Moles and reacting masses

Chemistry calculations | AQA Combined Science 8464 and AQA GCSE Chemistry 8462 | 12 questions, 35 marks

GCSE science calculations

Scan for the solutions

Equations for this topic (cover this box to practise recalling them)

- number of moles = $\frac{\text{mass}}{\text{relative formula mass}}$ learn this one
- number of particles = number of moles × Avogadro constant learn this one

Name: _____ **Date:** _____ **Score:** _____ **/ 35**

1 **Higher tier**

A gas cartridge for a paintball marker holds 88 g of carbon dioxide, CO_2.

Relative atomic masses (A_r): C = 12, O = 16

Calculate the number of moles of carbon dioxide.

(2 marks)

Answer _____

2 **Higher tier**

Daniel measures out 9.0 g of pure water, H_2O.

Relative atomic masses (A_r): H = 1, O = 16

Calculate the number of moles of water.

(2 marks)

Answer _____

3 **Higher tier**

A gas jar contains 0.40 mol of methane, CH_4.

The Avogadro constant is 6.02×10^{23} per mole.

Calculate the number of methane molecules in the gas jar.

Give your answer in standard form to 3 significant figures.

(2 marks)

Answer _____

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

4 **Higher tier**

A builders' merchant sells a 2.5 kg bag of powdered calcium carbonate, $CaCO_3$.

Relative atomic masses (A_r): Ca = 40, C = 12, O = 16

Calculate the number of moles of calcium carbonate in the bag.

(3 marks)

Answer _____

5 **Higher tier**

A painkiller tablet contains 450 mg of aspirin. The relative formula mass (M_r) of aspirin is 180.

Calculate the number of moles of aspirin in one tablet.

Give your answer in standard form.

(3 marks)

Answer _____

6 **Higher tier**

Mei cuts a small square of aluminium foil with a mass of 54 mg.

Relative atomic mass (A_r): Al = 27

The Avogadro constant is 6.02×10^{23} per mole.

Calculate the number of aluminium atoms in the square.

Give your answer in standard form to 3 significant figures. Show your working.

(3 marks)

Answer _____

7 **Higher tier**

A technician needs 0.15 mol of sodium hydroxide, NaOH, to make up a solution.

Relative atomic masses (A_r): Na = 23, O = 16, H = 1

Calculate the mass of sodium hydroxide she should weigh out.

(2 marks)

Answer _____

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

8 **Higher tier**

Rhys collects 0.050 mol of an unknown gas. The gas has a mass of 3.2 g.

Calculate the relative formula mass (M_r) of the gas.

(2 marks)

Answer _____

9 **Higher tier**

An iron nail contains 3.01×10^{22} atoms of iron.

The Avogadro constant is 6.02×10^{23} per mole.

Calculate the number of moles of iron atoms in the nail.

(2 marks)

Answer _____

10 **Higher tier**

Ayesha heats 5.04 g of sodium hydrogencarbonate, $NaHCO_3$, in a boiling tube that has a mass of 22.15 g.

$2NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$

Relative atomic masses (A_r): Na = 23, H = 1, C = 12, O = 16

Calculate the maximum mass of sodium carbonate, Na_2CO_3, she can make. Show your working.

(4 marks)

Answer _____

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

11 **Higher tier**

In a fume cupboard, a teacher heats aluminium foil in chlorine gas. 5.4 g of aluminium reacts with 21.3 g of chlorine, Cl_2, to make 26.7 g of aluminium chloride, $AlCl_3$.

Relative atomic masses (A_r): Al = 27, Cl = 35.5

a. Calculate the number of moles of aluminium.

b. Calculate the number of moles of Cl_2.

c. Calculate the number of moles of $AlCl_3$.

d. Use your answers to write the balanced symbol equation for the reaction.

Show your working.

(5 marks)

Answer _____

12 **Higher tier**

Jamal heats a mixture of 7.0 g of iron powder and 3.2 g of sulfur powder until they react.

$Fe + S \rightarrow FeS$

Relative atomic masses (A_r): Fe = 56, S = 32

a. Identify the limiting reactant.

b. Calculate the maximum mass of iron sulfide, FeS, that can be made.

c. Calculate the mass of the reactant that is left over.

Show your working.

(5 marks)

Answer _____

End of questions | Total 35 marks

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.