

OCR Gateway Chemistry

GCSE Questions

C3.1.8

Name Class Date

- 1 Potassium nitrate (KNO_3) decomposes on heating to give potassium nitrite (KNO_2) and oxygen (O_2). (A_r values K = 39, N = 14, O = 16)
When 4.04 g of KNO_3 is heated, 3.40 g of KNO_2 is produced.
- a Use the law of conservation of mass to work out the mass of O_2 produced. [1]
- b Calculate the M_r values of KNO_3 , KNO_2 , and O_2 . [3]
- c Calculate the number of moles of:
- i KNO_3 [1] ii KNO_2 [1] iii O_2 [1]
- d Work out the simplest whole-number ratio of these values, and use this ratio to write a balanced equation for the reaction. [2]

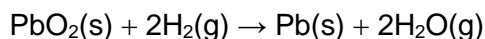
- 2 When calcium carbonate is heated it decomposes to form calcium oxide and carbon dioxide. This reaction can be represented by the following equation:



(A_r values: Ca = 40, O = 16, C = 12)

- a Calculate the M_r of CaCO_3 and CaO . [1]
- b If 25 g of calcium carbonate is heated:
- i Calculate the number of moles of calcium carbonate used [1]
- ii From the balanced equation, state the number of moles of calcium oxide produced. [1]
- iii Calculate the mass of calcium oxide produced. [1]
- c Calculate the M_r of CO_2 and use it to calculate the mass of CO_2 produced when 1 kg (1000 g) of CaCO_3 is heated. [4]

- 3 When lead dioxide is heated with hydrogen, the following reaction occurs:



(A_r values: Pb = 207, O = 16, H = 1)

- a Calculate the M_r of PbO_2 [1]
- b If 478 g of lead dioxide is heated calculate:
- i the number of moles of lead dioxide used [1]
- ii the number of moles of lead produced [1]
- iii the mass of lead produced. [1]
- c Calculate the mass of hydrogen needed to make 20.7 g of Pb. [3]

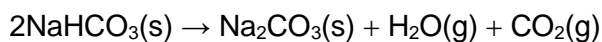
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4 Sodium hydrogencarbonate decomposes on heating:

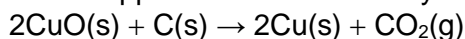


(A_r values: Na = 23, C = 12, O = 16, H = 1)

- a** If 3.36 g of sodium hydrogencarbonate is heated calculate:
- i** the number of moles of sodium hydrogencarbonate used [1]
 - ii** the number of moles of sodium carbonate produced [1]
 - iii** the mass of sodium carbonate produced. [1]
- b** If 2.1 kg (2100 g) of sodium hydrogencarbonate is heated, calculate the mass of CO_2 produced. [3]

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The reaction between copper oxide and carbon yields copper metal.

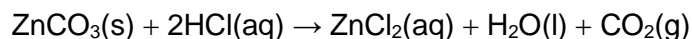


A mixture of 4.0 g of CuO and 1.2 g carbon is heated.

(A_r values: Cu = 64, C = 12, O = 16)

- a** Calculate the number of moles in 4.0 g of CuO. [1]
- b** Calculate the number of moles in 1.2 g of C. [1]
- c** The balanced equation tells us that for every one mole of carbon we need two moles of copper oxide. Use your answers to parts **a** and **b** to work out which reactant is the limiting reactant. [2]
- d** What mass of Cu would you expect to make? [2]

6 The reaction between zinc carbonate and hydrochloric acid can be used to make zinc chloride.



6.25 g of ZnCO_3 was added to a solution containing 1.825 g of HCl.

(A_r values: Zn = 65, Cl = 35.5, H = 1)

- a** Which reactant is in excess? Explain your reasoning. [4]
- b** What mass of zinc chloride would you expect to make? [2]