VCE CHEMISTRY 2016

YEAR 12 **TRIAL** EXAM

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Units 3/4
Reading time: 15 minutes
Writing time: 2 hours 30 minutes

Section	*Number of questions*	*Number of questions to be answered*	*Number of marks*
A	30	30	30
B	7	7	95
			Total 125

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VCE Chemistry 2016 Year 12 Trial Exam Units 3/4

SECTION A – Multiple Choice Questions

(30 marks)

Section A consists of 30 multiple-choice questions.
*Choose the response that is **correct** or **best answers** the question.*
A correct answer scores 1, an incorrect answer scores 0.
No mark is awarded if more than one answer is supplied for a question.
Indicate your choice on the answer sheet provided.

Question 1
Shown in **Figure 1** is a spectrum of an organic compound derived from butane.

Figure 1

SDBSWeb: http://sdbs.db.aist.go.jp (National Institute of Advanced Industrial Science and Technology, 18/07/2016)

The compound is
A. methylpropane.
B. 1-butanol.
C. 1-butanamine.
D. butanoic acid.

Question 2
The ^{1}H NMR spectrum below in **Figure 2** is that of an organic compound with molecular formula $C_4H_8O_2$.

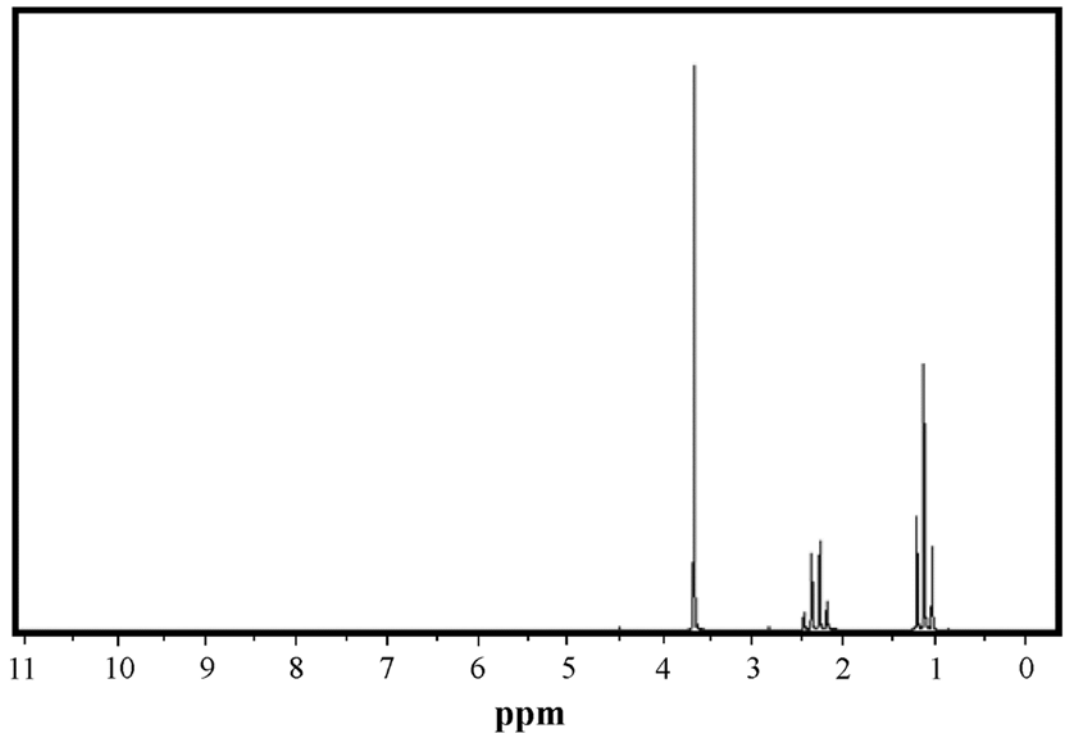


Figure 2

The compound is
A. butanoic acid.
B. ethyl ethanoate.
C. methyl propanoate.
D. 1-propyl methanoate.

Question 3
During a volumetric analysis of the ethanoic acid content of vinegar, the following titre volumes were recorded.
19.39 mL, 19.19 mL, 19.43 mL, 19.64 mL, 19.51 mL
How many of these titres should be used in determining the volume of titre used in the ensuing calculations?
A. 2
B. 3
C. 4
D. 5

Questions 4, 5 and 6 refer to the following information.
The diagram below shows concentration (mol L^{-1}) - time (seconds) graphs for the species in a homogeneous equilibrium system which was analysed for 35 minutes. The forward reaction in the equilibrium is endothermic. The system had not reached equilibrium at 5 minutes.

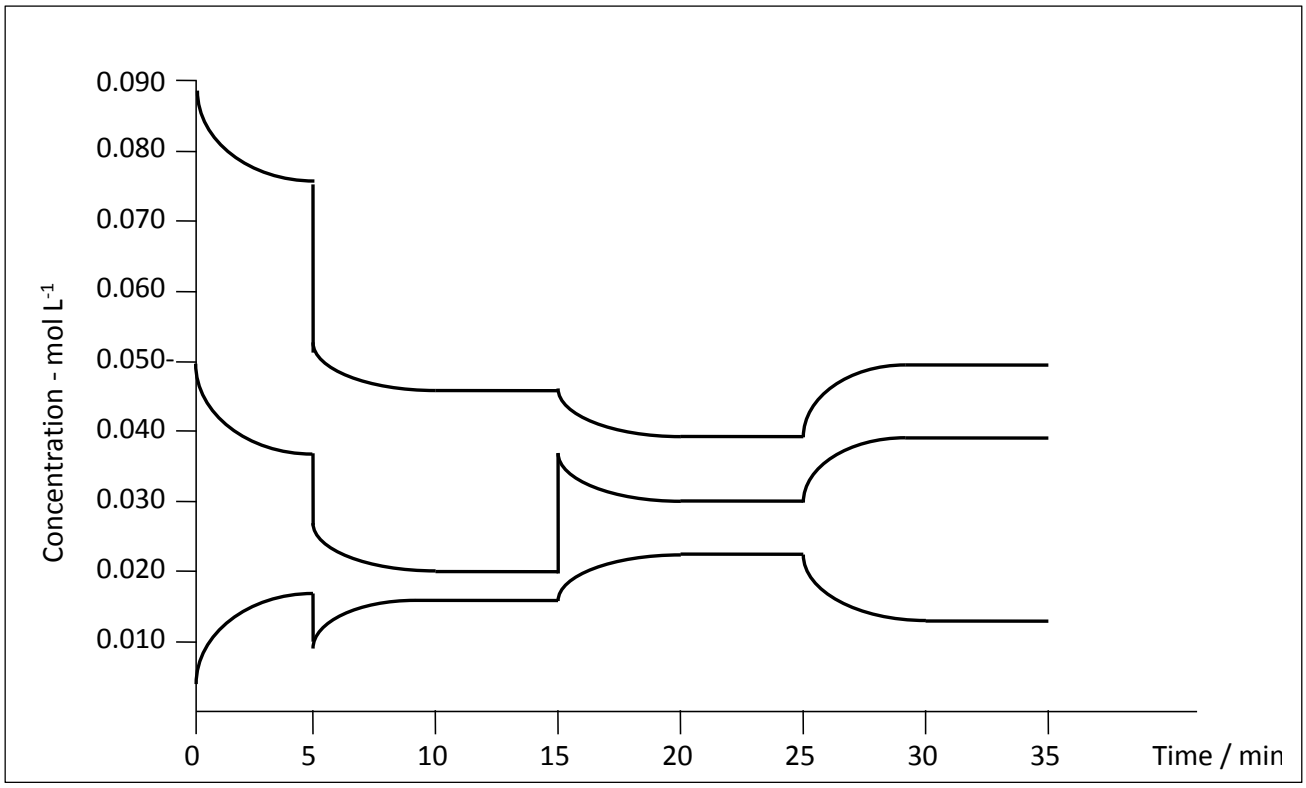


Figure 3

Question 4
Which of the following equations best represents the reverse reaction in this equilibrium?
A. $2X(g) \rightleftharpoons Y(g) + Z(g)$.
B. $Z(g) \rightleftharpoons X(g) + Y(g)$.
C. $2X(g) + Y(g) \rightleftharpoons 2Z(g)$.
D. $2Z(g) \rightleftharpoons X_2(g) + Y_2(g)$.

Question 5
Which of the following changes was **not** imposed on the system during the 35 minutes of the analysis?
A. Pressure decrease.
B. Temperature decrease.
C. Addition of a reactant.
D. Introduction of a catalyst at 16 minutes.

Question 6
Which of the following is a valid interpretation of the concentration-time graphs?
A. The lowest value of the equilibrium occurs after 30 minutes.
B. The system reached equilibrium twice.
C. Over the 35 minutes the system was studied, the pressure was decreasing for approximately 20 minutes.
D. The change imposed at 15 minutes increases the concentration fraction.

Question 7
If 270 kJ of energy is required to convert 110 g of liquid water at 100°C to steam, what is the amount of thermal energy, in kilojoule, required to convert 0.225 kg of water at 25°C to steam?

A. 70.5 kJ
B. 552 kJ
C. 623 kJ
D. 2.82×10^{3} kJ

Question 8
When an acid or a base is added to an aqueous solution, the equilibrium
$H_3O^+(aq) + OH^-(aq) \rightleftharpoons 2H_2O(l),\ \Delta H = -56\ kJ\ mol^{-1}$
responds in such a way as to partially compensate for the change.
When pure water is heated the pH

A. increases and the solution becomes more alkaline.
B. decreases and the solution remains neutral.
C. increases and the solution becomes more acidic.
D. decreases and the solution remains neutral.

Question 9
50.0 mL of 0.100 M NaOH and 50.0 mL of 0.0500 $Ca(OH)_2(aq)$ are both added to the same container of water at 25°C. The pH of the resultant solution is 12.7. The volume of water initially in the container was

A. 0.100 L
B. 0.200 L
C. 0.900 L
D. 1.00 L

Question 10
In an investigation of the reaction between 20.0 g marble chips (calcium carbonate) and hydrochloric acid, the data were collected and recorded as shown in the table below.

Time of reaction minutes : seconds	Mass loss during reaction (grams)		
	Investigation 1	Investigation 2	Investigation 3
0	0.000	0.000	0.000
0 : 15	0.227	0.562	0.079
0 : 30	0.457	0.797	0.157
1 : 00	0.702	0.925	0.292
1 : 30	0.822	0.951	0.369
2 : 00	0.880	0.963	0.410
2 : 30	0.913	0.970	0.433
3 : 00	0.932	0.975	0.446
3 : 30	0.944	0.980	0.457

According to these data, which of the following sets of conditions was used in **Investigation 2**?
A. 20.0 g limestone lumps and 25.0 mL of 2.00 M HCl(aq).
B. 20.0 g limestone lumps and 25 mL of 1.00 M HCl(aq).
C. 20.0 g powdered limestone and 25 mL of 2.00 M HCl(aq).
D. 20.0 g powdered limestone and 25 mL of 1.00 M HCl(aq).

Question 11
When an organic compound, **Z**, is heated in an acidified aqueous solution, it breaks down to produce two different organic compounds, **X** and **Y**. When acidified potassium dichromate, $K_2Cr_2O_7$, solution is added to a mixture of **X** and **Y**, all of the **Y** is converted to **X**. Analysis of **X** shows than when it is added to solid sodium carbonate, a gas is released.
Compound Z could be
A. $HCOOCH_2CH_3$.
B. CH_3COOCH_3.
C. $CH_3CH_2COOCH_3$.
D. $CH_3CH_2COOCH_2CH_2CH_3$.

Question 12
Hexadecane, $C_{16}H_{34}$, also known as cetane, is a liquid hydrocarbon that may be used to produce energy in a diesel engine by combustion. The density of cetane is 0.775 g mL^{-1}.
What mass, in kilograms, of carbon dioxide would be released during the complete combustion of twenty litres of cetane?
A. 48.3
B. 62.3
C. 124
D. 156

Question 13
Consider the representation of a fuel cell shown in **Figure 4**

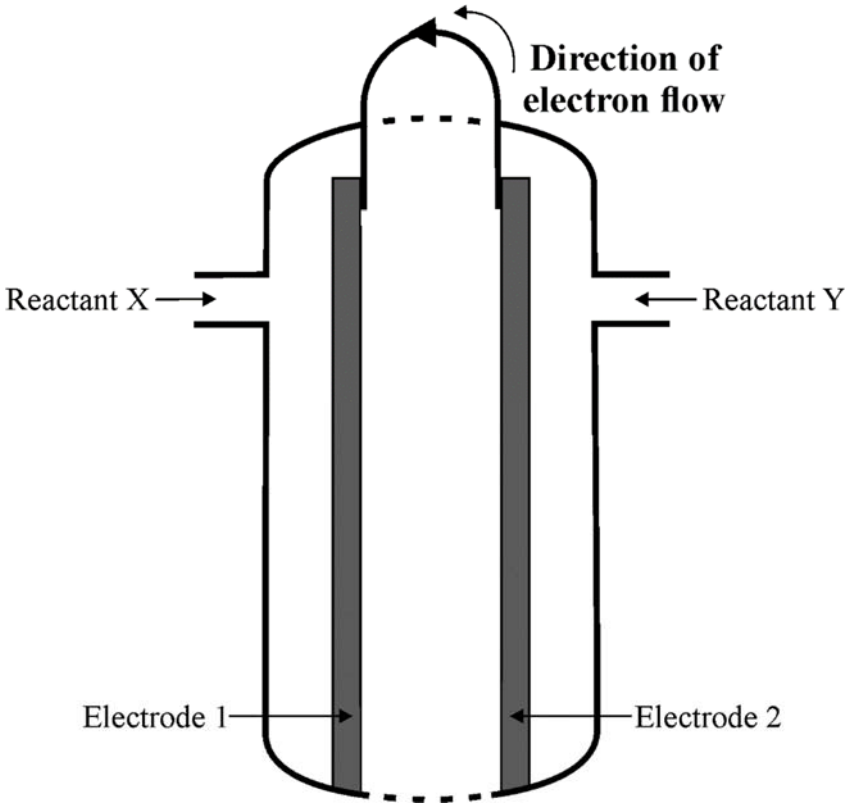


Figure 4

Which of the following statements about this fuel cell is correct?
A. Reactant X is the fuel and electrode 1 is the cathode.
B. Reactant Y is the fuel and electrode 2 is the anode.
C. Reactant X is the oxidant and electrode 1 is the anode.
D. Reactant Y is the oxidant and electrode 2 is the cathode.

Question 14
Coal-fired power stations and nuclear power stations are the most common modes of large scale electricity production.
Which of the following statements relating to these power station options is **incorrect**?
A. More electricity can be produced from 1 kg of uranium than from 1 kg of coal.
B. Steam is an important part of the electricity generating process in both types of power station.
C. During the respective chemical and nuclear reactions, mass is conserved in one but not the other.
D. For both the chemical and nuclear reactions the atoms present at the end of the reaction are the same as the atoms present at the start of the reaction.

Question 15
The energy produced, in kJ, when 9.60 g O_2 is consumed in the reaction with glucose during respiration is

A. 141 kJ.
B. 281 kJ.
C. 845 kJ.
D. 1.69×10^3 kJ.

Question 16
Semi-structural formula is an important way of representing key aspects of compounds which are structural isomers. Which one of the pairs of semi-structural formulae contains a pair of structural isomers?

A. $HOOCCH_2CH_2CH_3$ and $CH_3(CH_2)_2COOH$.
B. $HCOOCH_3$ and CH_3COOH.
C. $HOCH_2CH_2CH_2(CH_2)_2COOH$ and $HOOC(CH_2)_4CH_2OH$.
D. $ClCH_2CH{=}CHCH_2CH(OH)CH_3$ and $CH_3CH(OH)CH_2(CH)_2CH_2Cl$.

*Questions 17 and 18 refer to the galvanic cell represented in **Figure 5** under standard conditions.*

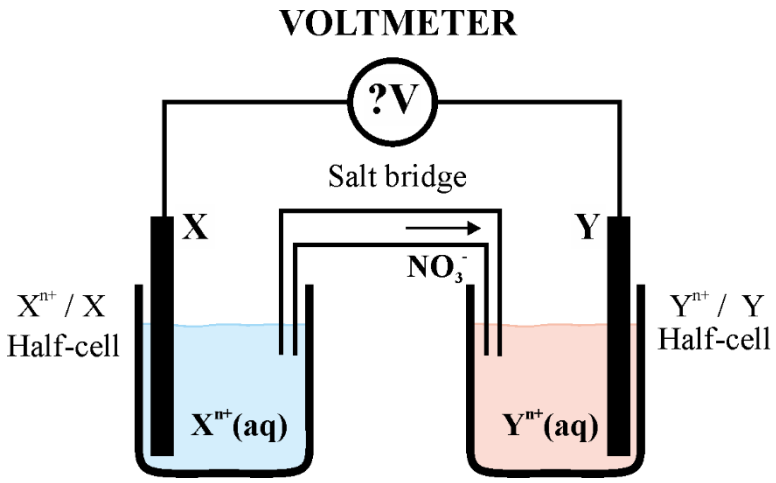


Figure 5

Question 17
The strongest reductant present in this cell is

A. X
B. X^{2+}
C. Y
D. Y^{2+}

Question 18
Under standard conditions the cell generates 1.03 V. Therefore, the cell should contain

A. Au^+
B. Cu^{2+}
C. Zn^{2+}
D. Ni^{2+}

Question 19
Uranium can exhibit a wide range of oxidation states. When uranium is extracted from its ore, called yellowcake, it undergoes a number of oxidation state changes. In which of the compounds represented below would uranium most likely have a mixture of oxidation states?

A. UF_6
B. U_3O_8
C. $Li_2U_2O_7$
D. UO_3

Question 20
In many analyses, where the active ingredient is in, or has been extracted into, aqueous solution UV-Visible spectroscopy can be employed. Which of the following statements relating to the use of UV-visible spectroscopy in such analyses is **least accurate**?

A. The active ingredient will absorb light at only one wavelength.
B. The amount of light absorbed enables calculation of the amount of active ingredient present.
C. Effective analysis depends on electrons transitioning to higher energy levels.
D. Solutions containing $Cu^{2+}(aq)$ would be expected to absorb wavelengths in the orange-red region of the spectrum.

Question 21
Quantitative analysis by gas chromatography can be used to determine blood alcohol (ethanol) levels more accurately than the breathalyser used to test drivers in roadside tests. Which of the following is **not** a significant factor in such an analysis?

A. The area under the peaks on the gas chromatogram.
B. A set of standards of known ethanol content.
C. The number of peaks on the gas chromatogram.
D. The retention time of ethanol.

Question 22
A 3.05 g sample of steel was analysed to determine its manganese content. The steel sample was dissolved in sulfuric acid and the resultant solution treated with an oxidant to convert all the manganese to permanganate ions, $MnO_4^-(aq)$, in a total volume of 100 mL.
The absorbance of this solution was measured in a UV-visible spectrometer under the same conditions which had been used previously to measure the absorbances of 100 mL solutions with known $MnO_4^-(aq)$ concentrations from which the calibration curve below was produced.
The absorbance of the treated steel solution was 0.350.

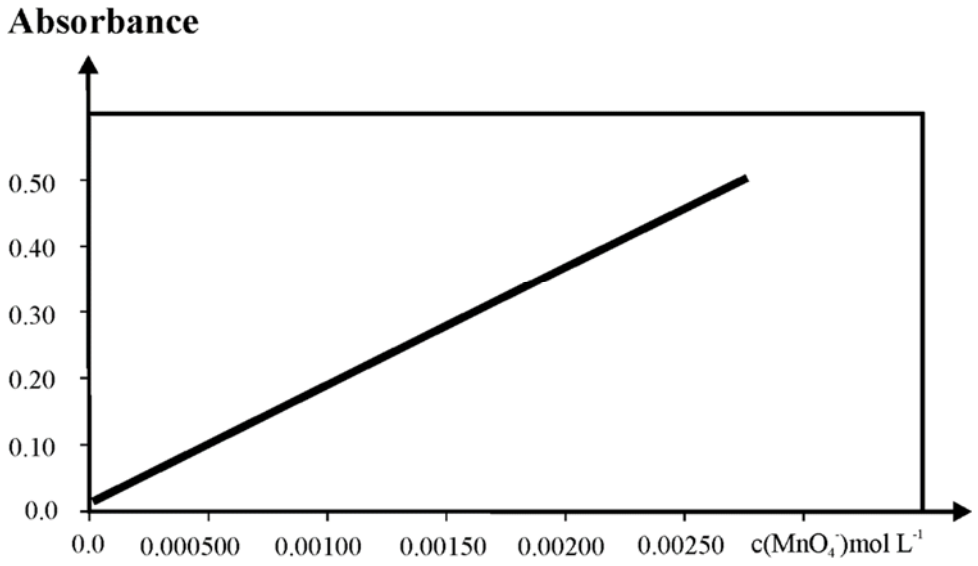


Figure 6

Assuming the sample of steel analysed was representative, the mass of manganese in one tonne of this steel would be closest to
A. 3.2 kg
B. 6.8 kg
C. 9.6 kg
D. 32 kg

Question 23
Vitamin B_{12}, made up of cobalamin molecules, plays a significant role in brain and nervous system function, affects DNA regulation and synthesis, and, all like B group vitamins, assists in the conversion of carbohydrates to glucose.
Each molecule contains one atom of cobalt and the percentage by mass of cobalt present is 4.34 %. The mass, in g, of five mole of cobalamin is closest to
A. 260
B. 1300
C. 1360
D. 6800

Question 24

Consider the following thermochemical equations:

$4NH_3(g) + 7O_2(g) \rightarrow 4NO_2(g) + 6H_2O(g)$; $\Delta H = -1132$ kJ mol^{-1}

$6NO_2(g) + 8NH_3(g) \rightarrow 7N_2(g) + 12H_2O(g)$; $\Delta H = -2740$ kJ mol^{-1}

What will be the amount of energy released when 1 mol NH_3 reacts with O_2 to produce N_2 and one other compound not containing nitrogen?

A. 283 kJ
B. 317 kJ
C. 1268 kJ
D. 1608 kJ

Question 25

Each member of a homologous series of five unbranched primary amines has a single amino functional group attached to the end carbon. The average molar mass of the five amines is 87.0 g mol^{-1}.

The diagram below is a simulation of the chromatograph produced when a mixture of these five amines is separated by gas chromatography.

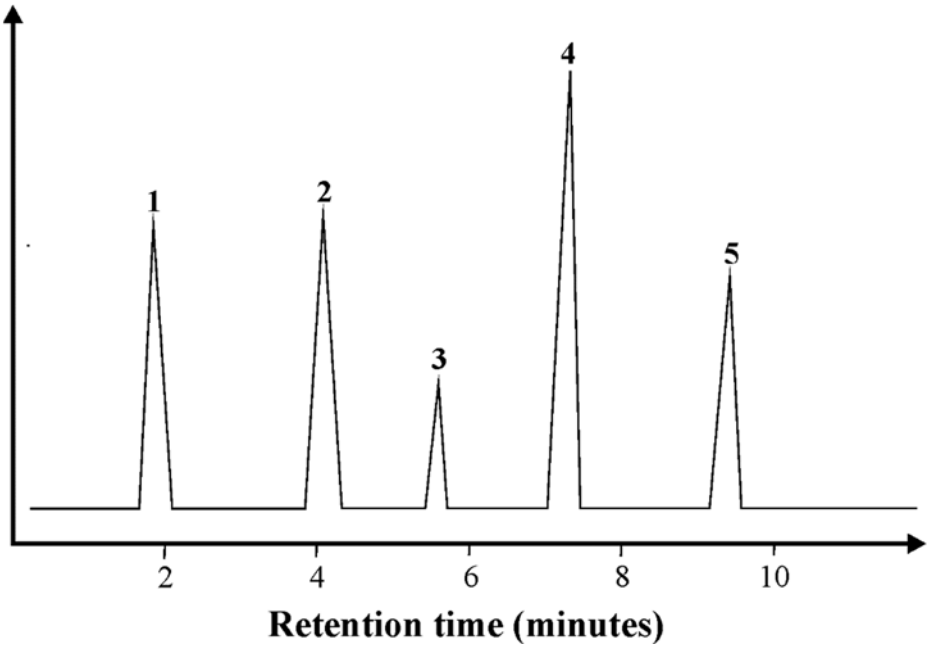


Figure 7

Which one of the following statements is correct?

A. 1-propanamine is the least abundant compound in the mixture.
B. Ethanamine has the lowest retention time.
C. 1-pentamine has the highest retention time.
D. 1-hexanamine is the most abundant compound in the mixture.

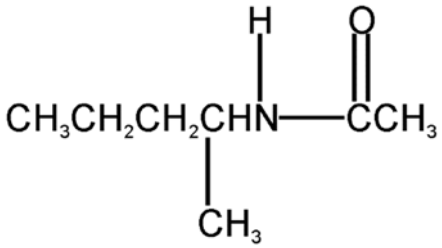
Question 26
When a 2.06 g sample of pure manganese is reacted with excess hydrogen chloride gas, 2.32 L of hydrogen gas, at 100°C and 752 mm Hg, and a manganese chloride compound $MnCl_x$ were produced, the oxidation state of manganese in the compound is

A. +2
B. +3
C. +4
D. +5

Question 27
When a hydrocarbon containing five carbon atoms reacts with $Cl_2(g)$ in the presence of ultraviolet light, only one monochlorinated product forms. The hydrocarbon is

A. pentane.
B. 1-pentene
C. methylbutane.
D. dimethylpropane.

Question 28
Molecules of the compound represented below undergo hydrolysis.



Which of the alternatives below correctly identifies products of this hydrolysis?

A. Methanoic acid and 2-butanamine.
B. 2-pentanamine and ethanoic acid.
C. Ethanol and 2-butanamine.
D. 2-pentanamine and methanoic acid.

Question 29
UV-Visible absorbance spectra of two species, X and Y, were determined by measuring absorbances over a range of wavelengths. The spectra are shown in **Figure 8** below.

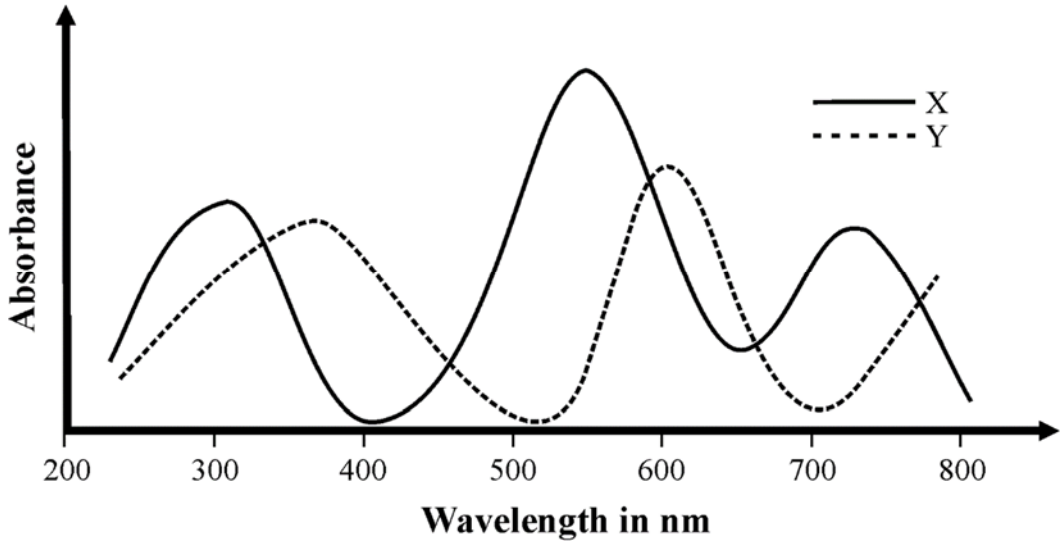


Figure 8

Which is the best wavelength to use in determining the concentration of Y in a solution containing both X and Y by UV-Visible spectroscopy?
A. 300 nm.
B. 400 nm.
C. 500 nm.
D. 600 nm.

Question 30
Faraday's constant is determined experimentally by electrolysis of an aqueous solution of $Cu^{2+}(aq)$ using copper electrodes.
In the analysis, passage of 915 C of charge resulted in the mass of one of the electrodes changing by 0.298 g.
Calculating the Faraday constant from these data gives the numerical value
A. 9.75×10^4
B. 9.65×10^4
C. 9.37×10^4
D. 4.87×10^4

End of Section A

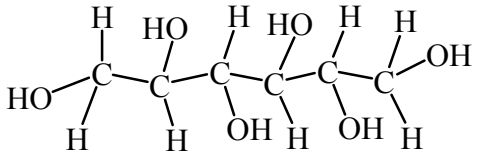
VCE Chemistry 2016 Year 12 Trial Exam Units 3/4

SECTION B – Short Answer Questions

(95 marks)

Section B consists of 7 short answer questions.
You should answer all of these questions in the spaces provided.
*The **marks** allotted are shown at the end of each part of each question.*

Question 1 (19 marks)
Sorbitol, also known as glucitol, is a polyol which occurs naturally in corn, pears, peaches and prunes. It is used as a humectant in some cosmetics, a laxative, together with potassium nitrate as rocket fuel, and has promise as a source of biofuels.
The structure of a sorbitol moleculesis is shown below.



a. Sorbitol is an effective laxative because it draws water into the large intestine and stimulates bowel movements. Explain how and why water molecules are attracted to sorbitol. **2 marks**

b. Sorbitol is the main ingredient in Fisherman's Friend throat lozenges. The nutrition information label on a 25 g packet of Fisherman's Friend indicates that 100 g of lozenges contains 94.5 g of sorbitol and has an energy content of 1395 kJ.

i. If a packet of lozenges contains 20 lozenges, what is the chemical amount, in mol, of sorbitol in one lozenge. **2 marks**

ii. Assuming that all the energy available from Fisherman's Friend lozenges comes from sorbitol, compare the relative energies, on a mass basis, of sorbitol and glucose. **2 marks**

c. Transformation of sorbitol into hydrocarbons is currently seen as a promising option in the production of second-generation biofuels. One pathway investigated includes APR (aqueous phase reforming) followed by APD/H (aqueous phase dehydration/hydrogenation).
The overall APR reaction, in which hydrogen is produced from sorbitol reacting with high temperature steam, is represented by the equation
$C_6H_{14}O_6(s) + 6H_2O(g) \rightarrow 6CO_2(g) + 13H_2(g)$
Hydrogen produced in APR is then reacted with sorbitol to produce biohexane and water in the ADP/H process.

i. Write a balanced equation for the ADP/H reaction. **1 mark**

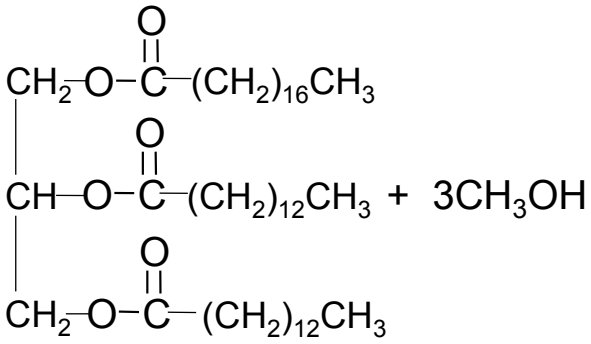
ii. Calculate the minimum mass, in kg, of sorbitol required to produce 10.0 L, collected at SLC, of biohexane via APR and APD/H. The density of hexane at SLC is 0.659 g mL^{-1}. **4 marks**

Recent research has focussed on combining APR and ADP/H in a one pot process without any H_2 supply. Research has shown that with appropriate catalysis in this process, 19 mol of sorbitol produces 13 mol of hexane as well as carbon dioxide and water.

iii. Write a balanced equation for the overall reaction in this one pot process. **1 mark**

d. Sorbolene, a well-known skin moisturizer contains, amongst other ingredients, sorbitol and another polyol which is also a useful by-product of the production of biodiesel by transesterification.

The semi-structural formulae of the reactants in a transesterification process are given below:



Give the semi-structural formulae and names of all the products of this transesterification. **5 marks**

e. The molar enthalpy of combustion of a particular biodiesel is 1.17×10^5 kJ mol^{-1}. The molar mass of the biodiesel is 294.5 g mol^{-1}.
What chemical amount, in mol, of biohexane, produced from sorbitol, would produce the same amount of energy as 0.500 kg of the biodiesel? **2 marks**

Question 2 (20 marks)
Energy exists in many forms and transformations between its various forms is integral to our existence and lifestyles.

a. All of the processes below were part of Unit 4 of the VCE Chemistry course. For each one, identify the main energy transformation (e.g. kinetic to mechanical) associated with the process. **3 marks**

Using electrical heating to calibrate a calorimeter:

_____

Investigating an endothermic reaction using a calibrated calorimeter:

_____

Constructing an operating galvanic cell from $Cu^{2+}(aq)/Cu(s)$ and $Zn^{2+}(aq)/Zn$ half-cells:

_____

A hydrogen-oxygen fuel cell:

_____

Electrolysis of 1 M NaCl(aq):

_____

The reactor in a nuclear power station:

_____

b. Using a calorimeter calibrated for 100 mL water and with a calorimeter constant of 475 J K^{-1}, the reaction between 0.235 g Mg and 100 mL of 0.500 M HCl(aq) is investigated. A temperature increase of 8.35ºC is recorded.

i. Develop a balanced thermochemical equation for the reaction. **4 marks**

ii. State **two** assumptions associated with your calculations. **2 marks**

c. The overall redox reaction for a fuel cell is the same as the combustion reaction of the fuel.
Consider a methanol-O_2 fuel cell with an acidic electrolyte.
When the fuel cell is delivering energy, write balanced half-equations for the reactions occurring at the electrodes **2 marks**

(-) electrode

(+) electrode

d. In an investigation of the relative strengths of oxidants and reductants, a series of galvanic cells were constructed and the following results were obtained and recorded in **Table 1**.

Galvanic cell	Voltage	Location of positive electrode
1. $Q_2(g)/Q^-(aq)$ and $X^+(aq)/X(s)$	0.36 V	$Q_2(g)/Q^-(aq)$
2. $Y^{2+}(aq)/Y(s)$ and $Z^{2+}(aq)/Z(s)$	0.14 V	$Z^{2+}(aq)/Z(s)$
3. $X^+(aq)/X(s)$ and $Z^{2+}(aq)/Z(s)$	0.93 V	$X^+(aq)/X(s)$
4. $Y^{2+}(aq)/Y(s)$ and $X^+(aq)/X(s)$	1.07 V	$X^+(aq)/X(s)$

Table 1

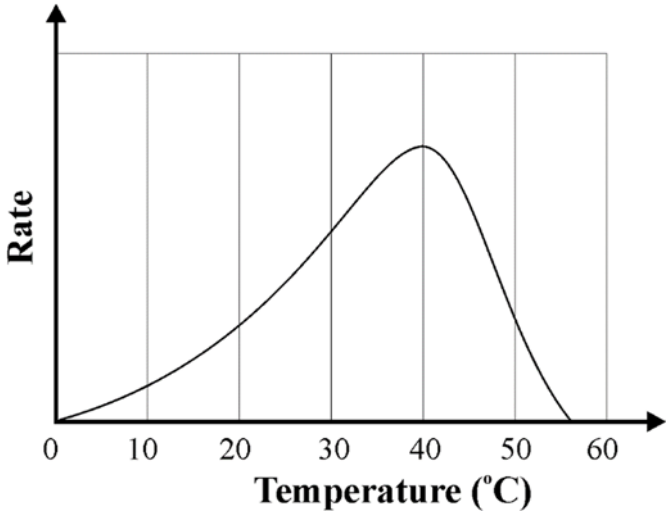
Use these data to identify the strongest reductant investigated. Explain your reasoning. **4 marks**

e. The electrolysis of an aqueous solution of 1 M $SnCl_2(aq)$ with two different electrodes produces a gas at one electrode and a metal deposit at the other electrode. However, when the power supply connections to the electrodes are swapped over, i.e. connected to the other electrode in each case, one of the electrodes starts to gradually disappear but concentration of $Sn^{2+}(aq)$ in the electrolyte stays constant.

i. Write the half-equations for the initial half-equations and give the signs of the electrodes at which they occur. **2 marks**

ii. Explain, using half-equations where appropriate, why one of the electrodes gradually disappeared after the power supply connections were swapped and why this did not occur with the initial connections. **3 marks**

Question 3 (11 marks)
Graph 1 relates to the production of ethanol by fermentation.



Graph 1

a. Write a balanced equation for the production of ethanol by fermentation. **1 mark**

b. Explain the variations in reaction rate as temperature increases and the differences in behaviour and, where relevant, structure at

20°C **1 mark**

40°C **1 mark**

50°C **1 mark**

c. Write a balanced equation for an alternative method for the production of ethanol and state the type of reaction represented by the equation. **1 mark**

d. In a laboratory exercise a compound X, containing the same elements as ethanol, is to be produced. The only organic compound available in the laboratory is ethanol, but an extensive cause of inorganic reagents is available.
The IR spectrum of this compound shows a significant peak at the 1670-1750 cm^{-1} absorption band, but no broad peak at 2500-3300 cm^{-1}.

i. Name compound X. **1 mark**

ii. Describe how this compound could be produced from ethanol in the laboratory exercise. Give the chemical formulae of all inorganic reagents used. **3 marks**

e. The density of pure ethanol is 0.785 g mL^{-1}. The label on a 750 mL bottle of red wine indicates that it is 14.5 % alcohol (v/v) and contains 8.5 standard drinks. Calculate the amount of ethanol, in mol, present in one standard drink. **2 marks**

Question 4 (15 marks)

Aspirin is the common name of the weak monoprotic acid, acetylsalicylic acid.
Aspirin molecules have the semi structural formula $HOOCC_6H_4OCOCH_3$.
A pain reliever was analysed for aspirin content by dissolving a 0.225 g sample in water and titrating with 0.0235 M KOH(aq) to the phenolphthalein endpoint. 28.71 mL was required to reach the endpoint.

a. Draw the structural formula, showing all bonds, of aspirin molecules. **2 marks**

b. Aspirin is produced from salicylic acid and one other reactant. Give the chemical name of the other reactant. **1 mark**

c. **i.** Calculate the percentage, by mass, of aspirin in the pain reliever. **3 marks**

ii. How would the calculated percentage result have been affected if phenol red had been used as the indicator rather than phenolphthalein? Explain why. **2 marks**

d. Pure aspirin is only slightly soluble in water but quite soluble in alkaline solutions. Referring to the structure of aspirin, explain the higher solubility in alkaline solution. **2 marks**

e. When aspirin is added to an aqueous NaOH(aq) which is then boiled for 10 minutes, the reaction of aspirin with $OH^-(aq)$ becomes

$C_9H_8O_4(s) + 2OH^-(aq) \rightarrow C_7H_5O_3^-(aq) + CH_3COO^-(aq) + H_2O(l)$

A 1.594 g sample of recently extracted aspirin was boiled in 50.0 mL of 0.500 M Na(OH). After the solution cooled it was titrated with 0.275 M HCl(aq), with 27.35 mL required to reach the bromothymol blue endpoint.

i. The ions produced during the reaction are the conjugate bases of salicylic acid and ethanoic acid. These acids were not present as separate entities in the aspirin sample analysed. Where did they come from? **1 mark**

ii. Calculate the percentage purity of the recently extracted aspirin sample. **4 marks**

Question 5 (8 marks)
The right side of **Figure 1**, shows part of the titration curves for the titration of 50 mL aliquots of 6 monoprotic acids, all of the same initial concentration, with 0.10 M NaOH(aq).

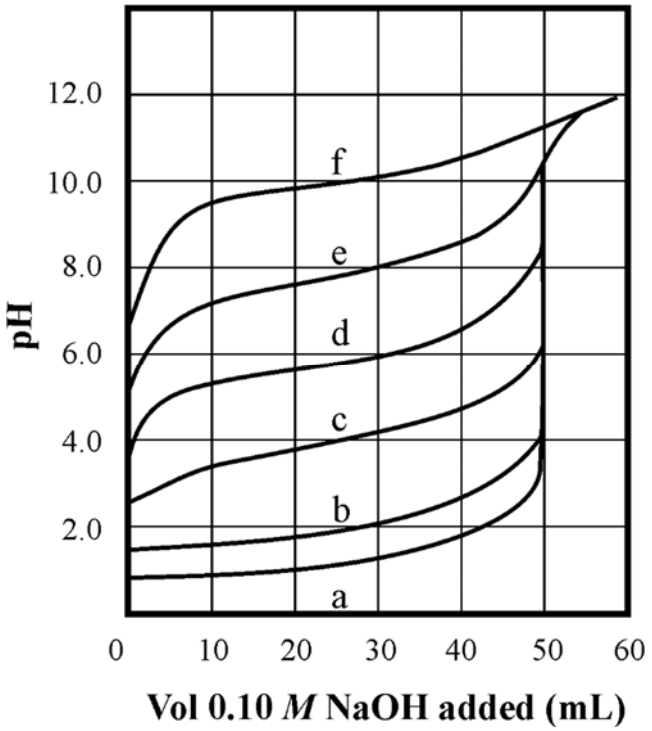


Figure 1

a. Why do aqueous solutions of these acids have different pH values? **1 mark**

b. Explain how the data provided enable you to determine the initial concentration of the acids. **2 marks**

c. Which of the acids is most likely to be hydrochloric acid? Explain. **2 marks**

d. Using the information supplied, and other relevant available information, identify which one of the acids is hypobromous acid. **3 marks**

Question 6 (9 marks)

Hydrogen iodide may be produced by reaction between purified hydrogen gas and iodine according to the equilibrium

$$H_2(g) + I_2(g) \rightleftharpoons 2HI(g), \quad K_c = 45.2 \text{ at } 400°C$$

a. If the [HI] at 400°C, in an equilibrium mixture resulting from the addition of equal mole amounts of $H_2(g)$ and $I_2(g)$, is 1.05 M, what was the initial concentration of iodine in the reaction vessel? **3 marks**

b. At 800°C, the value of K_c for the equilibrium $2HI(g) \rightleftharpoons H_2(g) + I_2(g)$ is 0.0174. Explain how this enables you to deduce the thermochemistry of the equilibrium $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$ **2 marks**

c. Represented in **Figure 2** are concentration-time and rate-time graphs of an equilibrium mixture of $H_2(g)$, $I_2(g)$ and HI(g).

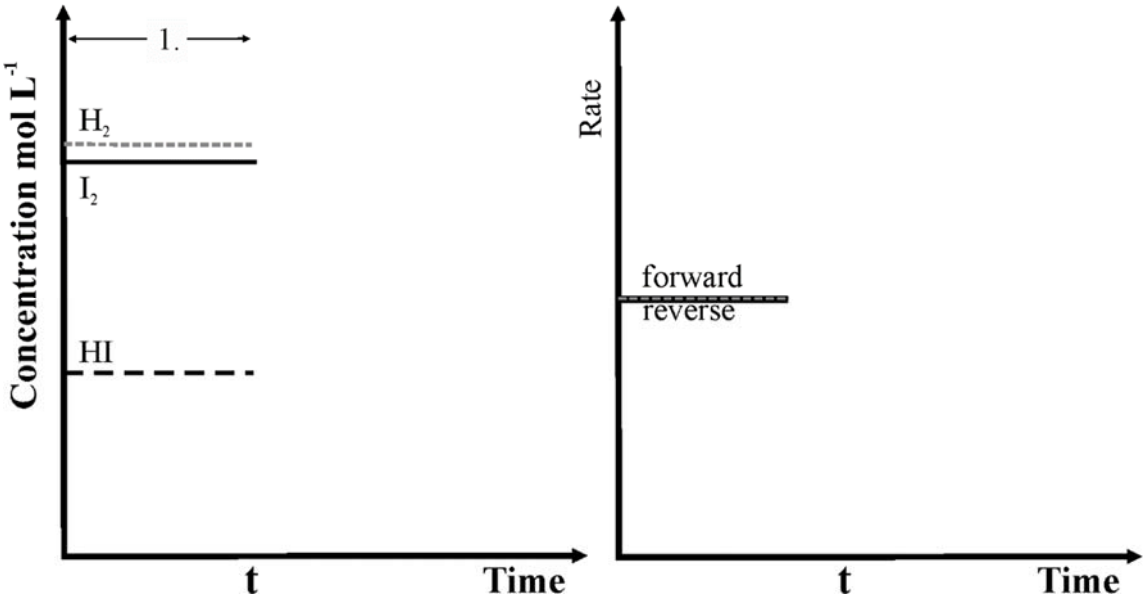


Figure 2

i. On both graphs show the effect that doubling the volume of the equilibrium mixture would have. **2 marks**

ii. Explain this response to a volume increase on an equilibrium mixture of $H_2(g)$, $I_2(g)$ and HI(g). **2 marks**

Question 7 (13 marks)

The ^{13}NMR spectrum of an amino acid, which carries a charge of -2 in alkaline solution, shows that it has 5 different carbon environments.

a. Identify the amino acid and show the structure of its zwitterion. **2 marks**

b. **i.** How many signals would be expected to appear on a ^{1}H NMR spectrum of the molecular form of this amino acid? Explain. **2 marks**

ii. How would a ^{1}H NMR spectrum of the amino acid in alkaline solution differ from the ^{1}H NMR spectrum of the molecular form? **1 mark**

iii. On a high resolution ^{1}H NMR spectrum, which hydrogen atoms will have their signals split and how many of the signals on the ^{1}H NMR spectrum of the molecular form of the acid would be split? **1 mark**

iv. What would you expect to be the mass/charge ratio of the amino acid on its mass spectrum and why might a peak not appear at this value on the spectrum. **2 marks**

c. **Figure 3** represents parts of a key biomolecule.

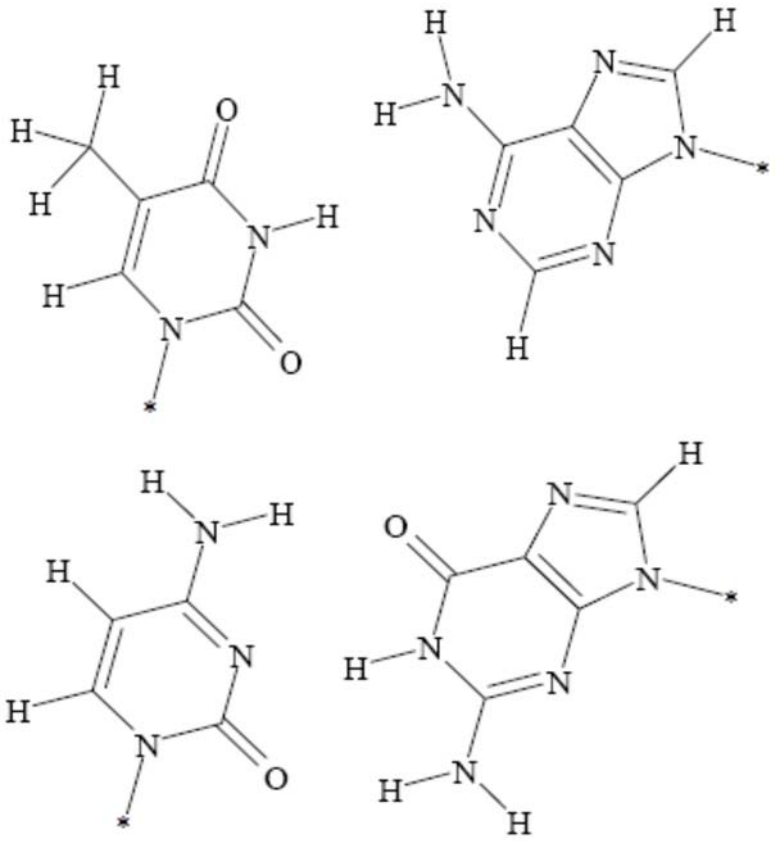


Figure 3

i. Name this biomolecule and describe the asterisked (*) bonds made by those N atoms in this biomolecule. **1 mark**

ii. On **Figure 3**, show the bonding that occurs between the **two** members of each pair, and explain how it contributes to maintaining the structure of the biomolecule **2 marks**

iii. Describe **two** ways in which the type of bonding identified in **Question 7c ii** contributes to the structure of proteins. **2 marks**

End of Section B

End of Trial Exam

STUDENT NUMBER

									Letter
Figures									
Words									

Student Name.....…….....

VCE Chemistry 2016 Year 12 Trial Exam Units 3/4

Student Answer Sheet

Instructions for completing test. Use only a 2B pencil. If you make a mistake, erase it and enter the correct answer. Marks will not be deducted for incorrect answers.

Write your answers to the Short Answer Section in the space provided directly below the question. There are **30 Multiple Choice** questions to be answered by circling the correct letter in the table below.

Question 1	A	B	C	D	*Question 2*	A	B	C	D
Question 3	A	B	C	D	*Question 4*	A	B	C	D
Question 5	A	B	C	D	*Question 6*	A	B	C	D
Question 7	A	B	C	D	*Question 8*	A	B	C	D
Question 9	A	B	C	D	*Question 10*	A	B	C	D
Question 11	A	B	C	D	*Question 12*	A	B	C	D
Question 13	A	B	C	D	*Question 14*	A	B	C	D
Question 15	A	B	C	D	*Question 16*	A	B	C	D
Question 17	A	B	C	D	*Question 18*	A	B	C	D
Question 19	A	B	C	D	*Question 20*	A	B	C	D
Question 21	A	B	C	D	*Question 22*	A	B	C	D
Question 23	A	B	C	D	*Question 24*	A	B	C	D
Question 25	A	B	C	D	*Question 26*	A	B	C	D
Question 27	A	B	C	D	*Question 28*	A	B	C	D
Question 29	A	B	C	D	*Question 30*	A	B	C	D