

# Solids 3

## Essential Pre-Uni Chemistry B4.3

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GCSE



A Level



Calculate the amount of substance in:

### Part A (a)

1.001 g of  $\text{CaCO}_3$  (s), to 3 significant figures

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### Part B (b)

197 kg of Au (s), to 3 significant figures

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### Part C (c)

1.4 g of CO (g), to 2 significant figures

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### Part D (d)

2.006 kg of Hg (l), to 4 significant figures

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**Part E** (e)

11.1 g of lithium carbonate, to 3 significant figures

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**Part F** (f)

10.0 mg of lead(II) iodide, to 3 significant figures

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Physics. *You work it out.*

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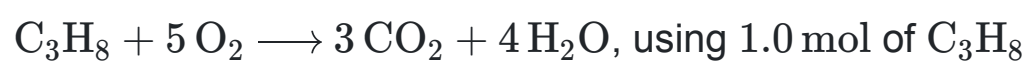
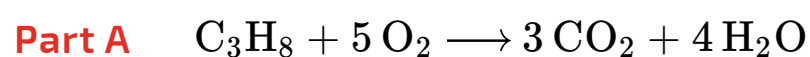
# Reactions 1

## Essential Pre-Uni Chemistry B6.1

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Calculate the amount of oxygen needed, and amount of carbon dioxide produced, in each of the cases below.



Calculate the amount of oxygen needed.

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Calculate the amount of carbon dioxide produced.

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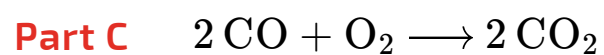


Calculate the amount of oxygen needed.

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Calculate the amount of carbon dioxide produced.

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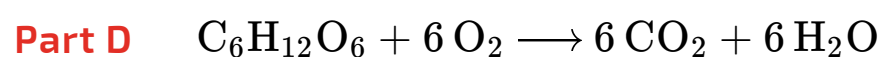


Calculate the amount of oxygen needed:

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Calculate the amount of carbon dioxide produced:

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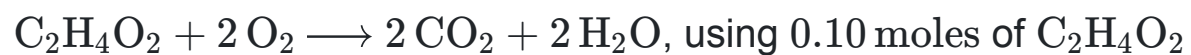
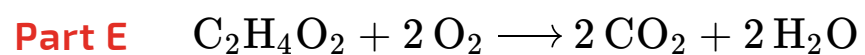


Calculate the amount of oxygen needed:

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Calculate the amount of carbon dioxide produced:

---



Calculate the amount of oxygen needed:

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Calculate the amount of carbon dioxide produced:

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# Reactions 2

## Essential Pre-Uni Chemistry B6.2

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By considering a balanced equation each time, calculate the amount of water produced by complete combustion of the following in oxygen.

### Part A (a)

1 mole of pentane,  $\text{C}_5\text{H}_{12}$

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### Part B (b)

2.5 moles of heptane,  $\text{C}_7\text{H}_{16}$

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### Part C (c)

200 moles of hydrogen,  $\text{H}_2$

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### Part D (d)

4.0 moles of butane

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**Part E** (e)

0.0030 moles of methane

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Gameboard:

**STEM SMART Chemistry Week 5**

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# Reactions 3

## Essential Pre-Uni Chemistry B6.3

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Consider the equation for each reaction and hence calculate the amount of acid required for complete reaction in each of the following cases.

### Part A (a)

0.10 mol NaOH reacting with  $\text{H}_2\text{SO}_4$ . Give your answer to 2 significant figures.

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### Part B (b)

HCl reacting with 20 g of  $\text{CaCO}_3$ . Give your answer to 2 significant figures.

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### Part C (c)

24 g CuO reacting with  $\text{HNO}_3$ . Give your answer to 2 significant figures.

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### Part D (d)

5.6 g Fe reacting with HCl. Give your answer to 2 significant figures.

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**Part E** (e)

14.8 g of calcium hydroxide reacting with  $\text{H}_2\text{SO}_4$ . Give your answer to 3 significant figures.

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**Part F** (f)

10 g of magnesium oxide reacting with nitric acid. Give your answer to 2 significant figures.

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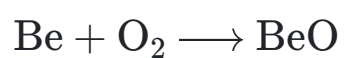
# Balancing Equations

A Level



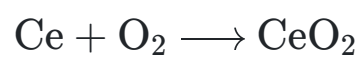
## Part A Be and O

Balance the following equation, reducing coefficients to the smallest possible integers:



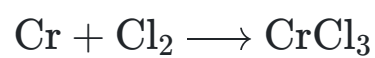
## Part B Ce and O

Balance the following equation, reducing coefficients to the smallest possible integers:



## Part C Cr and Cl

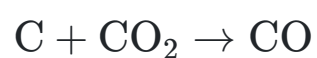
Balance the following equation, reducing coefficients to the smallest possible integers:



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**Part D** C and CO<sub>2</sub>

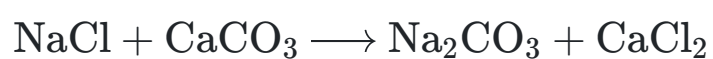
Balance the following equation, reducing coefficients to the smallest possible integers:



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**Part E** NaCl and CaCO<sub>3</sub>

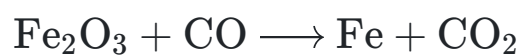
Balance the following equation, reducing coefficients to the smallest possible integers:



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**Part F** Fe<sub>2</sub>O<sub>3</sub> and CO

Balance the following equation, reducing coefficients to the smallest possible integers:



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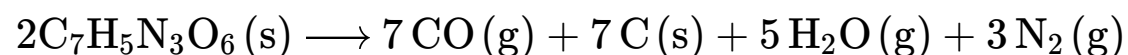


# TNT

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TNT is used as an explosive. It can decompose according to the following equation:



## Part A RMM

Calculate the relative molecular mass of TNT, rounding your answer to an integer.

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## Part B Moles of gas

The volume of gas produced at  $400^\circ\text{C}$ , when 10 g of TNT explode, is to be calculated.

How many moles of gas are produced from 1 mol of TNT?

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## Part C Volume of gas

At  $400^\circ\text{C}$  and 1 atm, 1 mol of gas occupies  $55\text{ dm}^3$ .

Calculate the volume of gas produced under these conditions from 10 g of TNT.

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# Gases 1

## Essential Pre-Uni Chemistry B3.1

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GCSE



A Level



RTP = room temperature and pressure.

Any gas occupies  $24 \text{ dm}^3$  per mole at RTP.

Avogadro's number,  $N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$ .

### Part A (a)

Calculate the volume occupied by 4.0 moles of gas at RTP.

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### Part B (b)

Calculate the volume occupied by 0.030 moles of gas at RTP.

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### Part C (c)

Calculate the volume occupied by  $5.0 \times 10^{18}$  atoms of helium gas at RTP.

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**Part D (d)**

Calculate the volume occupied by  $1.2 \times 10^{24}$  molecules of ozone at RTP.

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**Part E (e)**

Calculate the volume occupied by 8.0 g of O<sub>2</sub> at RTP.

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**Part F (f)**

Calculate the volume occupied by 1.1 kg of carbon dioxide at RTP.

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# Gases 2

## Essential Pre-Uni Chemistry B3.2

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RTP = room temperature and pressure.

Any gas occupies  $24 \text{ dm}^3$  per mole at RTP.

Avogadro's number,  $N_A = 6.02 \times 10^{23}$ .

### Part A (a)

Calculate the amount of gas (at RTP) in  $4.8 \text{ dm}^3$ .

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### Part B (b)

Calculate the amount of gas (at RTP) in  $12 \text{ m}^3$ .

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### Part C (c)

Calculate the amount of gas (at RTP) in  $400 \text{ cm}^3$ . Give your answer to 2 significant figures.

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**Part D**    (d)

Calculate the amount of gas (at RTP) in 18 mL.

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# Gases 5

## Essential Pre-Uni Chemistry B3.5

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RTP = room temperature and pressure.

Any gas occupies  $24 \text{ dm}^3$  per mole at RTP.

Avogadro's number,  $N_A = 6.02 \times 10^{23}$ .

### Part A (a)

Calculate the the mass of  $1.0 \text{ m}^3$  of neon at RTP.

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### Part B (b)

Calculate the the mass of  $20 \text{ cm}^3$  of  $(\text{CH}_3)_2\text{O}$  at RTP.

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### Part C (c)

Calculate the the mass of  $420 \text{ cm}^3$  of ammonia at RTP. Give your answer to 2 significant figures.

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Gameboard:

**STEM SMART Chemistry Week 5**



# Compounds TBC

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**A Level**

When calcium oxide is heated with carbon, an ionic compound, **D**, containing 62.5% of calcium and 37.5% of carbon (by mass), is formed. Under similar conditions, aluminium metal and carbon produce compound **E** which contains 75% of aluminium and 25% of carbon.

When treated with cold water:

- compound **D** produces a gaseous hydrocarbon **F** containing 92.3% of carbon
- compound **E** produces another gaseous hydrocarbon **G** containing 75% of carbon

## Part A    **D**

Determine the empirical formula of compound **D**.

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## Part B    **E**

Determine the empirical formula of compound **E**.

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## Part C    **F**

Determine the empirical formula of compound **F**.

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**Part D**    **G**

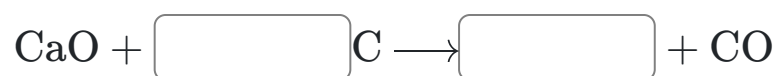
Determine the empirical formula of compound **G**.

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**Part E**    **Reaction to form D**

Write a balanced equation for the reaction of calcium oxide with carbon, using the empirical formula for **D** you have previously deduced.



Items:

**1**   **2**   **3**   **4**   **5**   **D**   **2D**   **3D**   **4D**   **5D**

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**Part F**    **Reaction to form E**

Write a balanced equation for the reaction of aluminium metal and carbon to form **E** (do not include state symbols).

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**Part G**    **Reaction of E with water**

Assuming the empirical formula you deduced for **G** is also its molecular formula, write a balanced equation for the reaction when compound **E** is treated with water.



Items:

**1**   **2**   **3**   **4**   **6**   **8**   **12**

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