Student Number……

Mark ……..

James Ruse Agricultural High School

Theory

Chemistry Assessment
Task 1 Term 4 2007

Chemistry

General Instructions

- Reading Time 5 minutes
- Working Time 45 minutes
- Write using black or blue pen
- Draw diagrams using pencil
- Board approved calculators may be used.
- A data sheet and a Periodic Table are provided at the back of the paper.
- Write your Student Number at the top of this page

Total Marks 37

Part A

Multiple Choice: 10 marks
Attempt Questions 1-10
Allow about 10 minutes for this part **Total Marks 10**

Select the alternative A, B, C or D that best answers the question. Fill in the response oval completely.

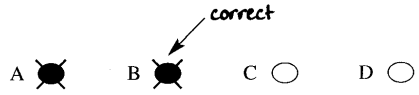
Sample: $2 + 4 =$ (A) 2 (B) 6 (C) 8 (D) 9

A ○ B ● C ○ D ○

If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

A ● B ⊗ C ○ D ○

If you change your mind and have crossed out what you consider to be the correct answer, then indicate the correct answer by writing the word ~~correct~~ and drawing an arrow as follows.



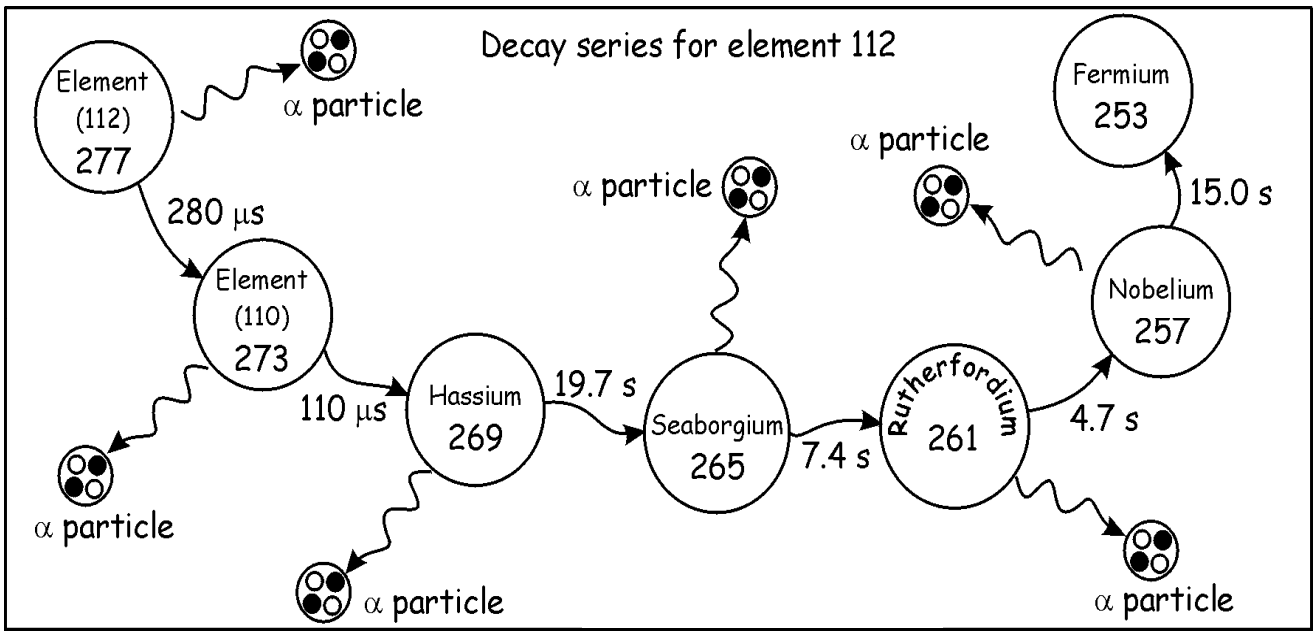
▸ Mark your answers for Questions 1 – 10 in the Answer Box on page 6

1. Gold exists in 35 isotopic forms. Stable isotopes of gold have a neutron to proton ratio of 1.5 to1.

Which of these gold isotopes is stable?

(A) Au–171
(B) Au–205
(C) Au–184
(D) Au–197

2. The diagram shows the progressive decay of element 112.



How long does it take an atom of element 112 to decay into an atom of fermium–253?

(A) 15.0 seconds
(B) 27.1 seconds
(C) 46.8 seconds
(D) 436.8 seconds

3. Which addition polymer is used to make a disposable plastic shopping bag?

(A) cellulose
(B) polyethylene
(C) polystyrene
(D) polyvinylchloride

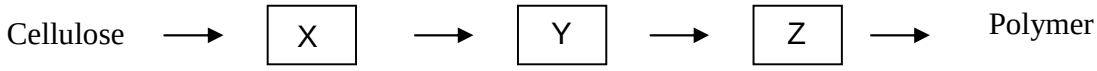
4. Californium–246 is prepared by bombarding a target of uranium–238 with carbon.

$$^{238}_{92}\mathrm{U} + {}^{12}_{6}\mathrm{C} \rightarrow {}^{246}_{98}\mathrm{Cf} + 4\,{}^{1}_{0}\mathrm{n}$$

Where must the bombardment occur?

(A) A catalytic cracker
(B) A cloud chamber
(C) A nuclear reactor
(D) A particle accelerator

5. The reaction sequence below shows how a monomer can be derived from cellulose in order to build a polymer



Identify X, Y and Z.

	X	***Y***	***Z***
(A)	Glucose	Ethene	ethanol
(B)	Ethanol	Glucose	ethene
(C)	Glucose	Ethanol	ethene
(D)	Ethene	Ethanol	glucose

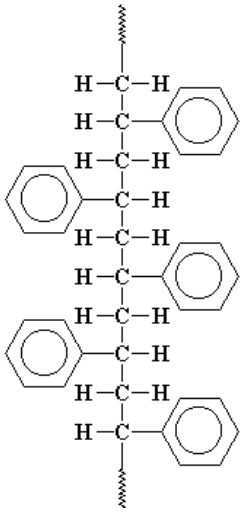
6. What is the major component of biomass?

(A) cellulose
(B) crude oil
(C) ethylene
(D) glucose

7. What are two examples of biopolymers?

(A) cellulose, glucose
(B) starch, cellulose
(C) ethanol, ethylene
(D) petroleum, natural gas

8. A section of a polymer is represented by the following structural formula.



What is the systematic name of the monomer that forms this polymer?

(A) benzene
(B) ethylbenzene
(C) phenylbenzene
(D) phenylethene

9. What name is given for the chemical process that involves the breaking of large carbon compounds found in petroleum into molecules such as propene?

(A) catalysis
(B) cracking
(C) distillation
(D) fractional distillation

10. What is the oxidation state of iodine in $NaIO_4$?

(A) - 1
(B) +3
(C) +4
(D) +7

Student Number

Part A Answer grid for multiple choice questions. **Total ……/ 10**

1.	A O	B O	C O	D O
2.	A O	B O	C O	D O
3.	A O	B O	C O	D O
4.	A O	B O	C O	D O
5.	A O	B O	C O	D O
6.	A O	B O	C O	D O
7.	A O	B O	C O	D O
8.	A O	B O	C O	D O
9.	A O	B O	C O	D O
10.	A O	B O	C O	D O

Part B. Extended Response Questions:
Allow about 35 minutes for this part.
Question 11 (4 marks)

Describe a chemical procedure that can be used to distinguish between cyclohexane and cyclohexene. Include observations and relevant equation(s).

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Question 12 (3 marks)

Using an example, outline the steps in the formation of an addition polymer.

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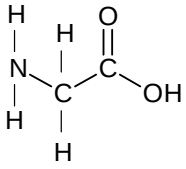
Question 13 (5 marks)

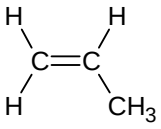
(a) Draw the structure of a section of an addition polymer and a condensation polymer that can be made from the monomers below. Include 3 monomer units for each polymer**.** **(4 marks)**

Monomers:

an amino acid



an alkene



Addition
Condensation

(b) What is the name of the addition polymer? **(1 mark)**

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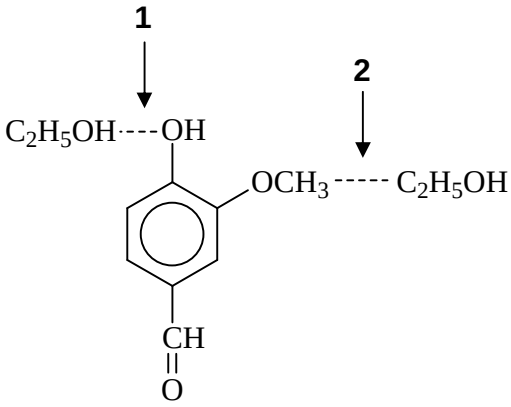
Question 14 (2 marks)

A major use of ethanol is as a solvent in the perfume industry. Vanillin (an extract from vanilla) is component of *Vanilla Sky* perfume. The diagram below shows ethanol molecules dissolving vanillin.



Identify the intermolecular forces and the type (polar or non-polar) of solvent behaviour acting at locations 1 & 2.

Location 1 **(1 mark)**

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Location 2 **(1 mark)**

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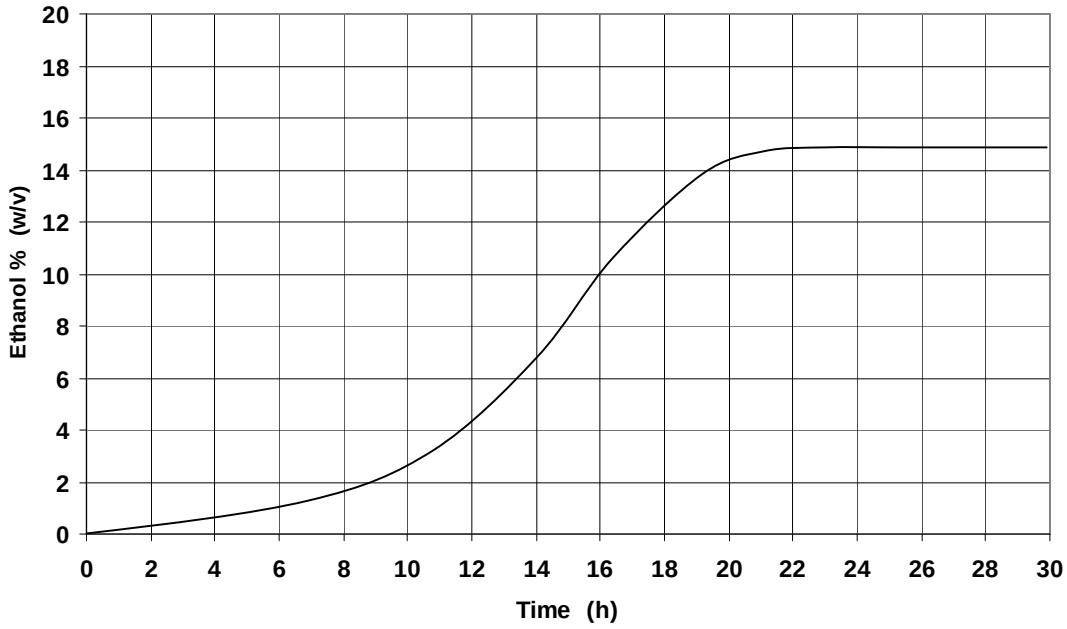
Question 15 (4 marks)

Ethan is conducting research on the effect of temperature on the fermentation of glucose.
The graph shows the production of ethanol at a constant temperature of 25°C.



(a) Calculate the concentration of the ethanol (mol L^{-1}) at 16 hours. **(2 marks)**

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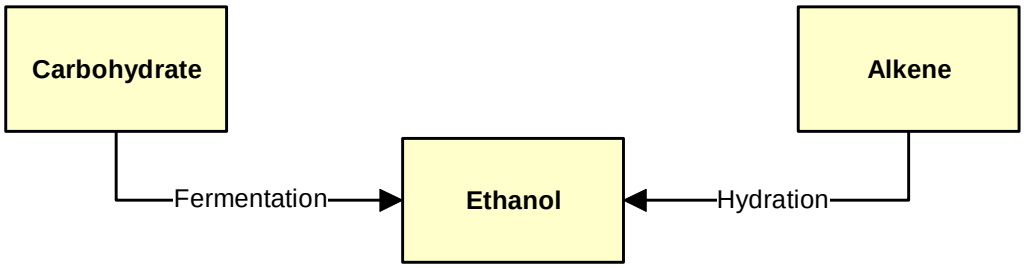
(b) Draw another curve on the graph above, showing the relative production of ethanol if the fermentation had been performed for 30 hours at 35°C instead of 25°C. **(2 marks)**

Question 16 (5 marks)

Ethanol is globally produced on a large-scale by two main processes as shown on the flow chart.



(a) Write balanced chemical equations for the two processes including reaction conditions. **(3 marks)**

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(b) Australia has a high potential for expanded ethanol production by fermentation. Identify two advantages and two disadvantages of ethanol as a fuel. **(2 marks)**

Advantages	*Disadvantages*

Question 17 (4 marks)

Cobalt–60 is a radioisotope used in medicine and industry and is prepared by a simple nuclear reaction.

$$^{59}_{27}\text{Co} + ^{1}_{0}\text{n} \rightarrow ^{60}_{27}\text{Co}$$

(a) Where does this process takes place?. **(1 mark)**

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(b) All radioisotopes must be used with extreme caution.

(i) Outline the danger associated with radioisotopes. **(2 marks)**

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(c) (ii) Identify an instrument which can be used to detect the danger. **(1 mark)**

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End of Test