**Chemistry 20: Practice final # 2**

**Name** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Score \_\_\_\_\_\_\_\_\_\_\_\_\_\_ /76

1. The mass of 0.25 mol of iron (II) chloride is \_\_\_\_

|  |  |
| --- | --- |
| a | 65 g |
| b | 37 g |
| c | 32 g |
| d | 1.3 kg |

1. The volume of 4.50 mol of ammonia at STP is \_\_\_\_\_\_\_\_ L

|  |  |
| --- | --- |
| a | 112 |
| b | 4.98 |
| c | 5.51 |
| d | 101 |

1. The number of moles of HNO3(aq) in 3.75 x 1025 particles of HNO3(aq) is \_\_\_\_\_\_\_ mol

|  |  |
| --- | --- |
| a | 59.3 |
| b | 62.3 |
| c | 60.5 |
| d | 6.23 x 1047 |

1. Which quantity is equivalent to the smallest mass of water vapor?

|  |  |
| --- | --- |
| a | 3.01 x 1023 particles |
| b | 1.25 mol |
| c | 19.8 L of gas at STP |
| d | 45.14 g |

1. When heated, calcium carbonate releases carbon dioxide gas and leaves behind a residue of solid calcium oxide. If 0.250 mol of residue is formed, then a mass of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ g of calcium carbonate has been heated.

|  |  |
| --- | --- |
| a | 100 |
| b | 56.0 |
| c | 224 |
| d | 25.0 |

1. Propane (C3H8(g) undergoes complete combustion with sufficient oxygen. If 7.5 mol of oxygen is consumed, then \_\_\_\_\_\_\_ mol of carbon dioxide will be formed .

|  |  |
| --- | --- |
| a | 13 |
| b | 2.0 |
| c | 4.5 |
| d | 9.0 |

1. When a 1.2 solution of copper (II) nitrate dissociates, the concentration of the anion will be \_\_\_\_\_\_ 

|  |  |
| --- | --- |
| a | 2.4 |
| b | 0.60 |
| c | 1.2 |
| d | 0.40 |

1. The solute that is immiscible with its solvent is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | Water in oil |
| b | Water in ethanol |
| c | NaCl(s) in water |
| d | Butanol in methanol |

1. When making 200 mL solution of 1.00  NaOH(aq), one should begin by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | Dissolving 8.00 g of solute in 200 mL of solvent |
| b | Dissolving 40.0 g of solute in 100 mL of solvent |
| c | Dissolving 8.00 g of solute in 100 mL of solvent |
| d | Dissolving 40.0 g of solute in 200 g of solvent |

1. Samples of oxygen gas are compared. Which sample has the most particles?
   * 1. 12.0 g of oxygen
     2. 8.50 L at STP
     3. 2.53 x 1023 particles
     4. 9.00 L at SATP

|  |  |
| --- | --- |
| a | i |
| b | ii |
| c | iii |
| d | iv |

1. In a formation reaction sufficient hydrogen gas reacts with 5.00 mol of oxygen gas to form hydrogen peroxide (H2O2(l)). If 12.0 mol of hydrogen peroxide is collected, then the percentage yield for this reaction is \_\_\_\_\_\_\_\_\_%

|  |  |
| --- | --- |
| a | 120 |
| b | 83.3 |
| c | 240 |
| d | 41.7 |

1. A 23.5 mg sample of a toxic compound is placed in 1.50 kg of water. The concentration of this toxic compound is \_\_\_\_\_\_\_ ppm.

|  |  |
| --- | --- |
| a | 23.5 |
| b | 15.7 |
| c | 0.282 |
| d | 3.54 |

1. An unknown volume of 0.90 solution has 60 mL of water added to it. If the new diluted concentration of the solution is 0.45 , then the initial volume of the solution was \_\_\_\_ mL

|  |  |
| --- | --- |
| a | 60 |
| b | 120 |
| c | 30 |
| d | 90 |

1. Choosing from the list of equipment below, the glassware that gives the most accurate measurement for a volume of 10.0 mL will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | Evaporating dish |
| b | Erlenmeyer flask |
| c | Burette |
| d | beaker |

1. Michelle says that a 25.0 mL sample of a 5.00 %  solution of hydrogen peroxide will have \_\_\_\_ mL of solute

|  |  |
| --- | --- |
| a | 30.0 |
| b | 5.00 |
| c | 25.0 |
| d | 1.25 |

1. A solution with a pH of 2.50 is added to three indicators: HBg, H2Tb, and HBb. The colour of the indicators in the order given will be \_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_’

|  |  |  |  |
| --- | --- | --- | --- |
| a | Blue | Yellow | Blue |
| b | Green | Orange | Blue |
| c | Yellow | Yellow | yellow |
| d | Yellow | Orange | yellow |

1. The pOH of a 0.000 225 solution of nitric acid is \_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | 2.60 |
| b | 10.35 |
| c | 3.65 |
| d | 11.40 |

1. If an acid has a pH of 3.50. the [OH-(aq)] will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | 3.16 x 10-4 |
| b | 3.16 x 10-11 |
| c | 3.2 x 10-4 |
| d | 3.2 x 10-11 |

1. A solution has less H+(aq) ions than OH-(aq) ions. Choose the statement below that is **TRUE**.

|  |  |
| --- | --- |
| a | The pH of the solution will be low |
| b | The indicator HOr will turn orange. |
| c | The solution will feel slippery. |
| d | The indicator HPr will be yellow. |

1. When an acid is diluted with distilled water, then the pH will \_\_\_\_\_\_\_\_\_\_\_\_, and the solution will become \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| a | Rise | More acidic |
| b | Rise | More basic |
| c | Fall | More acidic |
| d | Fall | More basic |

1. The new volume of a fixed mass of an ideal gas whose pressure is increased from 100 kPa to 200 kPa at a constant temperature will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | One half the original volume |
| b | Two times the original volume |
| c | Four times the original volume |
| d | One fourth the original volume |

1. A solution of Epsom salts (MgSO4(s)) is 7.50 % . The mass of Epsom salts that will be present in 150 mL of solution will be \_\_\_\_\_\_\_\_ g .

|  |  |
| --- | --- |
| a | 5.00 |
| b | 15.0 |
| c | 11.3 |
| d | 50.0 |

1. The correct name for Au3(PO4)(s) would be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | Silver phosphate |
| b | Gold (III) phosphate |
| c | Gold (I) phosphate |
| d | Gold phosphate |

1. A sample of lead (II) chloride is added to 100 mL of water at room temperature. The correct symbol for this compound will be \_\_\_\_

|  |  |
| --- | --- |
| a | PbCl2(l) |
| b | PbCl2(s) |
| c | PbCl2(g) |
| d | PbCl2(aq) |

1. Which of the following observations is not evidence for a chemical reaction?

|  |  |
| --- | --- |
| a | Cu(s) + 2HCl(aq) 🡪 CuCl2(aq) + H2(g) |
| b | H2(s) 🡪 H2(g) |
| c | Precipitate is formed |
| d | HPr changes from pink to colourless |

1. A dilute solution is one in which there is \_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | Large amount of solute in a large amount of solvent |
| b | Large amount of solute in a small amount of solvent |
| c | Small amount of solute in a large amount of solvent |
| d | Small amount of solute in a small amount of solvent |

1. Consider the following unbalanced reaction

**\_\_\_\_F2(g) + \_\_\_\_ C8H12(l) 🡪 \_\_\_\_\_C(s) + \_\_\_\_ HF(g)**

When the above reaction is balanced with the smallest whole numbers possible, the numerical coefficient for HF(g) is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | 1 |
| b | 6 |
| c | 8 |
| d | 12 |

1. When an acid is diluted with a large quantity of water, the pH will \_\_\_\_\_\_\_\_\_\_ because the [H+(aq)] is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |  |
| --- | --- | --- |
| a | Rise | Falling |
| b | Rise | Rising |
| c | Fall | Falling |
| d | Fall | rising |

1. A compound has a formula of T3M2(s). If the molar mass of the compound is 155.9  and the molar mass of the element T(s) is 25.1, then the molar mass of the element M(s) is \_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | 35.2 |
| b | 130.8 |
| c | 40.3 |
| d | 26.9 |

1. The molar mass of Mn(CO3)2(s) is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ 

|  |  |
| --- | --- |
| a | 144.33 |
| b | 174.96 |
| c | 126.96 |
| d | 114.95 |

1. Use the reaction given below:

**\_\_\_\_ Ca(OH)2(s) + \_\_\_\_ HF(aq) 🡪 \_\_\_\_H2O(l) + \_\_\_\_CaF2(s)**

Be sure to balance the reaction first.

If 150 g of water is formed, then the number of moles of Ca(OH)2(s) that is reacted is \_\_\_\_\_\_\_\_ mol

|  |  |
| --- | --- |
| a | 17 |
| b | 9.38 |
| c | 8.32 |
| d | 4.16 |

1. A quantity of \_\_\_\_ mol of NaCl(s) **is equal in mass** to 1.50 mol of CaO(s) .

|  |  |
| --- | --- |
| a | 1.56 |
| b | 1.44 |
| c | 1.50 |
| d | 1.04 |

1. Consider the following unbalanced equation

\_\_\_ Li2S(s) + \_\_\_\_ MnO2(s) 🡪 \_\_\_\_ Li2O + \_\_\_\_\_\_MnS2

The TRUE statement about the balanced reaction will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | When 4.0 mol of Li2S(s) is consumed, 2 mol of MnS2(s) will be formed. |
| b | When 0.5 mol of MnO2(s) is consumed, 2 mol of Li2O(s) will be formed. |
| c | If 3 mol Li2O(s) is formed, then 4 mol of Li2S will be consumed. |
| d | If 3.0 mol of Li2O(s) forms, then 6.0 mol of MnS2(s) will be formed. |

1. The concentration of a salt solution that contains 120 g of NaOH(s) in 200 mL of water is \_\_\_\_\_ 

|  |  |
| --- | --- |
| a | 15.0 |
| b | 0.600 |
| c | 1.67 |
| d | 24.0 |

1. In order to dilute70.0 mL of a 2.00 NaCl(aq) to a concentration of 0.750 , \_\_\_\_\_ mL of distilled water should be added.

|  |  |
| --- | --- |
| a | 187 |
| b | 21.4 |
| c | 48.6 |
| d | 117 |

1. A technician added 50.0 mL of distilled water to a 100 mL sample of 1.50  solution of Na3PO4(aq). The diluted concentration of the compound, the anion, and the cation will be \_\_\_\_\_\_\_\_\_\_\_ , \_\_\_\_\_\_\_\_\_\_\_\_ , and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ respectively.

|  |  |  |  |
| --- | --- | --- | --- |
| a | 0.500 | 1.50 | 0.500 |
| b | 1.00 | 1.00 | 3.00 |
| c | 0.500 | 0.500 | 1.50 |
| d | 1.00 | 3.00 | 1.00 |

1. Consider the following reaction

Al3+(aq) + 3Ag(s) 🡪 3Ag+(aq)+ Al(s)

The chemical reagent that has undergone reduction is \_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | Ag(s) |
| b | Ag+(aq) |
| c | Al3+(aq) |
| d | Al(s) |

1. When a substance undergoes oxidation, it \_\_\_\_\_\_\_\_\_\_\_\_ electrons and becomes more \_\_\_\_\_\_\_ charged.

|  |  |  |
| --- | --- | --- |
| a | Gains | Negatively |
| b | Gains | Positively |
| c | Loses | Negatively |
| d | Loses | Positive ly |

1. An atom of sulfur has \_\_\_\_\_\_\_\_\_\_\_\_\_ valence electrons and \_\_\_\_\_\_\_\_\_ lone pairs of electrons.

|  |  |  |
| --- | --- | --- |
| a | 16 | 2 |
| b | 6 | 4 |
| c | 6 | 2 |
| d | 16 | 4 |

1. The element on the periodic table with the highest electronegativity is \_\_\_\_\_\_\_\_\_\_\_\_ and it commonly forms a(n) \_\_\_\_\_\_\_\_ because it wants to \_\_\_\_\_\_\_\_\_\_ outer electron(s).

|  |  |  |  |
| --- | --- | --- | --- |
| a | F | Cation | Lose |
| b | F | Anion | Gain |
| c | Fr | Cation | Lose |
| d | Fr | Anion | Gain |

1. NaCl(s), LiOH(s) and Ca(NO3)2(s) are all \_\_\_\_\_\_\_\_\_\_\_\_\_\_ compounds because electrons are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |  |
| --- | --- | --- |
| a | Ionic | Shared |
| b | Molecular | Shared |
| c | Ionic | Transferred |
| d | molecular | transferred |

1. The compound C6H6(l) has a common name of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and a scientific name of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |  |
| --- | --- | --- |
| a | Hexacarbon hexahydride | Benzene |
| b | Benzene | Hexacarbon hexahydrate |
| c | Benzene | Hexacarbon hexahydride |
| d | Heptacarbon heptahydrate | Benzene |

1. A molecule of methane (CH4(g)) has a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ shape with \_\_\_\_\_\_\_\_\_\_ single bond(s) between hydrogen and carbon.

|  |  |  |
| --- | --- | --- |
| a | Pyramidal | 4 |
| b | Tetrahedral | 4 |
| c | Linear | 1 |
| d | Trigonal planar | 1 |

1. When separating the boiling points of CH4(g) from that of C3H8(g), the most significant force is \_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | Non polar covalent bonds |
| b | Dipole dipole forces |
| c | Hydrogen bonds |
| d | London dispersion forces |

1. Intermolecular forces measure forces \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ particles while intramoleucular forces measure forces \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ particles. The stronger of the two types of forces is \_\_\_\_\_\_\_\_\_\_\_\_\_ forces.

|  |  |  |  |
| --- | --- | --- | --- |
| a | Within | between | Intermolecular |
| b | Between | Within | Intramolecular |
| c | Within | Between | Intramolecular |
| d | between | within | Intermolecular |

1. The compound that exhibits polar covalent bonds with NO hydrogen bonds is \_\_\_\_\_\_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| a | CH3F | |
| b | NH3 |
| c | C2H2 | |
| d | F2 | |

1. A molecule that has dipole-dipole, but is a non polar molecule is\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | H2O(l) |
| b | C2Cl2 |
| c | CH3F(g) |
| d | N2(g) |

1. The strongest bonding force is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ while the weakest bonding force is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |  |
| --- | --- | --- |
| a | Ionic | Dipole – dipole |
| b | Metallic | Non polar covalent |
| c | Network covalent | London dispersion |
| d | Non polar covalent | Network covalent |

1. If the following chemicals were placed in order from the lowest boiling point to the highest boiling point, the chemical that would be listed last would be \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ammonia (NH3(g)), sucrose (C12H22O11(s)) , lithium hydroxide (LiOH(s)), nitrogen gas (N2(g))

|  |  |
| --- | --- |
| a | Sucrose |
| b | Ammonia |
| c | Lithium hydroxide |
| d | Nitrogen gas |

1. Audrey and Samantha match up compounds with sterochemical shapes.
   * 1. Methane A. linear
     2. Water B. Bent
     3. Ethene C. trigonal planar
     4. Ammonia D. Pyramidal

The pair above that is FALSE is

|  |  |
| --- | --- |
| a | i and A |
| b | ii and B |
| c | iii and C |
| d | Iv and D |

1. A compound that has a coordinate covalent bond is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | ammonia |
| b | Lithium sulfide |
| c | Ammonium chloride |
| d | methane |

1. **Numerical response question:**

Left justify the answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

A 340 g sample of chromium (II) oxide has \_\_\_\_\_\_\_ mol.

1. **Numerical r response question**

Left justify the answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

The cation concentration of a 75.0 mL sample of 2.54 zinc sulfate solution will be \_\_\_\_\_

1. **Numerical response question**

Left justify the answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

A 20.0 L sample of nitrogen gas at 34.0 oC will have a volume of \_\_\_\_\_\_L if the temperature changes to 75.1oC. Assume the pressure of the gas remains constant.

1. **Numerical response question**

Left justify the answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

A 60 g sample of titanium (III) chloride has \_\_\_\_\_\_\_\_\_\_\_\_\_ particles. Express the answer as a.b x 10cd where a,b,c,d are the four digits recorded in the boxes provided above.

1. **Numerical response question**

Left justify the answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

Samples of 0.0054 Nitric acid are added to four indicators: thymol blue, orange IV, cresol red and bromothymol blue. Bert and James record the color for these indicators in the order given using the table below.

|  |  |
| --- | --- |
| Number | color |
| 1 | Red |
| 2 | Yellow |
| 3 | Orange |
| 4 | Blue |
| 5 | Green |
| 6 | Colorless |

Their answer would be \_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.

1. **Numerical response question**

Left justify the answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

**A pressure of 800 mm of mercury will be equivalent to \_\_\_\_\_\_\_ kPa.**

|  |  |
| --- | --- |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |

1. **Numerical response question**

Left justify the answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

**Justin and Aaron have a 50 mL sample of 0.0036 Ba(OH)2(aq)**

**Express the concentration of [H+(aq)] found in this solution in the form a.b x 10‑cd .**

1. **Numerical response question**

Left justify the answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

**Lynn and Carol build a three dimensional model of a molecule of acetylene (C2H2(g)). Record ALL the correct observations from the table below. The observations should be listed from the lowest number to the largest number.**

|  |  |
| --- | --- |
| **1** | **The molecule is a symmetrical linear shape** |
| **2** | **The molecule has double bond(s)** |
| **3** | **The molecule is a non symmetrical angular shape** |
| **4** | **The molecule has triple bonds** |

1. **Numerical response question**

Left justify the answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

**Sarah and Erin react 45 g of oxygen gas with 3.5 mol of hydrogen gas to form water. The number of moles of excess reagent for this reaction will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_ mol.**

1. **Numerical response question**

Left justify the answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

The number of polyprotic acids given in the list below is \_\_\_\_\_\_\_\_\_\_\_

Sulfuric acid, nitric acid, oxalic acid, hydrochloric acid, sulfurous acid

1. **Long answer:**

A 25.0 mL sample of 2.0 sodium oxalate is reacted with 30.0 mL of 1.50 copper (II) nitrate solution.

1. Write a balanced reaction (1 mark)
2. Find the limiting reagent (3 marks)
3. Find the mass of precipitate formed (2 marks)
4. Find the **mmol** of excess reagent left. (2 marks)
5. A 50 g sample of chlorine gas is placed in a 4.0 L container. Find the pressure inside the container if the temperature of the container is 300K. Express the answer in kPa. (2 marks)
6. Kent and Rhonda have 100 mL of a solution of Na2SO3(aq) . The concentration of the **cation** is 1.40 
7. Find the concentration of the **compound**. (1 mark)
8. Find the mass of solute that will be dissolved to make this solution. (2 marks)
9. If 150 mL of distilled water is added to the original solution, the new diluted concentration of the **cation** will be \_\_\_\_\_\_\_\_  (2 marks)

Answer Page

Multiple choice questions (1 mark each = 51)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | C | 16 | D | 31 | D | 46 | A |
| 2 | D | 17 | B | 32 | B | 47 | B |
| 3 | B | 18 | D | 33 | A | 48 | C |
| 4 | A | 19 | C | 34 | A | 49 | C |
| 5 | D | 20 | B | 35 | D | 50 | A |
| 6 | C | 21 | A | 36 | B | 51 | C |
| 7 | A | 22 | C | 37 | c |
| 8 | A | 23 | C | 38 | d |
| 9 | C | 24 | B | 39 | c |
| 10 | C | 25 | B | 40 | b |
| 11 | C | 26 | C | 41 | c |
| 12 | B | 27 | D | 42 | C |
| 13 | A | 28 | A | 43 | B |
| 14 | C | 29 | C | 44 | D |
| 15 | D | 30 | B | 45 | B |

Numerical response questions (1 mark x 10 = 10)

|  |  |  |  |
| --- | --- | --- | --- |
| 52 | 5.00 | 57 | 107 |
| 53 | 2.54 | 58 | 1412 |
| 54 | 22.7 | 59 | 14 |
| 55 | 2323 | 60 | 0.69 |
| 56 | 3322 | 61 | 3 |

Long answer:

62. a) Na2OOCCOO(aq) + Cu(NO3)2(aq) 🡪 2NaNO3(aq) + CuOOCCOO(s) (1 mark)

b) copper (II) nitrate (3 marks)

c) mass of CuOOCCOO(s) = 6.82 g (2 marks)

d) excess Na2OOCCOO(aq) = 0.500 mmol (2 marks)

63. p = 440 kPa (2 marks)

64. a) [Na2OO3(aq)] = 0.700  (1 mark)

b) mass = 8.82 g (2 marks)

c) [cation] = 0.560  (2 marks)

Total: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_76 marks