

Y11 into Y12 transition tasks

Pearson BTEC Level 3 Extended Certificate in Applied Science

This pack contains a programme of activities to prepare you to start a BTEC in Applied Science in September.

It will be assessed at Level 2 standard and the answers must be written in the space provided.

You must ensure that ALL questions are attempted and further research may need to be carried out in order to complete all questions.

Question 1. Iron ore contains iron oxide.

- (i) Calculate the relative formula mass of iron oxide, Fe_2O_3 .

Relative atomic masses: O = 16; Fe = 56.

Answer = _____

(2)

- (ii) Calculate the percentage by mass of iron in iron oxide.

Percentage of iron = _____ %

(2)

- (iii) Calculate the mass of iron that could be extracted from 1000 kg of iron oxide.

Use your answer to part (c) (ii) to help you with this calculation.

Mass of iron = _____ kg

(1)

(Total 5 marks)

Question 2. (a) A chemist was asked to identify a nitrogen compound. The chemist carried out an experiment to find the relative formula mass (M_r) of the compound.

The M_r of the compound was 44.

Relative atomic masses: N = 14, O = 16

Draw a ring around the formula of the compound.

NO

NO₂

N₂O₄

N₂O

(1)

- (b) Potassium nitrate is another nitrogen compound. It is used in fertilisers. It has the formula **KNO₃**.

The **M_r** of potassium nitrate is **101**.

Calculate the percentage of **nitrogen** by mass in potassium nitrate.

Relative atomic mass: N = 14.

Percentage of nitrogen = _____ %

(2)

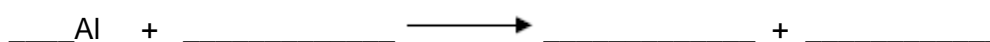
(Total 3 marks)

Question 3.

Formulae and equations are used to describe chemical reactions.

- (a) Aluminium reacts with sulfuric acid (H₂SO₄) to produce aluminium sulfate, Al₂(SO₄)₃ and hydrogen (H₂).

Complete and balance the equation for this reaction.



(2)

- (b) Calcium carbonate reacts with nitric acid to produce calcium nitrate.

Calculate the relative formula mass (*M_r*) of calcium nitrate, Ca(NO₃)₂

Relative atomic masses (*A_r*): N = 14; O = 16; Ca = 40

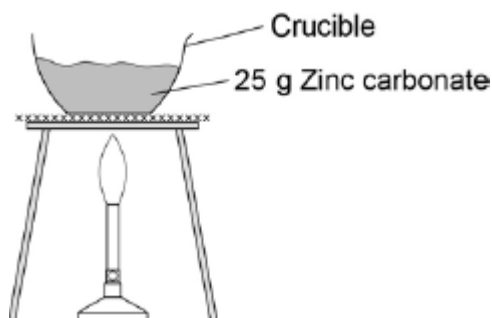
Relative formula mass (*M_r*) = _____

(2)

- (c) Zinc carbonate decomposes when heated.

A student heated 25 g zinc carbonate (ZnCO₃).

The figure below shows how he set up the apparatus.



The balanced chemical equation for the decomposition reaction is:



The student measured the mass of solid product after heating until there was no further change in mass.

The student did the experiment four times. The table below shows the results.

Experiment	1	2	3	4
Mass of solid product in g	17.4	19.7	17.6	16.9

Calculate the mean mass of the solid product.

Do **not** use any anomalous results in your calculation.

Mean mass = _____ g

(2)

(Total 6 marks)

Question 4.

Scientists found that a compound contained:

22.8% sodium; 21.8% boron; and 55.4% oxygen.

Use the percentages to calculate the empirical formula of the compound.

Relative atomic masses (A_r): B = 11; O = 16; Na = 23

To gain full marks you **must** show all your working.

Empirical formula = _____

(Total 5 marks)

Question 5 – Titration curves

Plot a graph from the following results. You need to plot the volume HCL/cm³ against the mean. You can ignore pH Run 1, pH Run 2 and pH Run 3 in your graph.

You need to remember to fully label the axis and create a title.

The independent variable goes on the X axis

The dependent variable goes on the Y axis

Volume HCL/cm³	pH- Run 1	pH- Run 2	pH- Run 3	Mean pH
1	10.58	10.53	10.55	10.55
2	10.38	10.43	10.43	10.41
3	10.27	10.28	10.30	10.28
4	10.19	10.13	10.11	10.14
5	9.99	9.93	9.96	9.96
6	9.73	9.69	9.71	9.71
7	9.41	9.40	9.27	9.36
8	8.31	8.37	8.29	8.32
9	7.77	7.83	7.85	7.82
10	7.44	7.51	7.51	7.49
11	7.05	7.39	7.34	7.26
12	6.79	7.17	7.07	7.01
13	6.78	7.02	6.99	6.93
14	6.71	6.82	6.78	6.77
15	6.60	6.67	6.55	6.61
16	6.44	6.48	6.33	6.42
17	6.22	6.18	5.97	6.12
18	5.83	5.64	5.16	5.54
19	5.21	3.53	3.24	3.99
20	3.31	2.97	2.95	3.08