. | 4 | |  | e. | 5 |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 65. Determine the coefficient for O2 when the following equation is balanced in standard form (smallest whole numbers).                C6H14(*g*) + O2(*g*) → CO2(*g*) + H2O(*g*)   |  |  |  | | --- | --- | --- | |  | a. | 6 | |  | b. | 13 | |  | c. | 14 | |  | d. | 19 | |  | e. | 12 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 66. What is the sum of the coefficients of the following equation when it is balanced using smallest whole numbers?                NaNH2 + NaNO3 → NaN3 +NaOH + NH3   |  |  |  | | --- | --- | --- | |  | a. | 5 | |  | b. | 6 | |  | c. | 7 | |  | d. | 8 | |  | e. | 9 |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 67. *w*PCl5 + *x*H2O → *y*POCl3 + *z*HCl The above equation is properly balanced when:   |  |  |  | | --- | --- | --- | |  | a. | *w* = 1, *x* = 2, *y* = 2, *z* = 4 | |  | b. | *w* = 2, *x* = 2, *y* = 2, *z* = 2 | |  | c. | *w* = 2, *x* = 2, *y* = 2, *z* = 1 | |  | d. | *w* = 1, *x* = 1, *y* = 1, *z* = 2 | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 68. Potassium forms an oxide containing 1 oxygen atom for every 2 atoms of potassium. What is the coefficient of oxygen in the balanced equation for the reaction of potassium with oxygen to form this oxide?   |  |  |  | | --- | --- | --- | |  | a. | 0 | |  | b. | 1 | |  | c. | 2 | |  | d. | 3 | |  | e. | 4 |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 69. Indium reacts with chlorine to form InCl3. In the balanced equation for this reaction, the coefficient of the indium trichloride is   |  |  |  | | --- | --- | --- | |  | a. | 1 | |  | b. | 2 | |  | c. | 3 | |  | d. | 4 | |  | e. | 6 |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 70. Give (in order) the correct coefficients to balance the following reaction:                H2SnCl6 + H2S → SnS2 + HCl   |  |  |  | | --- | --- | --- | |  | a. | 1, 2, 1, 6 | |  | b. | 1, 2, 2, 2 | |  | c. | 1, 1, 1, 6 | |  | d. | 6, 2, 1, 1 | |  | e. | 2, 4, 2, 6 |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 71. In the balanced equation for the reaction:       *x*P4O6(*s*) + *y*H2O(*l*) → *z*H3PO3(*aq*) if *x* equals 2, the coefficient *z* equals:   |  |  |  | | --- | --- | --- | |  | a. | 2 | |  | b. | 4 | |  | c. | 6 | |  | d. | 10 | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 72. The correct coefficients to balance the following reaction are, in order:                I2O5 + H2S → I2 + SO2 + H2O   |  |  |  | | --- | --- | --- | |  | a. | 1, 1, 1, 1, 1 | |  | b. | 1, 2, 1, 2, 1 | |  | c. | 2, 4, 1, 4, 5 | |  | d. | 2, 5, 2, 5, 5 | |  | e. | 3, 5, 3, 5, 5 |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 73. When the equation C4H10 + O2 → CO2 + H2O is balanced with the smallest set of integers, the sum of the coefficients is   |  |  |  | | --- | --- | --- | |  | a. | 4 | |  | b. | 33 | |  | c. | 11 | |  | d. | 19 | |  | e. | 24 |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 74. Which of the following equations correctly describes the combustion of CH4 and O2 to produce water (H2O) and carbon dioxide (CO2)?   |  |  |  | | --- | --- | --- | |  | a. | CH4 + O2 → CO2 + H2O | |  | b. | CH4 + O2 → CO2 + 2H2O | |  | c. | CH4 + 2O2 → CO2 + 2H2O | |  | d. | CH4 + 3O2 → 2CO2 + H2O | |  | e. | 2CH4 + 3O2 → 2CO2 + 2H2O |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 75. A reaction occurs between sodium carbonate and hydrochloric acid producing sodium chloride, carbon dioxide, and water. The correct set of coefficients, respectively, for the balanced reaction is:   |  |  |  | | --- | --- | --- | |  | a. | 3    6    6    3    4 | |  | b. | 8    6    5   10   5 | |  | c. | 5   10  10   5    5 | |  | d. | 1    2    2    1    1 | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 76. When the following equation is balanced, what is the sum of the coefficients?           Al2(SO4)3 + Ca(OH)2 → Al(OH)3 + CaSO4   |  |  |  | | --- | --- | --- | |  | a. | 4 | |  | b. | 9 | |  | c. | 8 | |  | d. | 7 | |  | e. | 10 |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 77. When balancing a chemical equation, it is generally best to start with the least complicated molecules.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 78. To balance a chemical equation, the coefficients must not be changed.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 79. You heat 3.939 g of a mixture of Fe3O4 and FeO to form 4.197 g Fe2O3. The mass of oxygen reacted is   |  |  |  | | --- | --- | --- | |  | a. | 0.258 g | |  | b. | 0.540 g | |  | c. | 1.259 g | |  | d. | 1.000 g | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | general concepts | Law of Conservation of Mass | matter | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 80. The Claus reactions, shown below, are used to generate elemental sulfur from hydrogen sulfide.           2H2S + 3O2 → 2SO2 + 2H2O           SO2 + 2H2S → 3S + 2H2O How much sulfur (in grams) is produced from 23.0 grams of O2?   |  |  |  | | --- | --- | --- | |  | a. | 103.7 g | |  | b. | 15.4 g | |  | c. | 23.1 g | |  | d. | 46.1 g | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | amounts of substances | Chemistry | general chemistry | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 81. A chemical reaction has the equation: 2A + B → C. Which of the following figures best illustrates a stoichiometric ratio of A and B?  I.    II.    III.    IV.   |  |  |  | | --- | --- | --- | |  | a. | I only | |  | b. | II only | |  | c. | III only | |  | d. | IV only | |  | e. | both I and IV |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | stoichiometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/6/2017 5:40 AM | |

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| 82. When 189.6 g of ethylene (C2H4) burns in oxygen to give carbon dioxide and water, how many grams of CO2 are formed?   |  |  |  | | --- | --- | --- | |  | a. | 594.9 g | |  | b. | 297.5 g | |  | c. | 148.7 g | |  | d. | 6.76 g | |  | e. | 243.5 g |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | amounts of substances | Chemistry | general chemistry | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 83. What would be the g Al / mole S ratio for the product of a reaction between aluminum and sulfur?   |  |  |  | | --- | --- | --- | |  | a. | 26.98 g Al / mol S | |  | b. | 80.94 g Al / mol S | |  | c. | 40.47 g Al / mol S | |  | d. | 53.96 g Al / mol S | |  | e. | 17.99 g Al / mol S |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | molar interpretation | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 84. A 7.11-g sample of potassium chlorate was decomposed according to the following equation:           2KClO3 → 2KCl + 3O2 How many moles of oxygen are formed?   |  |  |  | | --- | --- | --- | |  | a. | 2.78 g | |  | b. | 0.0580 mol | |  | c. | 0.0387 mol | |  | d. | 0.0870 mol | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | amounts of substances | Chemistry | general chemistry | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 85. How many grams of Ca(NO3)2 can be produced by reacting excess HNO3 with 8.90 g of Ca(OH)2?   |  |  |  | | --- | --- | --- | |  | a. | 9.86 g | |  | b. | 19.7 g | |  | c. | 39.4 g | |  | d. | 17.8 g | |  | e. | 8.90 g |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | amounts of substances | Chemistry | general chemistry | stoichiometry | stoichiometry calculation | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 86. Sulfuric acid may be produced by the following process:           4FeS2 + 11O2 → 2Fe2O3 +8SO2           2SO2 +O2 → 2SO3           SO3 + H2O → H2SO4 How many moles of H2SO4 will be produced from 6.15 moles of FeS2?   |  |  |  | | --- | --- | --- | |  | a. | 33.8 | |  | b. | 6.15 | |  | c. | 12.3 | |  | d. | 3.08 | |  | e. | 1.54 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | molar interpretation | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 87. Reaction of methane with oxygen really proceeds in two steps:                       A sample of CH4 is burned in an excess of O2 to give 2.6 moles of H2O. How many moles of CH4 were in the original sample?   |  |  |  | | --- | --- | --- | |  | a. | 1.3 | |  | b. | 1.7 | |  | c. | 5.2 | |  | d. | 0.7 | |  | e. | 2.6 |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | molar interpretation | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 88. Iron is produced from its ore by the reactions:            How many moles of O2(*g*) are needed to produce 9.4 moles of Fe(*s*)?   |  |  |  | | --- | --- | --- | |  | a. | 4.7 mole O2 | |  | b. | 7.1 mole O2 | |  | c. | 9.4 mole O2 | |  | d. | 14.1 mole O2 | |  | e. | 28.2 mole O2 |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | molar interpretation | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 89. The refining of aluminum from bauxite ore (which contains 50.% Al2O3 by mass) proceeds by the overall reaction 2Al2O3 + 3C → 4Al + 3CO2. How much bauxite ore is required to give the 5.0 × 1013 g of aluminum produced each year in the United States? (Assume 100% conversion.)   |  |  |  | | --- | --- | --- | |  | a. | 1.3 × 1013 g | |  | b. | 5.3 × 1013 g | |  | c. | 1.9 × 1014 g | |  | d. | 7.6 × 1014 g | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | amounts of substances | Chemistry | general chemistry | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 90. Consider the following reaction:            What mass of CCl4 is formed by the reaction of 1.93 g of methane with an excess of chlorine?   |  |  |  | | --- | --- | --- | |  | a. | 4.6 g | |  | b. | 0.20 g | |  | c. | 297 g | |  | d. | 18.5 g | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | amounts of substances | Chemistry | general chemistry | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 91. One commercial system removes SO2 emissions from smoke at 95.0°C by the following set of balanced reactions:                SO2 + Cl2 → SO2Cl2                SO2Cl2 + 2H2O → H2SO4 + 2HCl                H2SO4 + Ca(OH)2 → CaSO4 + 2H2O Assuming the process is 95.0% efficient, how many grams of CaSO4 may be produced from 100. grams of SO2? (molar masses: SO2, 64.1 g/mol; CaSO4, 136 g/mol)   |  |  |  | | --- | --- | --- | |  | a. | 44.8 g | |  | b. | 47.1 g | |  | c. | 87.2 g | |  | d. | 202 g | |  | e. | 212 g |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 3.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | amounts of substances | Chemistry | general chemistry | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 92. When rubidium metal is exposed to air, two atoms of rubidium, Rb, combine with one atom of oxygen. If 2.16 grams of rubidium is exposed to air, what will be the mass of the product in grams?   |  |  |  | | --- | --- | --- | |  | a. | 18.16 g | |  | b. | 2.36 g | |  | c. | 10.16 g | |  | d. | 9.45 g | |  | e. | 4.72 g |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | amounts of substances | Chemistry | general chemistry | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 93. The following two reactions are important in the blast furnace production of iron metal from iron ore (Fe2O3):            Using these balanced reactions, how many moles of O2 are required for the production of 3.36 kg of Fe?   |  |  |  | | --- | --- | --- | |  | a. | 45.1 moles | |  | b. | 20.1 moles | |  | c. | 180 moles | |  | d. | 60.2 moles | |  | e. | 2.52 moles |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 3.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | amounts of substances | Chemistry | general chemistry | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 94. Nitric oxide, NO, is made from the oxidation of NH3, and the reaction is represented by the equation: 4NH3 + 5O2 → 4NO + 6H2O What mass of NO can be produced from 6.82 g of NH3?   |  |  |  | | --- | --- | --- | |  | a. | 3.87 g NO | |  | b. | 12.0 g NO | |  | c. | 6.82 g NO | |  | d. | 18.0 g NO | |  | e. | 15.0 g NO |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | amounts of substances | Chemistry | general chemistry | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 95. Nitric oxide, NO, is made from the oxidation of NH3, and the reaction is represented by the equation: 4NH3 + 5O2 → 4NO + 6H2O What mass of O2 would be required to react completely with 7.42 g of NH3?   |  |  |  | | --- | --- | --- | |  | a. | 4.94 g O2 | |  | b. | 11.2 g O2 | |  | c. | 8.71 g O2 | |  | d. | 17.4 g O2 | |  | e. | 13.9 g O2 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | amounts of substances | Chemistry | general chemistry | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 96. The limiting reactant in a reaction   |  |  |  | | --- | --- | --- | |  | a. | has the lowest coefficient in a balanced equation | |  | b. | is the reactant for which you have the fewest number of moles | |  | c. | has the lowest ratio of moles available/coefficient in the balanced equation | |  | d. | has the lowest ratio of coefficient in the balanced equation/moles available | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 97. Phosphoric acid can be prepared by reaction of sulfuric acid with “phosphate rock” according to the equation:            Ca3(PO4)2 + 3H2SO4 → 3CaSO4 + 2H3PO4  Suppose the reaction is carried out starting with 123 g of Ca3(PO4)2 and 90.2 g of H2SO4. Which substance is the limiting reactant?   |  |  |  | | --- | --- | --- | |  | a. | Ca3(PO4)2 | |  | b. | H2SO4 | |  | c. | CaSO4 | |  | d. | H3PO4 | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 2/3/2017 8:12 AM | |

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| 98. Suppose the reaction Ca3(PO4)2 + 3H2SO4 → 3CaSO4 + 2H3PO4 is carried out starting with 149 g of Ca3(PO4)2 and 86.9 g of H2SO4. How much phosphoric acid will be produced?   |  |  |  | | --- | --- | --- | |  | a. | 86.8 g | |  | b. | 57.9 g | |  | c. | 235.9 g | |  | d. | 130.2 g | |  | e. | 94.1 g |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 99. Phosphorus, P4, can be prepared from calcium phosphate by the reaction   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | 3410 g |  | 1695 g |  | 660 g |  | | 2Ca3(PO4)2 | + | 6SiO2 | + | 10C | → 6CaSiO3 + P4 + 10CO | | 310 g/mol |  | 60.1 g/mol |  | 12.0 g/mol |  |   The *molar mass* for each reactant is shown *below* the reactant, and the *mass* of each reactant for this problem is given *above*. Which reactant is the limiting reagent?   |  |  |  | | --- | --- | --- | |  | a. | C | |  | b. | SiO2 | |  | c. | Ca3(PO4)2 | |  | d. | P4 | |  | e. | More information is needed. |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 100. SO2 reacts with H2S as follows:                2H2S + SO2 → 3S + 2H2O When 7.50 g of H2S reacts with 12.75 g of SO2, which statement applies?   |  |  |  | | --- | --- | --- | |  | a. | 6.38 g of sulfur are formed. | |  | b. | 10.6 g of sulfur are formed. | |  | c. | 0.0216 moles of H2S remain. | |  | d. | 1.13 g of H2S remain. | |  | e. | SO2 is the limiting reagent. |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 101. How many grams of H2O will be formed when 32.0 g H2 is mixed with 84.0 g of O2 and allowed to react to form water?   |  |  |  | | --- | --- | --- | |  | a. | 94.6 g | |  | b. | 286 g | |  | c. | 47.3 g | |  | d. | 23.6 g | |  | e. | 144 g |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 102. A 15-g sample of lithium is reacted with 15 g of fluorine to form lithium fluoride: 2Li + F2 → 2LiF. After the reaction is complete, what will be present?   |  |  |  | | --- | --- | --- | |  | a. | 2.16 moles lithium fluoride only | |  | b. | 0.789 moles lithium fluoride only | |  | c. | 2.16 moles lithium fluoride and 0.395 moles fluorine | |  | d. | 0.789 moles lithium fluoride and 1.37 moles lithium | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 103. Consider the fermentation reaction of glucose:  A 1.00-mole sample of C6H12O6 was placed in a vat with 100 g of yeast. If 39.6 grams of C2H5OH was obtained, what was the percent yield of C2H5OH?   |  |  |  | | --- | --- | --- | |  | a. | 43.0% | |  | b. | 21.5% | |  | c. | 100% | |  | d. | 39.6% | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 104. A 5.95-g sample of AgNO3 is reacted with BaCl2 according to the equation            to give 4.07 g of AgCl. What is the percent yield of AgCl?   |  |  |  | | --- | --- | --- | |  | a. | 57.7% | |  | b. | 68.4% | |  | c. | 40.5% | |  | d. | 81.1% | |  | e. | 100% |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 105. The reaction of 11.9 g of CHCl3 with excess chlorine produced 10.1 g of CCl4, carbon tetrachloride:            What is the percent yield?   |  |  |  | | --- | --- | --- | |  | a. | 100% | |  | b. | 32.8% | |  | c. | 65.7% | |  | d. | 85% | |  | e. | 43.8% |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 106. When 20.0 g C2H6 and 60.0 g O2 react to form CO2 and H2O, how many grams of water are formed?   |  |  |  | | --- | --- | --- | |  | a. | 14.5 g | |  | b. | 18.0 g | |  | c. | 58.0 g | |  | d. | 20.0 g | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 107. Given the equation 3*A* + *B* → *C* + *D*, you react 2 moles of *A* with 1 mole of *B*. Which of the following is true?   |  |  |  | | --- | --- | --- | |  | a. | *A* is the limiting reactant because of its higher molar mass. | |  | b. | *A* is the limiting reactant because you need 3 moles of *A* and have 2. | |  | c. | *B* is the limiting reactant because you have fewer moles of *B* than *A*. | |  | d. | *B* is the limiting reactant because 3 *A* molecules react with 1 *B* molecule. | |  | e. | Neither reactant is limiting. |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 108. The following equation describes the oxidation of ethanol to acetic acid by potassium permanganate:            5.00 g of ethanol and an excess of aqueous KMnO4 are reacted, and 5.24 g of HC2H3O2 result. What is the percent yield?   |  |  |  | | --- | --- | --- | |  | a. | 100% | |  | b. | 80.4% | |  | c. | 26.8% | |  | d. | 19.6% | |  | e. | 5.24 g HC2H3O2 is impossible since it represents more than 100% yield. |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 109. Consider the following reaction:            What mass of CCl4 will be formed if 1.20 moles of methane react with 1.07 moles of chlorine?   |  |  |  | | --- | --- | --- | |  | a. | 185 g | |  | b. | 165 g | |  | c. | 658 g | |  | d. | 41.1 g | |  | e. | 19.0 g |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 110. The limiting reactant in a reaction   |  |  |  | | --- | --- | --- | |  | a. | is the reactant for which there is the least amount in grams | |  | b. | is the reactant which has the lowest coefficient in a balanced equation | |  | c. | is the reactant for which there is the most amount in grams | |  | d. | is the reactant for which there is the fewest number of moles | |  | e. | none of the above |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 111. The limiting reactant is the reactant   |  |  |  | | --- | --- | --- | |  | a. | for which you have the lowest mass in grams | |  | b. | which has the lowest coefficient in the balanced equation | |  | c. | which has the lowest molar mass | |  | d. | which is left over after the reaction has gone to completion | |  | e. | none of the above |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 112. Consider the following reaction:                2*A* + *B* → 3*C* + *D* 3.0 mol *A* and 2.0 mol *B* react to form 4.0 mol *C*. What is the percent yield of this reaction?   |  |  |  | | --- | --- | --- | |  | a. | 50% | |  | b. | 67% | |  | c. | 75% | |  | d. | 89% | |  | e. | 100% |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 113. A chemical reaction has the equation: 2A + B → C. In which case is B the limiting reactant?   |  |  |  | | --- | --- | --- | |  | a. | I | |  | b. | II | |  | c. | III | |  | d. | IV | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:33 PM | | *DATE MODIFIED:* | 3/4/2016 4:33 PM | |

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| 114. Which of the following statements is always true concerning a reaction represented by the following balanced chemical equation? 2C2H6(*g*) + 7O2(*g*) → 6H2O(*l*) + 4CO2(*g*)   |  |  |  | | --- | --- | --- | |  | a. | If we have equal masses of C2H6 and O2, there is no limiting reactant. | |  | b. | If we have an equal number of moles of C2H6 and O2, there is no limiting reactant. | |  | c. | If we have more mass of C2H6, then O2 must be limiting. | |  | d. | If we have more mass of O2, then C2H6 must be limiting. | |  | e. | None of these statements are true. |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 115. Equal masses (in grams) of hydrogen gas and oxygen gas are reacted to form water. Which substance is limiting?   |  |  |  | | --- | --- | --- | |  | a. | Oxygen gas is limiting. | |  | b. | Hydrogen gas is limiting. | |  | c. | Water is limiting. | |  | d. | Nothing is limiting. | |  | e. | More information is needed to answer this question. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 116. If 34.0 g of O2 are mixed with 34.0 g of H2 and the mixture is ignited, what mass of water is produced?   |  |  |  | | --- | --- | --- | |  | a. | 34.0 g | |  | b. | 38.3 g | |  | c. | 60.4 g | |  | d. | 19.1 g | |  | e. | 68.0 g |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 117. For the reaction N2(*g*) + 2H2(*g*) → N2H4(*l*), if the percent yield for this reaction is 67.0%, what is the actual mass of hydrazine (N2H4) produced when 26.57 g of nitrogen reacts with 4.65 g of hydrogen?   |  |  |  | | --- | --- | --- | |  | a. | 45.4 g N2H4 | |  | b. | 20.4 g N2H4 | |  | c. | 31.2 g N2H4 | |  | d. | 30.4 g N2H4 | |  | e. | 24.7 g N2H4 |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 118. Nitric oxide, NO, is made from the oxidation of NH3, and the reaction is represented by the equation: 4NH3 + 5O2 → 4NO + 6H2O A 9.8-g sample of NH3 gives 12.0 g of NO. The *percent yield* of NO is   |  |  |  | | --- | --- | --- | |  | a. | 82% | |  | b. | 56% | |  | c. | 43% | |  | d. | 69% | |  | e. | 17% |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 119. Ammonia can be made by reaction of water with magnesium nitride as shown by the following *unbalanced* equation:           Mg3N2(*s*) + H2O(*l*) → Mg(OH)2(*s*) + NH3(*g*) If this process is 81% efficient, what mass of ammonia can be prepared from 23.0 kg magnesium nitride?   |  |  |  | | --- | --- | --- | |  | a. | 3.1 kg NH3 | |  | b. | 7.8 kg NH3 | |  | c. | 6.3 kg NH3 | |  | d. | 3.9 kg NH3 | |  | e. | 19 kg NH3 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 120. Given the equation 3*A* + *B* → *C* + *D*, you react 1 mole of *A* with 3 moles of *B*. True or false: *A* is the limiting reactant because you have fewer moles of *A* than *B*.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 121. The reactant with the highest molar mass is always the limiting reactant.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 122. The reactant which, when used up completely, can produce the least amount of product, is the limiting reactant.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | True | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 123. Naturally occurring iron contains 5.82% , 91.66% , 2.19% , and 0.33%. The respective atomic masses are 53.940 amu, 55.935 amu, 56.935 amu, and 57.933 amu. Calculate the average atomic mass of iron.   |  |  | | --- | --- | | *ANSWER:* | 55.85 amu  See Sec. 3.2 of Zumdahl, *Chemistry*. 0.0582(53.940 amu) + 0.9166(55.935 amu) + 0.0219(56.935 amu) + 0.0033(57.933 amu) = 55.85 amu | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.2 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | atomic theory of matter | atomic weight | Chemistry | early atomic theory | general chemistry | mass spectroscopy | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 124. Vitamin B12, cyanocobalamin, is essential for human nutrition. It's concentrated in animal tissue but not in higher plants. People who abstain completely from animal products may develop anemia, so cyanocobalamin is used in vitamin supplements. It contains 4.35% cobalt by mass. Calculate the molar mass of cyanocobalamin assuming there is one cobalt per molecule.   |  |  | | --- | --- | | *ANSWER:* | 1355 g/mol  See Sec. 3.6 of Zumdahl, *Chemistry*. (1 mol Co/1 mol VitB12)\*(58.93 g Co/mol Co)\*(100 g VitB12/4.35 g Co) = 1355 g VitB12/mol VitB12 | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.6 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 125. Give the empirical formula for the following compounds:  a)   b)   c)   d)   |  |  | | --- | --- | | *ANSWER:* | a) CH         b) CH2         c) CH2O         d) C3H5O  See Sec. 3.7 of Zumdahl, *Chemistry*. observed molecular formulas: a) C6H6         b) C2H4         c) C6H12O6         d) C6H10O2 | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.7 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | empirical formula | general chemistry | stoichiometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 126. The hormone epinephrine is released in the human body during stress and increases the body's metabolic rate. Epinephrine, like many biochemical compounds, is composed of carbon, hydrogen, oxygen, and nitrogen. The percentage composition of the hormone is 59.0% C, 7.15% H, 26.2% O, and 7.65% N. Determine the empirical formula.   |  |  | | --- | --- | | *ANSWER:* | C9H13NO3  See Sec. 3.7 of Zumdahl, *Chemistry*. 59.0 g C \* (1 mol C/12.01 g) = 4.91 mol C     (÷ 0.546) = 9 mol C 7.15 g H \* (1 mol H/1.008 g) = 7.09 mol H     (÷ 0.546) = 13 mol H 26.2 g O \* (1 mol O/16.00 g) = 1.64 mol O    (÷ 0.546) = 3 mol O 7.65 g N \* (1 mol N/14.01 g) = 0.546 mol N  (÷ 0.546) = 1 mol N | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.7 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | empirical formula | general chemistry | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 127. The characteristic odor of pineapple is due to ethyl butanoate, a compound containing carbon, hydrogen, and oxygen. Combustion of 2.78 g of ethyl butanoate leads to formation of 6.32 g of CO2 and 2.58 g of H2O. The properties of the compound suggest that the molar mass should be between 100 and 150 g/mol. What is the molecular formula?   |  |  | | --- | --- | | *ANSWER:* | C6H12O2 See Sec. 3.7 of Zumdahl, *Chemistry*. 6.32 g CO2 \* (12.01 g C/44.01 g CO2) = 1.72 g C 2.58 g H2O \* (2.016 g H/18.02 g H2O) = 0.289 g H 2.78 g ethyl butanoate - 1.72 g C - 0.289 g H = 0.77 g O 1.72 g C \* (1 mol C/12.01 g) = 0.143 mol C         (÷ 0.048) = 3 mol C 0.289 g H \* (1 mol H/1.008 g H) = 0.287 mol H   (÷ 0.048) = 6 mol H 0.77 g O \* (1 mol O/16.00 g) = 0.048 mol O        (÷ 0.048) = 1 mol O empirical formula = C3H6O empirical formula mass = 58.08 g/mol 58.08 \* 2 = 116 g/mol which is between 100 and 150 ( 58.08 \* 3 = 174.2, too much) therefore, molecular formula = 2(C3H6O) = C6H12O2 | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 3.7 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | molecular formula | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 128. In order to determine the molecular formula from the empirical formula, we must know the \_\_\_\_\_\_\_\_\_\_.   |  |  | | --- | --- | | *ANSWER:* | molar mass | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.7 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | molecular formula | stoichiometry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 129. In a chemical equation, the \_\_\_\_\_\_\_\_\_ are written on the left side of the arrow, and the \_\_\_\_\_\_\_\_\_ are written on the right side of the arrow.   |  |  | | --- | --- | | *ANSWER:* | reactants, products | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.8 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | chemical equation | Chemistry | early atomic theory | general chemistry | writing equation | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 130. The \_\_\_\_\_\_\_\_\_\_ in a chemical equation represent the number of atoms in a particular molecule or formula unit.   |  |  | | --- | --- | | *ANSWER:* | subscripts | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.8 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | chemical equation | Chemistry | early atomic theory | general chemistry | writing equation | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 131. The \_\_\_\_\_\_\_\_\_\_ in a balanced equation represent numbers of molecules.   |  |  | | --- | --- | | *ANSWER:* | coefficients | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.8 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | chemical equation | Chemistry | early atomic theory | general chemistry | writing equation | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 132. One of the major commercial uses of sulfuric acid is in the production of phosphoric acid and calcium sulfate. The phosphoric acid is used for fertilizer. The reaction is Ca3(PO4)2 + 3H2SO4 → 3CaSO4 + 2H3PO4. What mass of concentrated H2SO4 (98% by mass) must be used to react completely with 100.00 g of calcium phosphate?   |  |  | | --- | --- | | *ANSWER:* | 97 g H2SO4  See Sec. 3.10 of Zumdahl, *Chemistry*. (100.00g) \* (1 mol Ca3(PO4)2/310.18 g)\*(3 mol H2SO4/1 mol Ca3(PO4)2)\*(98.09 g/1 mol H2SO4) \*(100 g solution/98 g H2SO4) = 96.81 = 97 g H2SO4 | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.1 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | amounts of substances | Chemistry | general chemistry | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 133. In a metallurgical process the mineral pyrite, FeS2, is roasted in air:             FeS2 + O2 → Fe2O3 + SO2 The SO2 is then converted into H2SO4 in the following reactions:             2SO2 + O2 → 2SO3 SO3 + H2SO4 → H2S2O7 H2S2O7 + H2O → 2H2SO4 Assuming the mineral is 24.0% FeS2 and the remainder is inert, what mass of H2SO4 is produced if 155 g of the mineral is used?   |  |  | | --- | --- | | *ANSWER:* | 60.8 g H2SO4  See Sec. 3.10 of Zumdahl, *Chemistry*. Calculate moles SO2 from FeS2: 155 g mineral \* (24 g FeS2/100 g mineral) \*(1 mol FeS2/119.99g)\*(2 mol SO2/1 mol FeS2) = 0.620 mol SO2 Overall rxn SO2 to H2SO4: SO2 + 1/2O2 +H2O --> H2SO4 0.620 mol SO2 \* (1 mol H2SO4/1 mol SO2) \* (98.09 g H2SO4/mol) = 60.8 g H2SO4 | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 3.1 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | amounts of substances | Chemistry | general chemistry | stoichiometry | stoichiometry calculation | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 134. The percent yield is a ratio of the \_\_\_\_\_\_\_\_\_\_\_\_ yield to the \_\_\_\_\_\_\_\_\_\_\_\_\_ yield, multiplied by 100%.   |  |  | | --- | --- | | *ANSWER:* | actual, theoretical | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.11 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | limiting reactant | stoichiometry | stoichiometry calculation | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 135. Tellurium consists of 3 common isotopes. Half of tellurium atoms have a mass of 127, and another 0.45 of tellurium atoms weigh 128. What is the mass of the remaining isotope? The atomic mass of tellurium is 127.6.   |  |  |  | | --- | --- | --- | |  | a. | 126 | |  | b. | 127 | |  | c. | 129 | |  | d. | 130 | |  | e. | 131 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | atomic theory of matter | atomic weight | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 136. Magnesium has an atomic mass of 24.3. There are two isotopes of magnesium – one contains 12 neutrons and the other contains 13 neutrons in the nucleus. What is the fractional abundance of the one that contains 12 neutrons?   |  |  |  | | --- | --- | --- | |  | a. | 0.3 | |  | b. | 0.5 | |  | c. | 0.67 | |  | d. | 0.7 | |  | e. | 0.75 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | atomic theory of matter | atomic weight | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 137. What is the mass of 9.00 x 1022 atoms of magnesium, Mg?   |  |  |  | | --- | --- | --- | |  | a. | 0.150 g | |  | b. | 0.363 g | |  | c. | 1.80 g | |  | d. | 3.63 g | |  | e. | 36.3 g |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.3 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | mole | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 138. What is the molar mass of tetraphosphorus decaoxide?   |  |  |  | | --- | --- | --- | |  | a. | 140 g/mol | |  | b. | 410 g/mol | |  | c. | 253 g/mol | |  | d. | 204 g/mol | |  | e. | 284 g/mol |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | mole | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 139. Calculate the number of nitrogen atoms in 240. g of ammonium nitrate.   |  |  |  | | --- | --- | --- | |  | a. | 2.01 x 1023 nitrogen atoms | |  | b. | 6.02  x 1023 nitrogen atoms | |  | c. | 1.20 x 1024 nitrogen atoms | |  | d. | 1.81 x 1024 nitrogen atoms | |  | e. | 3.61 x 1024 nitrogen atoms |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | mole | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 1/30/2017 7:11 AM | |

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| 140. 32.0 grams of the element oxygen:   |  |  |  | | --- | --- | --- | |  | a. | contain 6.02 x 1023 atoms of oxygen | |  | b. | contain 1.204 x 1024 molecules of oxygen | |  | c. | contain the same number of oxygen atoms as 18.0 g of water | |  | d. | contain the same number of oxygen atoms as 36.0 g of water | |  | e. | contain the same number of oxygen atoms as 72.0 g of water |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | mole | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 141. Which of the following samples contains the greatest number of moles of carbon atoms?   |  |  |  | | --- | --- | --- | |  | a. | 58 g of C4H10 | |  | b. | 46 g of C2H5OH | |  | c. | 44 g of CO2 | |  | d. | 180 g of C6H12O6 | |  | e. | all contain the same number of moles of carbon atoms |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 3.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | mass and moles of substance | mole | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 142. An unknown molecule is found to consist of 24.2% carbon by mass, 4.0% hydrogen by mass and the remaining mass is due to chlorine.  What is the molecular formula of the molecule given that the molar mass is found to be approximately 150?   |  |  |  | | --- | --- | --- | |  | a. | CH2Cl | |  | b. | C2H4Cl2 | |  | c. | CH2Cl4 | |  | d. | C3H6Cl3 | |  | e. | C6H10Cl2 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | determining chemical formulas | general chemistry | molecular formula | stoichiometry | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 143. Balance this equation using the smallest possible integers, S + HNO3 → H2SO4 + NO2 + H2O.  What is the coefficient of water.   |  |  |  | | --- | --- | --- | |  | a. | 1 | |  | b. | 2 | |  | c. | 4 | |  | d. | 6 | |  | e. | 10 |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 144. Balance this equation using the smallest possible integers, NO + NH3 → Ν2 +  H2O.  What is the coefficient of the water?   |  |  |  | | --- | --- | --- | |  | a. | 1 | |  | b. | 2 | |  | c. | 3 | |  | d. | 6 | |  | e. | 12 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 3.9 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | balancing chemical equation | chemical equation | Chemistry | early atomic theory | general chemistry | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:34 PM | | *DATE MODIFIED:* | 3/4/2016 4:34 PM | |

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| 145. You are given five beakers labeled A-E. Each beaker is labeled as follows:        Beaker A. 6.00 g of potassium thiocyanate            Beaker B. 6.00 g of magnesium oxalate        Beaker C. 6.00 g of gallium iodide                         Beaker D. 6.00 g of rubidium hypochlorite        Beaker E. 6.00 g of perchloric acid  ​  Which beaker, A-E, contains the **greatest** number of moles of compound?   |  |  | | --- | --- | | *ANSWER:* | A | | *POINTS:* | 1 | | *QUESTION TYPE:* | Objective Short Answer | | *HAS VARIABLES:* | False | | *DATE CREATED:* | 3/6/2017 7:19 AM | | *DATE MODIFIED:* | 3/6/2017 7:32 AM | |

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| 146. The products of complete combustion of acetaldehyde, CH3CHO, are shown in the following **unbalanced**equation:        CH3CHO(l) + O2(g) → CO2(g) + H2O(l).  This reaction has a CO2percent yield of 64.1%.  What will be the mass of CO2experimentally obtained when 49.1 g O2and 15.1 g CH3CHO are reacted?  Molar masses: CH3CHO = 44.052 g/mol; O2= 32.00 g/mol; CO2= 44.01 g/mol; H2O = 18.016 g/mol   |  |  |  | | --- | --- | --- | |  | a. | 19.3 g | |  | b. | 12.1 g | |  | c. | 30.2 g | |  | d. | 4.82 g | |  | e. | 7.71 g |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *DATE CREATED:* | 3/6/2017 7:23 AM | | *DATE MODIFIED:* | 3/6/2017 7:31 AM | |

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| 147. Combustion of a compound of formula CxHyOz yields 0.209 g H2O (molar mass = 18.016 g/mol) and 0.512 g CO2 (molar mass = 44.01 g/mol) when 0.497 g of O2 (molar mass = 32 g/mol) is used. Based on this combustion analysis data, what mass of oxygen is from the mass of compound combusted and **not** from the oxygen gas used to combust the compound?   |  |  |  | | --- | --- | --- | |  | a. | 0.0116 g | |  | b. | 0.0233 g | |  | c. | 0.0609 g | |  | d. | 0.0349 g | |  | e. | 0.0381 g |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *DATE CREATED:* | 3/6/2017 11:11 PM | | *DATE MODIFIED:* | 3/6/2017 11:14 PM | |

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| 148. A student carries out the following reaction:  4Fe (s) + 3O2 (g) ➝ 2Fe2O3 (s)  using 0.6836 moles of iron and 0.5127 moles of oxygen gas. On collecting the iron(III) oxide (MW = 159.7 g/mol) made, the student accidentally spilled some of the sample on the floor. He then weighed the remaining iron(III) oxide and recorded a mass of  32.15 g. Based on the information just given, which of the following statements, I-V, is/are **true**?  ​   I.  Fe is the limiting reagent.  II. O2 is the limiting reagent.  III. The theoretical yield for this reaction is 0.3418 moles of iron(III) oxide.  IV. This reaction has no limiting reagent.  V. The percent yield calculated will be less than 100%.   |  |  |  | | --- | --- | --- | |  | a. | I, III and V | |  | b. | II, III and V | |  | c. | III and V | |  | d. | III-V | |  | e. | II and V |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *DATE CREATED:* | 3/6/2017 11:15 PM | | *DATE MODIFIED:* | 3/6/2017 11:20 PM | |

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| Balance the following chemical equation for the combustion of propanol, C3H7OH, **using the smallest whole number coefficients** and use the balanced equation to answer the questions from 150-153.  ​                                                          C3H7OH  +  O2→  CO2  +  H2O |

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| 149. What is the sum of the coefficients used to balance this chemical equation?   |  |  |  | | --- | --- | --- | |  | a. | 17 | |  | b. | 22 | |  | c. | 19 | |  | d. | 25 | |  | e. | 28 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Combustion of Propane | | *DATE CREATED:* | 3/6/2017 11:23 PM | | *DATE MODIFIED:* | 3/6/2017 11:34 PM | |

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| 150. If the following moles of reagents are used for Reactions I-IV, to carry out the combustion of propanol, which Reaction(s) would have **propanol, C3H7OH, as the limiting reagent**?  Reaction I:  2 mol C3H7OH reacting with 9 moles O2  Reaction II:  0.3 mol C3H7OH reacting with 1.35 moles O2  Reaction III:  0.7 mol C3H7OH reacting with 4.15 moles O2  Reaction IV:  0.5 mol C3H7OH reacting with 1.45 moles O2   |  |  |  | | --- | --- | --- | |  | a. | Reactions I - III only | |  | b. | Reactions I and II only | |  | c. | Reactions III and IV only | |  | d. | Reaction III only | |  | e. | Reaction IV only |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Combustion of Propane | | *DATE CREATED:* | 3/6/2017 11:36 PM | | *DATE MODIFIED:* | 3/6/2017 11:40 PM | |

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| 151. If the following moles of reagents are used for Reactions I-IV, to carry out the combustion of propanol, which Reaction(s) would have **propanol, C3H7OH, as the reagent in excess**?  Reaction I:  2 mol C3H7OH reacting with 9 moles O2  Reaction II:  0.6 mol C3H7OH reacting with 3.5 moles O2  Reaction III:  0.8 mol C3H7OH reacting with 3.15 moles O2  Reaction IV:  0.1 mol C3H7OH reacting with 0.45 moles O2   |  |  |  | | --- | --- | --- | |  | a. | Reaction II only | |  | b. | Reactions I and IV only | |  | c. | Reactions I, II and IV only | |  | d. | Reaction III only | |  | e. | Reactions II and III only |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Combustion of Propane | | *DATE CREATED:* | 3/6/2017 11:41 PM | | *DATE MODIFIED:* | 3/6/2017 11:49 PM | |

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| 152. On performing the combustion reaction using 2 moles of C3H7OH and 9 moles O2; 5 moles of CO2and 6.5 moles of H2O were collected.  ​  Which of the following statements is **true**?   |  |  |  | | --- | --- | --- | |  | a. | The number of moles of CO2 collected experimentally is 6 moles. | |  | b. | The percent yield of CO2 collected will be more than 100%. | |  | c. | The theoretical number of moles of CO2 that could be collected in Reaction I is 6 moles. | |  | d. | The theoretical number of moles of H2O that could be collected in Reaction I is 6 moles. | |  | e. | The percent yield of H2O collected will be more than 100%. |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Combustion of Propane | | *DATE CREATED:* | 3/6/2017 11:54 PM | | *DATE MODIFIED:* | 3/6/2017 11:57 PM | |

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| 153. Which of the following statements is/are **true** about a sample of 4.24 g of benzene (C6H6, molar mass = 78.108 g/mol)?  I.   This sample of benzene contains 5.43 x 10-2 molecules of benzene.  II. This sample of benzene contains 3.27 x 1022 moles of benzene.  III. This sample of benzene contains 3.93 x 1023 atoms.  IV. The mass percent of hydrogen in benzene is the same as that of carbon because there are equal        amounts of these atoms in this molecule.   |  |  |  | | --- | --- | --- | |  | a. | III only | |  | b. | I, II and IV only | |  | c. | IV only | |  | d. | III and IV only | |  | e. | All statements are true |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *DATE CREATED:* | 3/7/2017 12:03 AM | | *DATE MODIFIED:* | 3/7/2017 12:05 AM | |

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| 154. For the reaction P4O10(*s*) + 6H2O(*l*) → 4H3PO4(*aq*), what mass of P4O10 must be consumed if  1.68× 1023 molecules of H2O are also consumed?   |  |  |  | | --- | --- | --- | |  | a. | 4.75 X 10 2 g P4O10 | |  | b. | 13.1g P4O10 | |  | c. | 79.1g P4O10 | |  | d. | 0.837g P4O10 | |  | e. | 30.1g P4O10 |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | True | | *DATE CREATED:* | 4/5/2017 2:31 AM | | *DATE MODIFIED:* | 4/7/2017 9:07 AM | |