**Stoichiometry Worksheet #2 (mole-mass, mass-mole problems)**

1. N2 + 2O­2 → N2O4
   1. If 15.0g of N2O4 was produced, how many moles of O2 were required?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | 15.0g N2O4 | 1 mol N2O4 | 2 mol O2 | |  | 92.0g N2O4 | 1 mol N2O4 | | = 0.326 mol O2 |

* 1. If 4.0x10-3 moles of oxygen reacted, how many grams of N2 were needed?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | 4.0x10-3 mol O2 | 1 mol N2 | 28.0g N2 | |  | 2 mol O2 | 1 mol N2 | | = 5.6x10-2 g N2 |

1. K3PO4 + Al(NO3)3 → 3KNO3 + AlPO4
   1. What is the mass of potassium nitrate that is produced when 2.04 moles of potassium phosphate react?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | 2.04 mol K3PO4 | 3 mol KNO3 | 101.1 g KNO3 | |  | ­1 mol K3PO4 | 1 mol KNO3 | | = 619g KNO3 |

* 1. If 5.80g of aluminum phosphate are formed, how many moles of aluminum nitrate reacted?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | 5.80g AlPO4 | 1 mol AlPO4 | 1 mol Al(NO3)3 | |  | 122.0g AlPO4 | 1 mol AlPO4 | | = 4.75x10-2 mol Al(NO3)3 |

1. CaC2 + 2H2O → Ca(OH)2 + C2H2
   1. If you have 5.50 mol of CaC2, how much C2H2 do you get?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | 5.50 mol CaC2 | 1 mol C­2H2 | 26.0g C­2H2 | |  | 1 mol CaC2 | 1 mol C­2H2 | | = 143g C2H2 |

* 1. How many moles of water are needed when 65.0g of CaC2 have reacted?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | 65.0g CaC2 | 1 mol CaC2 | 2 mol H2O | |  | 64.1g CaC2 | 1 mol CaC2 | | = 2.03 mol H2O |

1. In photosynthesis, water reacts with carbon dioxide to give oxygen and glucose (C6H12O6). Write and balance the chemical equation. How many moles of CO­2 are required to make 120.0g of glucose?

6H2O + 6CO2 → C6H12O6 + 6O2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | 120.0g C6H12O6 | 1 mol C6H12O6 | 6 mol CO2 | |  | 180.0 g C6H12O6 | 1 mol C6H12O6 | | = 4.000 mol CO2 |

1. 2NaClO3→ 2NaCl + 3O2 Balance and answer the following questions.
   1. How many grams of NaCl are produced when 20.00mol of Na­ClO3 react?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | 20.00 mol NaClO3 | 2 mol NaCl | 58.5g NaCl | |  | 2 mol NaClO3 | 1 mol NaCl | | = 1170g NaCl |

* 1. How many moles of O2 are produced when 40g of NaCl are formed?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | 40 g NaCl | 1 mol NaCl | 3 mol O2 | |  | 58.5g NaCl | 2 mol NaCl | | = 1 mol O2 |

1. 8Fe + S8 → 8FeS

How many moles of FeS are produced when 0.93g of S­8 react?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | 0.93g S­8 | 1 mol S8 | 8 mol FeS | |  | 256.8 g S8 | 1 mol S8 | | = 2.9x10-2 mol FeS |

1. Write a balanced chemical equation to represent the combustion of decane (C10H22). How many moles of water will form with the combustion of 540.4g of decane?

2C10H22 + 21O2 → 20CO2 + 22H2O

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | 540.4g C10H22 | 1 mol C10H22 | 22 mol H2O | |  | 142.0g C10H22 | 2 mol C10H22 | | = 41.86 mol H2O |

1. Balance and then answer the following questions:

\_4NH3(g) +5O2(g) → 4NO(g) + 6H2O(g)

* 1. How many moles of NO are formed if 824g of NH3 react?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | 824g NH3 | 1 mol NH3 | 4 mol NO | |  | 17.0g NH3 | 4 mol NH3 | | = 48.5 mol NO |

* 1. How many grams of water are formed if 2.55 mol of ammonia are oxidized?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | 2.55 mol NH3 | 6 mol H2O | 18.0 g H2O | |  | 4 mol NH3 | 1 mol H2O | | = 68.9g H2O |

1. Mercury (II) oxide decomposes into mercury and oxygen gas.
   1. Write and balance the equation.

2HgO → 2Hg + O2

* 1. How many moles of mercury (II) oxide are needed to produce 125g of oxygen?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | 125g O2 | 1 mol O2 | 2 mol HgO | |  | 32.0 g O2 | 1 mol O2 | | = 7.81 mol HgO |

* 1. How many grams of mercury are produced if 24.5 moles of mercury (II) oxide decomposes?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | 24.5 mol HgO | 2 mol Hg | 200.6g Hg | |  | 2 mol HgO | 1 mol Hg | | = 4.91x103 g Hg |

1. Cu + 2AgNO3 → Cu(NO3)2 + 2Ag

How many moles of Cu are needed to react with 3.50g of AgNO3?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | 3.50g AgNO3 | 1 mol AgNO3 | 1 mol Cu | |  | 169.9g AgNO3 | 2 mol AgNO3 | | = 1.03x10-2 mol Cu |