**SCIENCE WAGOLL WORK**

**For all calculation questions, whether it be Physics, Chemistry or Biology, ALWAYS show your working.**

**For reacting mass calculations, you need to:**

* **Start with the equation**
* **Work out the relative formula masses of the species in the question**
* **Write the relative formula masses underneath those species in the equation.**
* **Complete the calculation**
* **If needed, add the units.**

**Q1.**  This cake recipe is taken from a cookery book.

|  |
| --- |
| **Soda Cake**  •    Mix the flour and butter and add the sugar, currants and flavouring.  •    Then add the beaten egg.  •    Add a little milk with a teaspoonful of **baking soda (sodium hydrogencarbonate)** and mix it in well.  •    Bake in a moderate oven for about 30 minutes. |

When sodium hydrogencarbonate is heated in an oven, it forms carbon dioxide gas.

2 NaHCO3      Na2CO3   +   H2O   +   CO2

A teaspoonful of baking soda contains a mass of 11 g of **sodium hydrogencarbonate**.  
Calculate the mass of **carbon dioxide** that could be made from 11 g of sodium hydrogencarbonate.  
Show clearly how you work out your final answer.

Relative atomic masses: H = 1; C = 12; O = 16; Na = 23.

**2 NaHCO3      Na2CO3   +   H2O   +   CO2**

**Relative formula masses:**

**2 NaHCO3 = 2(23 + 1 + 12 + (3x16)) = 2 (23 + 1 + 12 + 48) = 2 x 84 = 168**

**CO2 = 12 + (2 x 16) = 12 + 32 = 44**

**2 NaHCO3      Na2CO3   +   H2O   +   CO2**

**168g 44g**

1 mark

**11g ?**

**Work out the ratio of CO2 for 1 gram of NaHCO3 = 44/168 = 0.262g**

1 mark

**Work out how much CO2 is produced from 11g of NaHCO3**

**= 11 x 0.262 = 2.88g**

1 mark

Mass of carbon dioxide = **2.88 g**

**(Total 3 marks)**