**Stoichiometry Worksheet #3 (mass-mass problems)**

1. Li3N(s) + 3H2O(l) → NH3(g) + 3LiOH(aq)­
   1. What mass of lithium hydroxide are produced when 0.38g of lithium nitride react?

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| |  |  |  |  | | --- | --- | --- | --- | | 0.38g Li3N | 1 mol Li3N | 3 mol LiOH | 23.9 g LiOH | |  | 34.7g Li3N | 1 mol Li3N | 1 mol LiOH | | = 0.79g LiOH |

* 1. How many grams of lithium nitride would react with 4.05g of H2O?

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| |  |  |  |  | | --- | --- | --- | --- | | 4.05g H2O | 1 mol H2O | 1 mol Li3N | 34.7g Li3N | |  | 18.0g H2O | 3 mol H2O | 1 mol Li3N | | = 2.60g Li3N |

1. 2NaI(s) + Cl2(g) → 2NaCl(s) + I2(g) Balance and answer the following questions.
   1. What mass of sodium chloride is produced when 0.294g of sodium iodide react?

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| |  |  |  |  | | --- | --- | --- | --- | | 0.294g NaI | 1 mol NaI | 2 mol NaCl | 58.5g NaCl | |  | 149.9g NaI | 2 mol NaI | 1 mol NaCl | | = 0.115g NaCl |

* 1. If 5.80g of iodine is formed, what is the mass of sodium iodide that reacted?

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| |  |  |  |  | | --- | --- | --- | --- | | 5.80g I2 | 1 mol I2 | 2 mol NaI | 149.9g NaI | |  | 253.8g I2 | 1 mol I2 | 1 mol NaI | | = 6.85g NaI |

1. In the combustion of 54.50g of butane (C4H6), how many grams of CO2 are produced? Write and balance the equation before solving.

2C4H6 + 11O2 → 8CO2 + 6H­2O

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| |  |  |  |  | | --- | --- | --- | --- | | 54.50g C4H6 | 1 mol C4H6 | 8 mol CO2 | 44.0g CO2 | |  | 54.0g C4H6 | 2 mol C4H6 | 1 mol CO2 | | = 178g CO2 |

1. In the following **unbalanced** equation,

4 FeS2 + 11O2 → 2Fe2O3 + 8SO2

* 1. How many grams of iron (IV) sulphide are used when 9.0g of O2 react?

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| |  |  |  |  | | --- | --- | --- | --- | | 9.0g O2 | 1 mol O2 | 4 mol FeS2 | 120.0g FeS2 | |  | 32.0g O2 | 11 mol O2 | 1 mol FeS2 | | = 12g FeS2 |

* 1. What is the mass of iron (III) oxide produced when 25.0g of iron (IV) sulphide are used?

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| |  |  |  |  | | --- | --- | --- | --- | | 25.0g FeS2 | 1 mol FeS2 | 2 mol Fe2O3 | 159.6g Fe2O3 | |  | 120.0g FeS2 | 4 mol FeS2 | 1 mol Fe2O3 | | = 16.6g Fe2O3 |

1. Write and balance the double replacement reaction between lead (II) nitrate and sodium chloride. What is the mass of each product when 50.0g of lead (II) nitrate react?

Pb(NO3)2 + 2NaCl → 2NaNO3 + PbCl2

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| |  |  |  |  | | --- | --- | --- | --- | | 50.0g Pb(NO3)2 | 1 mol Pb(NO3)2 | 2 mol NaNO3 | 85.0g NaNO3 | |  | 331.2g Pb(NO3)2 | 1 mol Pb(NO3)2 | 1 mol NaNO3 | | = 25.7g NaNO3 | |
| |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  |  |  |  | | --- | --- | --- | --- | | 50.0g Pb(NO3)2 | 1 mol Pb(NO3)2 | 1 mol PbCl2 | 278.2g PbCl2 | |  | 331.2g Pb(NO3)2 | 1 mol Pb(NO3)2 | 1 mol PbCl2 | | = 42.0g PbCl2 | | |  | |

1. Cu + 2AgNO3 → 2Ag + Cu(NO3)2

How many grams of silver are produced when 36.92g of copper react?

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| |  |  |  |  | | --- | --- | --- | --- | | ­36.92g Cu | 1 mol Cu | 2 mol Ag | 107.9g Ag | |  | 63.5g Cu | 1 mol Cu | ­1 mol Ag | | = 125g Ag |

1. Al2(SO4)3 + 3Ca(OH)2 →2Al(OH)3 + 3CaSO4 Balance and answer the following questions.
   1. What mass of aluminum (III) hydroxide are produced if 165.7g of aluminum (III) sulfate react?

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| |  |  |  |  | | --- | --- | --- | --- | | 165.7g Al2(SO4)3 | 1 mol Al2(SO4)3 | 2 mol Al(OH)3 | 78.0g Al(OH)3 | |  | 342.3g Al2(SO4)3 | 1 mol Al2(SO4)3 |  | | = 75.5g Al(OH)3 |

* 1. How many grams of calcium hydroxide are needed to form 6.35g of calcium sulphate?

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| |  |  |  |  | | --- | --- | --- | --- | | 6.35g CaSO4 | 1 mol CaSO4 | 3 mol Ca(OH)2 | 74.1g Ca(OH)2 | |  | 136.2g CaSO4 | 3 mol CaSO4 | 1 mol Ca(OH)2 | | = 3.45g Ca(OH)2 |

1. Balance and then answer the following questions:

\_3F2 +2AlBr3 → 3Br2 + 2AlF3

* 1. If 8.4g of aluminum bromide react, how many grams of bromine are produced?

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| |  |  |  |  | | --- | --- | --- | --- | | 8.4g AlBr3 | 1 mol AlBr3 | 3 mol Br2 | 159.8g Br2 | |  | 266.7g AlBr3 | 2 mol AlBr3 | 1 mol Br2 | | = 7.5g Br2 |

* 1. If 90 g of aluminum fluoride are made, how many grams of fluorine have reacted?

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| |  |  |  |  | | --- | --- | --- | --- | | 90g AlF3 | 1 mol AlF3 | 3 mol F2 | 38g F2 | |  | 84.0g AlF3 | 2 mol AlF3 | 1 mol F2 | | = 6x101 g F2 |

1. 2 KI + Pb(NO3)2 → PbI2 + 2KNO3
   1. Calculate the mass of PbI2 produced by reacting 30.0g KI.

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| |  |  |  |  | | --- | --- | --- | --- | | 30.0g KI | 1 mol KI | 1 mol PbI2 | 461.0g PbI2 | |  | 166.0g KI | 2 mol KI | 1 mol PbI2 | | = 41.7g PbI2 |

* 1. What mass of Pb(NO3)2 is required to make 50.69g of KNO3?

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| |  |  |  |  | | --- | --- | --- | --- | | 50.69g KNO3 | 1 mol KNO3 | 1 mol Pb(NO3)2 | 331.2g Pb(NO3)2 | |  | 101.1g KNO3 | 2 mol KNO3 | 1 mol Pb(NO3)2 | | = 83.03g Pb(NO3)2 |

1. Write and balance the single replacement between aluminum and zinc chloride. What is the combined mass of the products when 3.0g of zinc chloride react?

2Al + 3ZnCl2 → 2AlCl3 + 3Zn

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| |  |  |  |  | | --- | --- | --- | --- | | 3.0g ZnCl2 | 1 mol ZnCl2 | 2 mol AlCl3 | 133.5g AlCl3 | |  | 136.4g ZnCl2 | 3 mol ZnCl2 | 1 mol AlCl3 | | = 2.0g AlCl3 |

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| |  |  |  |  | | --- | --- | --- | --- | | 3.0g ZnCl2 | 1 mol ZnCl2 | 3 mol Zn | 65.4g Zn | |  | 136.4g ZnCl2 | 3 mol ZnCl2 | 1 mol Zn | | = 1.4g Zn |

Combined mass of products:

2.0g + 1.4g = 2.4g products