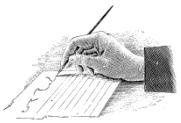
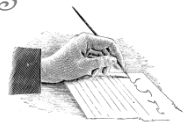
C3
TITRATIONS

Describe how a student could find the volume of hydrochloric acid that reacts with a known volume of sodium hydroxide solution. Include any measurements the student should make. (6)

Pipette, conical flask, burette, indicator, white tile, swirl, endpoint, colour change, meniscus, volume,



Describe
To recall facts, events or processes and give an ordered account.
Connectives: firstly, next, finally,...



Marking points

0 marks: No relevant comment

1-2 marks: a simple description of how to use some relevant titration equipment. Weak SPAG.

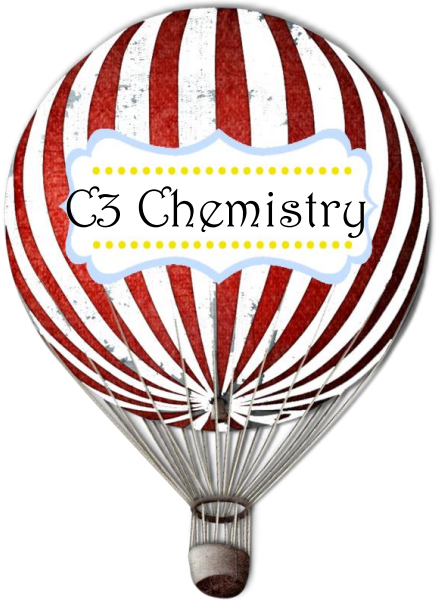
3-4 marks: There is a description of a method that involves a measurement or includes adding an acid to an alkali (or vice versa). Some SPAG errors.

5-6 marks: There is a description of a titration that would allow a successful result to be obtained. Almost faultless SPAG.

Firstly, use a pipette to measure out 20ml of alkali and transfer the alkali into a conical flask. Add a few drops of indicator to the alkali and place the flask onto a white tile. Next, fill a burette with hydrochloric acid. Slowly add the acid to the alkali, swirling after each addition. Go slower near the endpoint and stop when the colour of the indicator has changed. Finally, note down the volume of acid added by reading from the bottom of the meniscus at eyelevel.

C3
TITRATIONS

PERIODIC TABLE 1



Xenon reacts with fluorine to form xenon fluoride. Helium, neon and argon do not react with fluorine. Predict whether you think 1- krypton and 2- radon will react with fluorine. Explain the reasons for your prediction. (5)

Gain, electron, full, shielding, attraction, lose, nucleus, group, position, shell(s), outer, distance

Explain

All points are linked logically.

Connectives: as a result, therefore, consequently...

Marking points

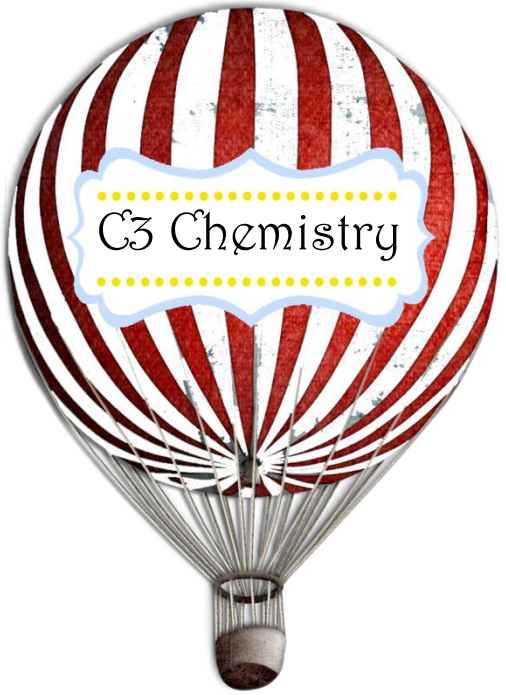
Reactivity increases down the group (1).

As radon is lower in the group than xenon it is more reactive than xenon (1).

Consequently, it should react with fluorine (1).

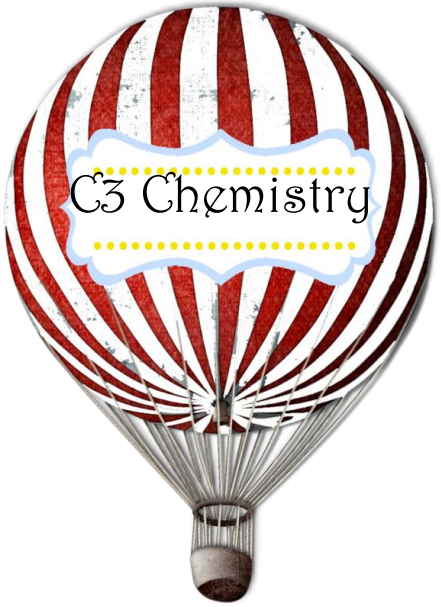
However, krypton is higher in the group than xenon. Therefore it is less reactive than xenon (1).

I predict that it would not react with fluorine (1).



PERIODIC TABLE 1

PERIODIC TABLE 2



In terms of electronic structures, explain why iodine is less reactive than bromine. (3)

Gain, electron, full, shielding, attraction, lose, nucleus, group, position, shell(s), outer, distance

Explain

All points are linked logically.

Connectives: as a result, therefore, consequently...

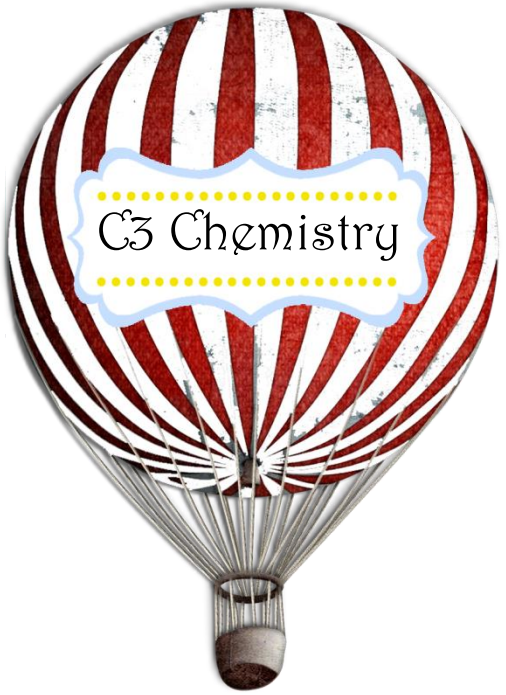
Marking points

Iodine is less reactive than bromine because the outer shell is further from the nucleus in an iodine atom (1).

The outer shell in iodine is therefore more shielded. This means that there is less attraction between the nucleus and an incoming electron (1).

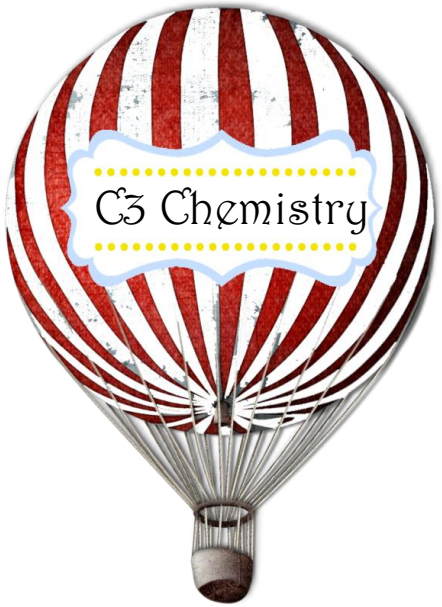
Consequently, it is harder for iodine to gain a further outer electron (1).

Note: 2 marks maximum if there is no reference to **outer** shell or **outer** electron.



PERIODIC TABLE 2

PERIODIC TABLE 3



Explain, in terms of electrons, why potassium reacts more violently than sodium. (3)

Gain, electron, full, shielding, attraction, lose, nucleus, group, position, shell(s), outer, distance

Explain

All points are linked logically.

Connectives: as a result, therefore, consequently...

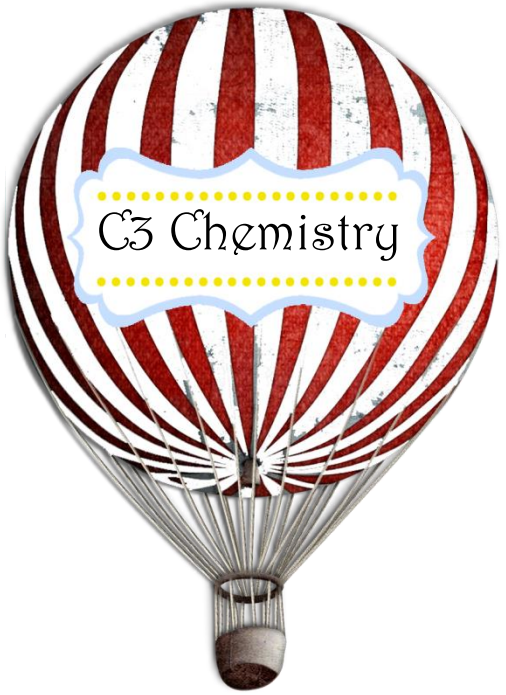
Marking points

Potassium is more reactive than sodium because the outer shell is further from the nucleus than in a sodium atom (1).

The outer shell in potassium is therefore more shielded. This means that there is less attraction between the nucleus and the outer electron (1).

Consequently, it is easier for potassium to lose the outer electron (1).

Note: 2 marks maximum if there is no reference to **outer** shell or **outer** electron.



PERIODIC TABLE 3

C3
ENERGETICS

Describe how you could find out the energy in joules that could be released by burning 1 mole or 46g of ethanol. You only have 2g of ethanol available and are going to heat some water. Include a risk assessment (6)

Volume, water, thermometer, temperature, mass, surroundings, specific heat capacity, mole, burner, draught, absorbed, released

Describe

To recall facts, events or processes and give an ordered account.

Connectives: firstly, next, finally,...

Marking points

C3 Chemistry

0 marks: No relevant comment

1-2 marks: a brief description of the experiment that might include a risk assessment. 1-2 points from examples included. Weak SPAG.

3-4 marks: There is some description of a method that might include a risk assessment. 3-4 points from examples included. Some SPAG errors.

5-6 marks: There is a detailed description of the experiment, including a risk assessment. 5-6 points form examples included. Almost faultless SPAG.

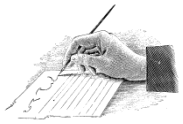
Measure out a fix amount of water to heat. Next, weigh the burner which contains the ethanol and record the mass. Light the burner and wait until the temperature of the water has risen by 10°C. Make sure that the burner is shielded from a potential draught. After the temperature of the water has increased by 10oC, reweigh the burner. Calculate how much ethanol has been burnt. Work out the energy released using the formula $Q = mc\Delta T$. To find out how much energy is released for 46g of ethanol, scale up the answer using the calculation mass used/46 x energy released. Risk assessment included.

ENERGETICS

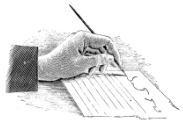
C3 WATER 1

Describe one method that people can use at home to improve the taste and quality of tap water. Explain how this method works. (4)

Filtration, chlorine, carbon, silver, bacteria, hardness, scale, ion exchange, calcium, sodium, hydrogen, ions, soft, taste



Describe
To recall facts, events or processes and give an ordered account.
Connectives: firstly, next, finally,...
Explain
All points are linked logically.
Connectives: as a result, therefore, consequently...



C3 Chemistry

Marking points

Install an ion exchange column (1).

Calcium ions are removed and replaced with hydrogen o
sodium ions. This removes hardness and softens the wate
(1).

In addition, install a water filter which contains either carbon or silver particles (1).

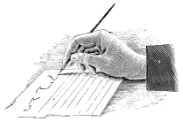
The carbon would remove chlorine and improve the taste of the water. The silver would prevent the growth of microorganisms and make the water safer to drink (1).

WATER 1

C3 WATER 2

Describe how water is treated in a water treatment plant. Explain how the water is made safe to drink. (3)

flocculation, filtration, chlorination, neutralisation, metal ions, soluble, insoluble, bacteria



Describe

To recall facts, events or processes and give an ordered account.

Connectives: firstly, next, finally,...

Explain

All points are linked logically.

Connectives: as a result, therefore, consequently...

C3 Chemistry

Marking points

First the water is filtered.
This removes insoluble substances
such as dirt, mud and soil (1).

Next, alum is added to precipitate some metal ions
and other soluble substances (1).

Finally, chlorine or ozone are added to kill bacteri
and other microbes (1).

WATER 2

C3 ANALYSIS 1

Describe and give the results of the chemical tests that you would do to distinguish between aluminium sulphate, magnesium sulphate and sodium sulphate. (4)

Flame test, orange, yellow, sodium hydroxide, precipitate, white, excess, soluble, insoluble

Describe

To recall facts, events or processes and give an ordered account.

Connectives: firstly, next, finally,...

C3 Chemistry

Marking points

Firstly, carry out a flame test.
Sodium sulphate will give a yellow/orange flame (1).

Next, add sodium hydroxide to the remaining two solutions to form a white precipitate (1).

Keep adding sodium hydroxide until it is in excess. With aluminium sulphate the white precipitate will dissolve (1).

With magnesium sulphate the white precipitate will remain insoluble (1).

ANALYSIS

C3 ANALYSIS 2

Describe and give the results of the chemical tests that you would do to distinguish between sodium chloride, sodium carbonate and sodium sulphate. (6)

Dilute acid, effervescence, silver nitrate, barium chloride, precipitate, white, silver chloride, barium sulphate

Describe

To recall facts, events or processes and give an ordered account.

Connectives: firstly, next, finally,...

C3 Chemistry

Marking points

Firstly, add an acid to a sample of all three solutions.
The one that fizzes is sodium carbonate (1).
The gas produced is carbon dioxide (1).

Next, add hydrochloric acid followed by barium chloride solution to a sample of the remaining two solutions. The one that forms a white precipitate is sodium sulphate (1).
The white precipitate is barium sulphate (1).

Finally, to confirm the presence of sodium chloride, add nitric acid followed by silver nitrate to the remaining solution. A white precipitate should form (1). The white precipitate is silver chloride (1).

ANALYSIS

C3 EQUILIBRIA

Factories that make ammonia are often near to large towns. Discuss the economic, safety and environmental factors to be considered when there is an ammonia factory near a town. (3)

Employment, transport, infra-structure, house prices, danger, explosion, energy, fossil fuels, carbon dioxide, greenhouse effect

Discuss
To consider advantages and disadvantages.
Connectives: although, on the one hand, however, whereas,....

Marking points

C3 Chemistry

Economic

Many workers are available and will gain employment and the transport infra structure will already be in place. Howeve house prices will fall as their value decreases (1).

Safety

If any dangerous chemicals escaped, a large number of people would be affected (1).

Environment

The factory requires energy for which fossil fuels must be burnt; this will increase CO_2 emissions which contribute to global warming (1).

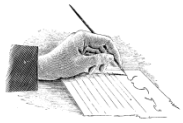
EQUILIBRIA

C3 EQUILIBRIA

State and explain which conditions of temperature and pressure would give the highest percentage of ammonia at equilibrium. (8)

Yield, equilibrium, position, right, left, cooled, liquefy, reversible, shift, exothermic, endothermic, favour, expensive, catalyst, iron, rate,

State
List facts.
Explain
All points are linked logically.
Connectives: as a result, therefore, consequently...



Marking points

The reaction is exothermic in the forward direction (1). This means that the equilibrium shifts to the right at low temperatures and the yield of ammonia increases (1).

However, the rate of reaction is low at low temperatures so a higher temperature is used as a compromise (1).

To increase the rate, an iron catalyst is used (1).

There are more molecules on the left hand side than the right hand side of the equation (1). This means that the equilibrium shifts to the right and the yield of ammonia increases at high pressure (1).

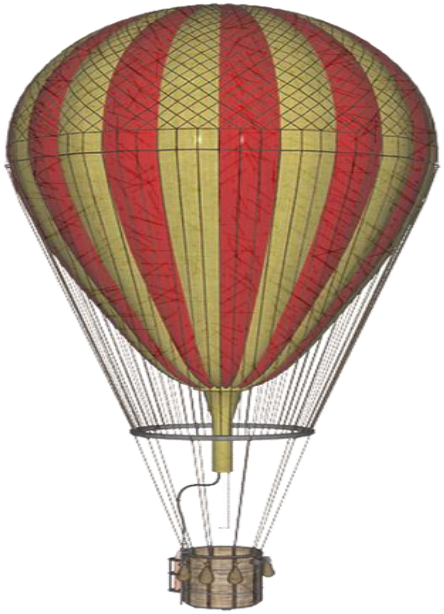
However, high pressure is expensive so a lower pressure is used as a compromise (1).

To prevent any ammonia that is formed from reacting back to hydrogen and nitrogen, the ammonia is cooled, liquefied and removed as soon as it is formed. (1)

C3 Chemistry

EQUILIBRIA

C3 PT HISTORY 1



The periodic table is now based on atomic structure.
Explain how. (3)

Atomic number, gaps, electrons, protons, group, period, shell(s), outer, properties, reactions

Explain
All points are linked logically.
Connectives: as a result, therefore, consequently...

Marking points

C3 Chemistry

Any three from:

The elements are arranged in proton number (called atomic number) (1).

Elements in the same group have the some number of outer electrons (1).

Elements in the same period have the same number of shells (1).

Going down a group, the number of shells increases (1).

The number of protons is equal to the number of electrons in a neutral atom (1).

To prevent any ammonia that is formed from reacting back to hydrogen and nitrogen, the ammonia is cooled, liquefied and removed as soon as it is formed. (1)

HISTORY OF PERIODIC TABLE

C3 PT HISTORY 2

Compare Newland's Periodic table to Mendeleev's Periodic table. (6)

Atomic number, gaps, electrons, protons, group, period, shell(s), outer, properties, reactions

Compare

To show the similarities and differences between two objects/ processes, commenting on both, not just one.

Connectives: whereas, unlike, similar to....

C3 Chemistry

Marking points

Both arranged the elements according to their atomic masses (1).

However, Mendeleev swapped elements around so that elements with similar chemical properties were in the same group, whereas Newland was criticised because many elements in his groups had dissimilar properties (1).

This also meant that metals and non-metals were separated in Mendeleev's Periodic table (1).

Unlike Newland, Mendeleev left gaps for undiscovered elements (1).

He also predicted the properties of the undiscovered elements (1).

Newland's Period table consisted of 7 groups, whereas Mendeleev's table was made of 8 groups. (1).

HISTORY OF PERIODIC TABLE