Q1. B

Q2. C

Q3. B

2676 kJ per (12.04\*4 + 1.008\*10 + 16.00) g = x kJ per 1 g

Therefore,

x = \frac {2676}{12.01 \times 4 + 1.008 \times 10 + 16.00} = 36.10

Q4. D

Q5. B

Q6. A

Ethyl Pentanoate is an ester. Esters are used for flavouring.

Q7. C

Q8. A

H2SO4

pH = - \log_{10} \left ( 2 \times 0.1 \right ) = 0.69897

Q9. D

Q10. C

Q11. A

AAS is used to detect concentrations of *metal* ions.

Q12. B

Q13. C

Q14. D

Q15. A

[[edit](http://www.boredofstudies.org/wiki/index.php?title=2005_HSC_Chemistry_Solutions&action=edit&section=2)]

**Q16.**

(a) Cyclohexene

(b) Cyclohexene is flamable. If it ignites it could injure people. To avoid this we made sure there was no open flames near the substances. We also wore safety goggles and a lab coat.

"Responses that successfully linked the identified hazard and how it was addressed scored well. Responses that scored poorly did not identify a specific hazard for the first hand investigation and/or used vague or generic terms to outline how to address the hazard."1

(c) The alkene and corresponing alkane were placed in sepearte beakers. Bromine water (diluted Br2) was placed in each beaker. The colour change of the bromin water was observed.

"Better responses indicated the key elements of a safe, experimental procedure and identified appropriate reactants for this investigation. Weaker responses incorrectly included results and presented contradictory data."1

[[edit](http://www.boredofstudies.org/wiki/index.php?title=2005_HSC_Chemistry_Solutions&action=edit&section=3)]

**Q17.**

(a) Not all of the heat is produced by the combustion of the ethanol went into heating the water. Some of the heat was lost to the air, etc.

(b)

\frac {200 \times 4.18 \times 10^{-3} \times \left ( 45 - 21 \right )}{x} = \frac {1367}{1 \times \left ( 12.01 \times 2 + 1.008 \times 6 + 16.00 \right )}

x = \frac {200 \times 4.18 \times 10^{-3} \times \left ( 45 - 21 \right ) \times \left ( 12.01 \times 2 + 1.008 \times 6 + 16.00 \right )}{1367}

*x* = 0.676*g*

[[edit](http://www.boredofstudies.org/wiki/index.php?title=2005_HSC_Chemistry_Solutions&action=edit&section=4)]

**Q18.**

Key Points: Biopol. Impacts on *Environment* because:

* 100% Biodegradable
* Renewable Resource

Impacts on *Society* because:

* Biocompatable - Used in stuches and other things that are artificially put inside the human body. As it is biocompatable the body will not reject it.

[[edit](http://www.boredofstudies.org/wiki/index.php?title=2005_HSC_Chemistry_Solutions&action=edit&section=5)]

**Q19.**

Cell X

(a) Cannot be recycled or recharged therefore contributes to landfill.

"Candidates are reminded that their answer should identify a specific impact rather than offer a general statement, such as the chemicals harm the environment."1

(b)

"Better responses included balanced half equations or an overall equation and included identification of the anode, cathode and electrolyte."1

Cell Y

(a)

(b)

[[edit](http://www.boredofstudies.org/wiki/index.php?title=2005_HSC_Chemistry_Solutions&action=edit&section=6)]

**Q20.**

Glucose is fermented to produce a mixture containing ethanol.

Fermentation,

<!-- REACTION

, is preformed in the presence of a catalyst yeast, warm temperatures (approx 35ºC) and in the presence of CO2 (g). Over several days a mixture with ethanol in it forms. This mixture is fractionally distilled to extract the ethanol (as ethanol has a low boiling point).

This gets pure ethanol which is used to produced ethyl butanoate in a process of esterfication. In esterfication, ethanol, concentrated sulfuric acid (used as a dehydrating agent) and butanoic acid is added to a flask which is heated. This mixture reacts forming ethyl butanoate. Refluxing is used in this process to prevent these volatile substances evaporating.

(this solution needs another equation and 2 diagrams for a chance of full marks)

For 6-7/7 marks:

* Provides characteristics and features of the chemistry of fermentation and esterification1
* Includes two correct balanced chemical equations1
* Describes procedures in each of three steps including at least one diagram1

[[edit](http://www.boredofstudies.org/wiki/index.php?title=2005_HSC_Chemistry_Solutions&action=edit&section=7)]

**Q21.**

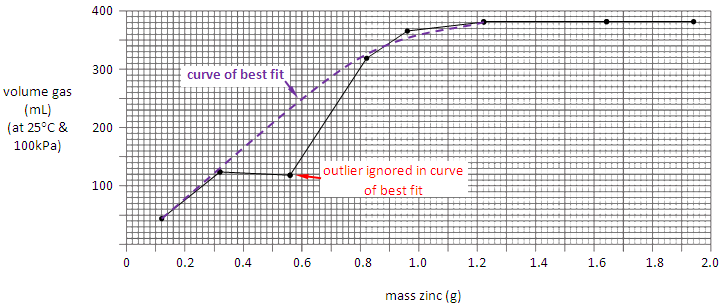
(in chronologial order)

* Lavoiser hypotheised that all acids contain oxygen.
* Davy showed all acids contain hydrogen, rather than oxygen as Lavoiser hypotheised.
* Arrehenius showed that acids ionise in water producing H+ ions as the only charged ions and bases ionise in water producing OH- ions as the only charged ions.
* Bronsted-Lowry therory says that acids are proton donors and bases are proton acceptors.

[[edit](http://www.boredofstudies.org/wiki/index.php?title=2005_HSC_Chemistry_Solutions&action=edit&section=8)]

**Q22.**

(a)

[](http://www.boredofstudies.org/wiki/Image:Sci_chem_pastpapers_2005hsc_22a.png)

To recieve 2/3 marks.

* Points plotted correctly1
* Axes labelled with units1
* Linear scale used on axes1

To recieve 3/3 marks:

* Outlier plotted but not included in graph (line of best fit)1 (but the question never asks for a line of best fit)
* Intersection point indicated1
* Lines connecting data points are straight1 (but question never asks for linear interpolation of data???)
* Points plotted correctly1
* Axes labelled1
* Linear scales used on axes1

"Better responses identified the independent and dependent variables and labelled the axes correctly. They ensured that axes had linear scales that used the extent of the grid provided. Most candidates plotted the points correctly by marking the point with a cross or a circle. The better candidates used a pencil and ruler to draw two lines of best fit that intersected at a point and left out the outlier point from the line of best fit."1

(b) 380mL. Once the volume of gass produced reaches 380mL all the H2 has been used up. HCl is the limiting reagent. So no matter how much more zinc there is, there is not enough HCl for the reaction to occur.

"Most candidates identified the correct volume; however, many did not use the correct unit for volume, milliliter (mL), although it was indicated in the table. The better responses identified that hydrochloric acid (HCl) was the limiting reagent."1

(c) 106.15 mL

[[edit](http://www.boredofstudies.org/wiki/index.php?title=2005_HSC_Chemistry_Solutions&action=edit&section=9)]

**Q23.**

(a) Incomplete combustion results when there is a lack of oxygen.1

(b) 3CH_{4 \left ( g \right )} + \frac {9}{2} O_{2 \left ( g \right )} \rightarrow C_{\left ( s \right )} + CO_{\left ( g \right )} + CO_{2 \left ( g \right )} + 6H_2O_{\left ( l \right )}

[[edit](http://www.boredofstudies.org/wiki/index.php?title=2005_HSC_Chemistry_Solutions&action=edit&section=10)]

**Q24.**

(a) CaCO_{3 \left ( s \right )} + 2HCl_{\left ( l \right )} \rightarrow CaCl_{2 \left ( aq \right )} + H_2O_{\left ( l \right )} + CO_{2 \left ( g \right )}

(b)

c = \frac {n}{v}

0.6 = \frac {n}{25 \times 10^{-3}}

n = 0.6 \times 25 \times 10^{-3} = 0.015moles

(c) 0.6796 g

[[edit](http://www.boredofstudies.org/wiki/index.php?title=2005_HSC_Chemistry_Solutions&action=edit&section=11)]

**Q25.**

(a)

This question is asking for the percentage of total dissolved solids in the creek sample. Therefore any solids colled by filtration are not dissolved and therefore not total dissolved solids. Only the mass left behind after evaporation is of total dissolved solids.

\frac {45.59 - 45.33}{500} \times 100 = 0.052% \frac {w}{v}

(b)

Precipitation. Add iodine ions. The lead and iodine ions will form a bright yellow precipitate. Pb^{2+} + I^- \rightarrow PbI_{2 \left ( s \right )}

OR

Atomic Absorbsion Spectroscopy (AAS). Where the substance is placed in a flame and the emmision spectra is either observed by the human eye or by a machine. Each metal ion has its own 'signature' emmision spectra.

(c) Lead ions in waterways need to be monitored. If lead is present in drinking water, even at low concentrations, can be harmful to humans. Also lead in non-drinking waterways may need to be monitored to ensure that the marine life will not be affected adversly.

[[edit](http://www.boredofstudies.org/wiki/index.php?title=2005_HSC_Chemistry_Solutions&action=edit&section=12)]

**Q26.**

Sources of Contamination:

* Farm/Vegetable Patch - Pesticides, fertelisers, other chemicals, animal droppings and decomposing organic matter may be washed into the lake when it rains. This could contaminate the lake water with toxic chemicals (eg. presticides) and the decaying organic matter could raise the biochemical oxygen demand (BOD).
* Boats - Dirt and algue/weeds, etc from the bottom of the boat (that could have came from other rivers) could fall into the river and contaminate it. The dirt could raise the turbidity and total dissolved solids (TDS) of the water and the algue could be deadly or dangerous to humans to drink (eg. ecoli bacteria).

Purifying Methods:

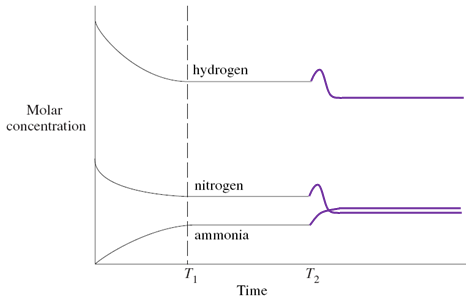
* Screening - Removes large solid objects (eg. large branches, dead animals, rocks, etc.).
* Sand Filtration - Removes smaller objects (eg. dirt)
* Chemical Treatment - eg. Chlorine is added to kill bacteria, and fluride is added to strenghten teeth of people drinking the water.
* Microscopic membrane filter - Can remove very fine particles from the water.

[[edit](http://www.boredofstudies.org/wiki/index.php?title=2005_HSC_Chemistry_Solutions&action=edit&section=13)]

**Q27.**

(a) Equlibrium has been reached.

(b)

(i) [](http://www.boredofstudies.org/wiki/Image:Sci_chem_pastpapers_2005hsc_27bi.png)

(I'm not sure if the two overlap as shown.)

(ii) The spike in molar concentration at T2 is because of the decrease in volume. As c = \frac {n}{v}, an decrease in *v* results in an increase in *c*. This is the spike, however then Le Chatelier's prinicple kicks in. A decrease in volume results in an increase of pressure. As the reaction is N_{2 \left ( g \right )} + 3H_{2 \left ( g \right )} \leftrightarrow 2NH_{3 \left ( g \right )}the total moles on the left is 4 and 2 on the right. Due to Le Chatelier's principle an increase in pressure will shift the equlibrium to the right to minimise the effect of the pressure increase. This decreases the concentration of H2 and N2 and increases the concentration of NH3. The system then reaches equlibrium and the concentrations will not change.

[[edit](http://www.boredofstudies.org/wiki/index.php?title=2005_HSC_Chemistry_Solutions&action=edit&section=14)]

**Section II**

[[edit](http://www.boredofstudies.org/wiki/index.php?title=2005_HSC_Chemistry_Solutions&action=edit&section=15)]

**Q28. Industrial Chemistry**

(a) (i)

(ii)

(b) (i) (ii)

(c)

(d) (i) (ii) (iii)

[[edit](http://www.boredofstudies.org/wiki/index.php?title=2005_HSC_Chemistry_Solutions&action=edit&section=16)]

**Q29. Shipwrecks, Corrosion and Conservation**

(a) (i) (ii)

(b) (i) (ii)

(c)

(d) (i) (ii) (iii)

[[edit](http://www.boredofstudies.org/wiki/index.php?title=2005_HSC_Chemistry_Solutions&action=edit&section=17)]

**Q30. The Biochemistry of Movement**

(a) (i) (ii)

(b) (i) (ii)

(c)

(d) (i) (ii) (iii)

[[edit](http://www.boredofstudies.org/wiki/index.php?title=2005_HSC_Chemistry_Solutions&action=edit&section=18)]

**Q31. The Chemistry of Art**

(a) (i)

(ii)

(b)

(i)

(ii)

(c)

(d)

(i)

(ii)

(iii)

[[edit](http://www.boredofstudies.org/wiki/index.php?title=2005_HSC_Chemistry_Solutions&action=edit&section=19)]

**Q32. Forensic Chemistry**

(a) (i) (ii)

(b) (i) (ii) (iii)

(c)

(d) (i) (ii) (iii)