

## Purity and Separating Mixtures

**Total Marks: 23**

1. The accurate relative atomic mass of aluminium is 26.9815385. What is this number to 5 significant figures?

- A 26.98153
- B 26.981
- C 26.98154
- D 26.982

Your answer

[1]

2. The formula of ammonium carbonate is  $(\text{NH}_4)_2\text{CO}_3$ .

What is the relative formula mass of ammonium carbonate?  
(A r: C = 12, H = 1, N = 14, O = 16)

- A 78
- B 90
- C 96
- D 120

Your answer

[1]

3. Which purification technique is used to separate ethanol and water from a mixture?

- A Chromatography
- B Distillation
- C Evaporation
- D Filtration

Your answer

[1]

4. What is the amount, in mol, of 15 g of carbonate ions,  $\text{CO}_3^{2-}$ ?

- A 0.18
- B 0.25
- C 4.0
- D 5.6

Your answer

[1]

5. Paper chromatography can be used to separate the colours in ink. Water is the solvent used to separate the colours in water soluble ink. What name is given to the water used in paper chromatography?

- A Absorption phase
- B Liquid phase
- C Mobile phase
- D Stationary phase

Your answer

[1]

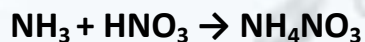
6.  $R_f$  values are used to compare the different spots on a chromatogram. What is the formula used to calculate an  $R_f$  value?

- A  $R_f = \frac{\text{distance travelled by solvent}}{\text{distance travelled by substance}}$
- B  $R_f = \frac{\text{distance travelled by substance}}{\text{distance travelled by solvent}}$
- C  $R_f = \frac{\text{distance travelled by stationary phase}}{\text{distance travelled by mobile phase}}$
- D  $R_f = \frac{\text{distance travelled by solvent}}{\text{distance travelled by mobile phase}}$

Your answer

[1]

7. Ammonium nitrate,  $\text{NH}_4\text{NO}_3$ , is a fertiliser made from ammonia. Ammonium nitrate is made by reacting ammonia with nitric acid.



i. Calculate the mass of **ammonium nitrate** that could be made

from 25.5 tonnes of ammonia.  $A_r$ : H = 1.0, N = 14.0, O = 16.0

Mass of ammonium nitrate = .....  
tonnes [3]

ii. A student makes some ammonium nitrate in the laboratory.

He predicts that he should make 12.5 g of ammonium nitrate.

His percentage yield is 80%.

Calculate the **actual mass** of ammonium nitrate that the student makes.

Actual mass of ammonium nitrate  
..... g

[2]

8. Calcium carbonate thermally decomposes to make calcium oxide and carbon dioxide.



Calculate the mass of calcium carbonate needed to make 209g of calcium oxide.

(A<sub>r</sub>: Ca = 40.1, C = 12.0, O = 16.0)

Give your answer to **3** significant figures.

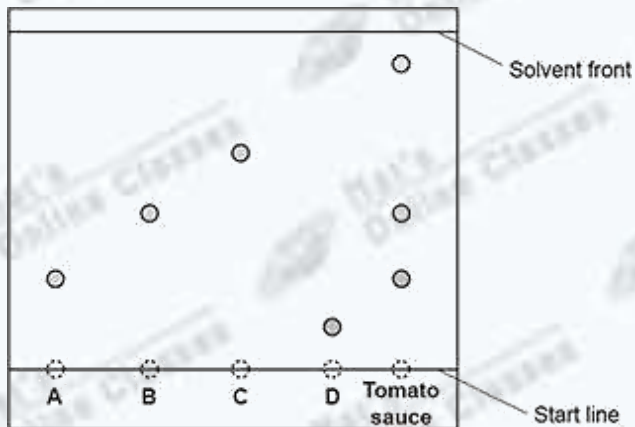
Mass of calcium carbonate =

..... g

[4]

9 (a). A student analyses a sample of tomato sauce using thin-layer chromatography.

The tomato sauce was compared to four known food additives, A, B, C and D, as shown in the chromatogram.



i. Calculate the  $R_f$  value for C.

Give your answer to 2 significant figures.

$R_f$  value =

.....

..

[3]

ii. Which additives are shown to be in the tomato sauce? Tick (✓) **all the correct** boxes.

A

B

C

D

[1]

iii. Suggest why **D** has **not** travelled as far up the plate as **C**.

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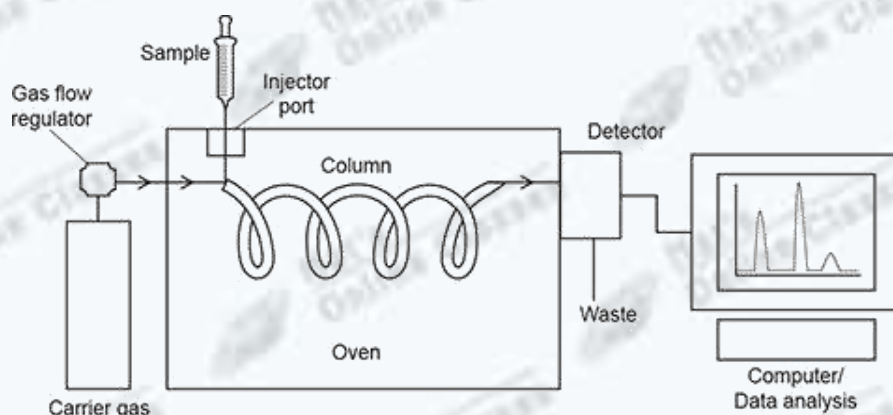
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[1]

(b). Gas chromatography is another type of chromatography.

The diagram shows the equipment used for gas chromatography.



i. State **one similarity** and **one difference** between gas chromatography and thin-layer chromatography.

Similarity

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Difference

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[2]

ii. Explain why thin-layer chromatography is used instead of gas chromatography to analyse the tomato sauce.

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[1]

