

Chemistry A level transition - baseline assessment.

40 marks

All data is given on this paper, you will not need a periodic table

Answer all questions.

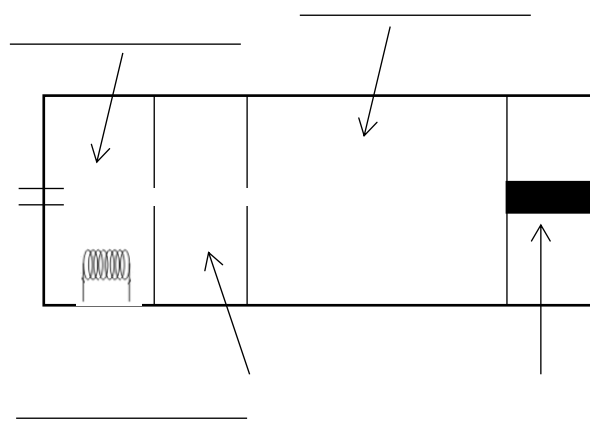
1. Here is part of a periodic table, use it to answer the following questions

10.8 B 5 boron	12.0 C 6 carbon	14.0 N 7 nitrogen	16.0 O 8 oxygen	19.0 F 9 fluorine	20.2 Ne 10 neon
27.0 Al 13 aluminium	28.1 Si 14 silicon	31.0 P 15 phosphorus	32.1 S 16 sulphur	35.5 Cl 17 chlorine	39.9 Ar 18 argon

- a. Which is the correct electron configuration for a nitrogen atom, circle the correct answer [1]
- $1s^22p^5$ $1s^12p^6$ $1s^22s^22p^3$ $1s^22s^5$ $1s^22s^22p^63s^23p^2$
- b. Which is the correct electron configuration for a chlorine atom, circle the correct answer [1]
- $1s^22s^82p^7$ $1s^22s^22p^82d^5$ $1s^22s^22p^63d^7$ $1s^22s^22p^63p^7$ $1s^22s^22p^63s^23p^5$
- c. Which is the correct electron configuration for an aluminium ion, Al^{3+} ? Circle the correct answer [1]
- $1s^22s^22p^6$ $1s^22s^22p^63s^23p^3$ $1s^22s^22p^63s^2$ $1s^22s^22p^62d^1$
2. Draw a dot and cross diagram to show the bonding in a molecule of water, H_2O . [2]
Atomic numbers: H =1, O =8

3. A time of flight mass spectrometer has 4 main stages. put the correct stage in the diagram below:

Drift region Ionisation Detector Acceleration



[4]

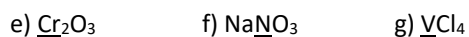
4. A mass spectrometer was used to analyse a sample of chlorine; the results of the analysis are as follows:

isotope mass	% of sample
Cl-35	75.53
Cl-37	24.47

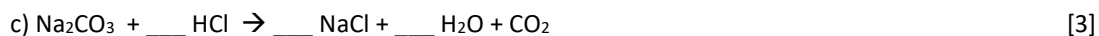
Calculate the accurate atomic mass of chlorine. Give your answer to **3 decimal places**. [3]

mass: _____

5. Give the oxidation state of the underlined atom in the following chemicals.
Useful information: H = +1, K = +1, Na = +1, Mg = +2, O = -2, Cl = -1 [7]



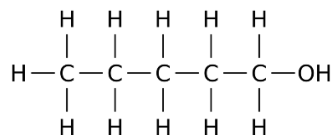
6. Balance the following chemical equations:



7. Calculate the relative formula masses of the following:
Atomic masses: H = 1, O = 16, S = 32.1, C = 12, Ca = 40.1, Na = 23, Cl = 35.5, Zn = 65.4



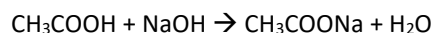
8. A student carried out a reaction with this molecule:



a. What is the name of this molecule? _____ [2]

9. Vinegar is a solution of ethanoic acid (CH_3COOH) in water. A student carried out a titration of a sample of vinegar. He used a pipette to measure exactly 25.0cm^3 of vinegar into a flask, added an indicator and titrated it with a 1.00 mol dm^{-3} solution of sodium hydroxide (NaOH).

The reaction is:



The student found that his average titration was 27.50cm^3

$c = n/v$ $c = \text{concentration (mol dm}^{-3}\text{), } n = \text{number of moles, } v = \text{volume (dm}^3\text{)}$

$n = m/R_{\text{fm}}$ $n = \text{number of moles, } m = \text{mass in grams, } R_{\text{fm}} = \text{formula mass}$

$1\text{dm}^3 = 1000\text{ cm}^3$

- a. Using the chemical equation, how many moles of sodium hydroxide will react with 1 mole of ethanoic acid?

_____ moles [1]

- b. How many moles of sodium hydroxide are in 27.50cm^3 of 1.00 mol dm^{-3} sodium hydroxide?

_____ moles [2]

- c. How many moles of ethanoic acid are in 25.0cm^3 of the vinegar sample?

_____ moles [1]

- d. How many moles of ethanoic acid are in 1dm^3 of vinegar?

_____ moles [1]

- e. Ethanoic acid has a formula mass of 48. What mass of ethanoic acid is present in 1dm^3 of vinegar?

_____ g [2]