Chemistry coursework copper flashcard

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Copper has two oxides, Cu O and CuOCopper carbonate, CuCO decomposes on heating to form one of these oxides and an equation can be written for each possible reaction: Equation 1: 2CuCO (s) Cu O(s) + 2CO (g) + 1/2 O (g)Equation 2: CuCO (s) CuO (s) + CO (g)My aim for this experiment is to find out which equation is correct, I will use my knowledge of the relationship between the mole and the volume to prove which equation is correct. In order to do this I will have to measure the volume of gas evolved from the two experiments. To begin my experiment I need to know how much (the mass) of copper carbonate I am going to use for each equation so that enough gas evolves to be easily calculated and so that my test is fair. To work out the mass firstly we need to find out the empirical formula, which is the ratio of the number of atoms of each element in the compound. 1. 2CuCO (s) Cu O(s) + 2CO (g) + 1/2 O (g)Ratio of moles: – 2 moles : 2 1/2Smallest ratio:- 1 mole : 1 1/42.

CuCO (s) CuO (s) + CO (g)Ratio of moles:- 1 mole : 1 moleNext, I need decide what volume of gas I want to measure, so that we can substitute this volume into the equation to find out the mass of copper carbonate required. I believe it would be suitable to use 50 cm this would improve the accuracy of my results I will explain why, once I have found out the mass of CuCO . In order to find out the mass I need to use relevant formulas that will help prove which equation is correct.’At room temperature, 25? C and atmospheric pressure at 1 atmosphere 1 mole of ant gas will occupy a volume of 24dm3.

‘ 1. This is useful because we have to use this to work out how much gas should be evolved from a specific measurement. It is also vital that we use a formula that shows the relationship between mass and moles and relative

atomic mass so that we can work out the mass of copper carbonate we need to use. 1. ‘ Advanced Chemistry for You’, by Laurie Ryan, 2000. Moles = Mass 2.

R. A. MCalculationsFirstly I will use this formula:- moles = Vol (cm3)24000This equation will help me find out the actual number of moles of gas evolved, this answer can then be substituted into another equation to find out the mass of copper carbonate. Moles = 5024000= 2. 08 x 10 3 moles of gas evolvedI can now use the actual number of moles of gas evolved to find out the number of moles of copper carbonate needed to be decomposed in order to produce 2. 08 x 10 moles of gas.

I can do this by looking at the relationship in terms of the ratio of moles of copper carbonate to gas evolved. If 1 mole of Copper Carbonate gives 1 1/4 moles of gas then by dividing 2. 08 x 10 by 1 1/4 I will get the actual number of moles of copper carbonate. CuCO3 : CO + O1 mole : 1 1/4 moles2. 08 x 10 = 1. 664 x 10 31.

25Then I will use this equation: – Moles = MassMr of CuCO3 is 63. 5 + 12+ (16 x 3)= 123. 5Mr1. 664 x 10 3 = Mass123.

5Rearrange the equation to get what the mass equals: Mass = Mr x Moles= 123. 5 x 1. 664 x 10 -3= 0. 205Therefore 0. 205g of Copper Carbonate is needed to decompose to produce 50cm of gas. 2.

‘ Chemistry 1 endorsed by OCRFor equation 2: 2CuCO3 Cu2O + 2CO2 + 1/2 O2Ratio: 1 : 1Moles: 1. 664 x 10 3 : 1. 664 x 10 3Therefore if I want to use 0. 205g then the amount of gas that should evolve if equation 2 is correct is:-

Vol = mol x 24000= 1. 664 x 10 3 x 24000= 39. 94In order for me to carry out this experiment, I will need suitable apparatus:-1.

5 large boiling tubes2. Bunsen Burner3. Clamp4. Bung5.

Delivery tube6. Piece of rubber tubing can be used to connect the glass tubing to a gas syringe7. Gas syringe8. Stand9. Accurate weighing scales capable of measuring to 0. 01 of a mole10.

Safety goggles11. Laboratory coatThe method I will use is as follows:-1. Set up the equipment as shown in the diagram below, making sure that there are no other chemicals in any of the equipment and also that the gas syringe is fully pressed in2. Measure out 0. 205g of copper carbonate on the scales and put this into a boiling tube3. Attach a delivery tube to the bung and put the bung on the boiling tube, which contains the 0.

205g of Copper Carbonate. 4. Attach the delivery tube using a piece of rubber tubing to the gas syringe5. Clamp the gas syringe to the stand.

6. Position the boiling tube so that the top of the blue cone of the roaring Bunsen burner flame is just touching the base of it. 7. Wait until the copper carbonate has completely decomposed. This will be indicated by a colour change, and the fact that the copper carbonate would have stopped bubbling. 8.

Copper carbonate is a green solid. Copper oxide is a jet black solid. 9. Green Black10. Start to heat the Copper Carbonate11.

Record the amount of gas in the gas syringe12. Repeat this experiment five times using a different boiling tube each time as well as resetting the gas syringe13. Work out average14. From this it should be possible to calculate which equation is correct by the amount of gas producedPossible limitations to my method1.

While the boiling tube is being heated, there will be an expansion of gas inside the apparatus which the syringe will of course record. You will need to think up a technique which enables you to measure the volume carbon dioxide evolved without having the added complication of measuring the volume of expanded air. 2. The plungers inside gas syringes tend to stick, so you should ensure that the plunger is free-running within the syringe before use. 3.

If you look at the gradations on a typical 100 cm3 syringe you will see that the volume collected can only be measured to the nearest cm3 at best, and possibly only to the nearest 2 cm3. Risk Assessment* There are two chemicals in this reaction that carry warnings: 1. Copper Carbonate (CuCO3) – Labelled as harmful if swallowed and also the dust irritates both lungs and eyes2. Copper Oxide (Cu2O and CuO) – Labelled as harmful if swallowed and also the dust irritates both lungs and eyesFollow standard Laboratory safety rules. I will make my test fair by taking the following precautions:-1. I will make certain that the gas syringe is at 0 before beginning the experiment.

2. I will ensure that all the copper carbonate has been fully decomposed by waiting until the copper carbonate, which is a green colour, has changed fully to a black colour which is the colour of copper oxide. Another way of

knowing whether the reaction has stopped is when no more gas is being evolved. 3. I will also wait about a minute before taking a result while the copper oxide cools and all the gas has been released while the copper carbonate decomposes.

4. I will allow the gases to cool to room temperature before taking a reading because when heated, gases tend to expand, which may affect my results. For every reading taken I will wait 3 minutes which is a reasonable time because it ensures accuracy and will not be too time consuming. 5.

I could also repeat the experiments 3-4 times to obtain an accurate average, this would minimise the risk of errors and it would also account for any anomalous results. 6. When taking my readings I will measure to 2 decimal places to ensure a high level of accuracy.