BLAKEHURST HIGH SCHOOL

Year 12 Half Yearly Exam

2002

CHEMISTRY

Time allowed: 1½ hours plus 5 minutes reading time.

Part A

Total marks 7
Attempt Questions 1 – 8
Allow about 16 minutes for this part

Use the multiple-choice answer sheet below.

Question	A	B	C	D
1				
2				
3				
4				
5				
6				
7				
8				

1. A titration was carried out with NaOH in the reaction flask and HCl in the burette. All the equipment was first rinsed with water and then each piece treated by rinsing as follows. Which is the correct procedure.

	Burette	Pipette	Reaction flask
A	HCl	NaOH	NaOH
B	NaOH	Water	Water
C	Water	HCl	HCl
D	HCl	NaOH	Water

2. Which of the following is the conjugate acid of HSO_4^-

   A SO_4^{2-}
   B H^+
   C H_2SO_4
   D H_3O^+

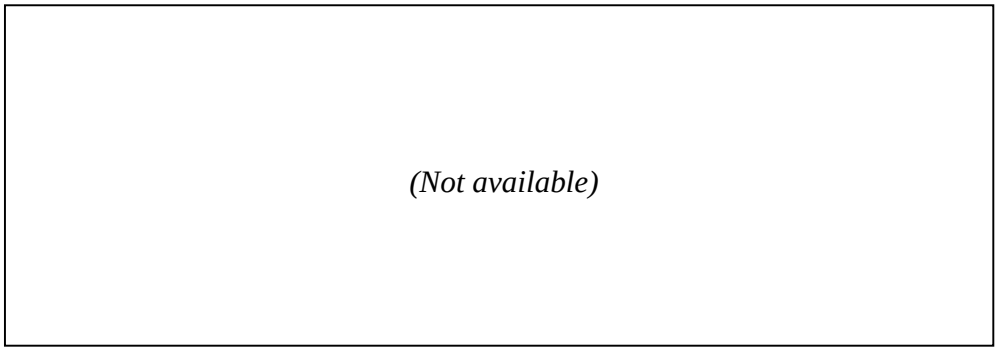
3. Ethanol can be converted to ethene using a catalyst. What is this type of reaction called?

   A Polymerisation
   B Hydration
   C Neutralisation
   D Dehydration

4. The pH of a mixture of 50mL 0.4 M HCl and 50mL 0.4 M $Ba(OH)_2$ is closest to

   A 12.6
   B 7.0
   C 14.0
   D 1.0

5. The graph below shows the colour ranges of three acid-base indicators.



A solution is colourless in phenolphthalein but yellow in both methyl orange and bromothymol blue. What is the pH of the solution?

   A 2.0 – 3.5
   B 4.5 – 6.0
   C 6.5 – 8.0
   D 10.0 – 11.5

6. What volume of CO_2 gas at 25^0C and 101.3 kPa is produced by the complete combustion of 4.0g of carbon in oxygen?

   A 25.4 L
   B 12.7 L
   C 8.47 L
   D 4.24 L

7. Production of energy from biomass would most likely use the following process:

   A Catalytic cracking
   B Polymerisation
   C Fermentation
   D Esterification

8. In the reaction;

   $Mg_{(s)} + H_2SO_{4\,(aq)} \rightarrow MgSO_{4\,(aq)} + H_{2\,(g)}$

   The reductant is:

   A Mg
   B H_2SO_4
   C $MgSO_4$
   D H_2

Part B

Total marks 42
Allow about 1 hour and 14 minutes for this part
Answer in the spaces provided
Show all relevant working in questions involving calculations
Show states of matter in all reactions involving symbols

9. Compare the reactivities of the alkenes with the corresponding alkanes to a solution of bromine in water. **3m**

10. (a) Name the process that produces polyethene from ethene. **1m**

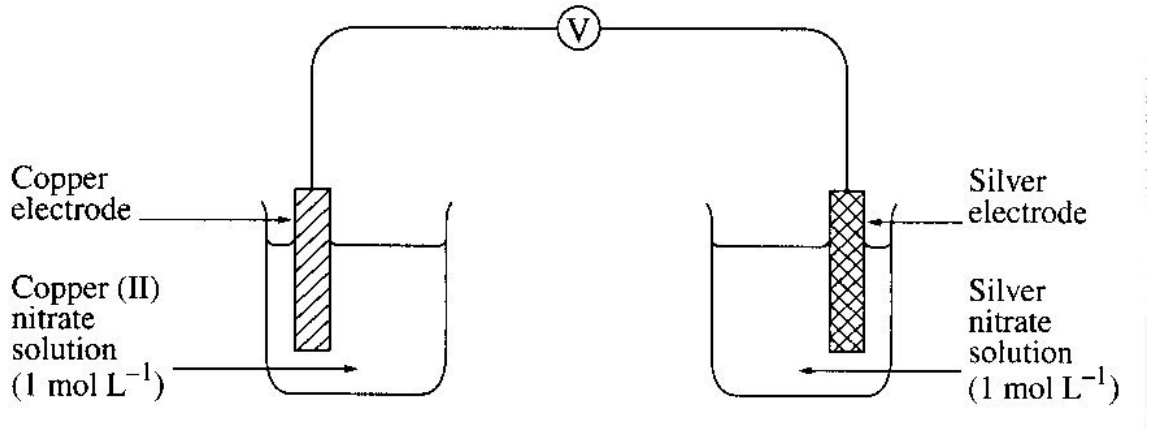
(b) Give the reaction for this process. **1m**

(c) Describe a source of ethene. **2m**

(d) Give two uses of polyethene. **1m**

11. You made ethanol from sugar (sucrose) in the laboratory. Outline this process briefly and draw and label the apparatus you used to separate the ethanol from it. **4m**

12. Examine the cell shown below.



(a) Draw in the salt bridge. **1m**

(b) Describe how you made a salt bridge in the laboratory **2m**

_____

_____

(c) Write the expected reaction and calculate the voltage produced by it. **3m**

_____

_____

(d) What would happen if the voltmeter was replaced with a battery? **1m**

_____

_____

13. Evaluate a dry cell or lead–acid cell with one other cell in terms of chemistry, cost and practicality, impact on society and environmental impact. **4m**

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

14. (a) Draw and label the equipment you would use to determine the heat of combustion of ethanol. **3m**

(b) Give a balanced reaction for the complete combustion of ethanol (CH_3CH_2OH). **1m**

(c) In an experiment, a student found that 1.55g ethanol burnt and raised the temperature of 100g water from 22.0^0C to 27.5^0C. Calculate the molar heat of combustion of ethanol. (specific heat of water is 4.18 J/^{0}C/g). **3m**

(d) The actual value of ΔH_{comb} for ethanol is 1367kJ/mol. Explain the discrepancy. **2m**

15. Describe a first hand investigation in which you prepared and tested a natural indicator. **3m**

16. (a) Dilute hydrochloric acid reacts with solid sodium carbonate to produce a solution of a salt, carbon dioxide gas and water. Give a balanced reaction including states. **1m**

(b) What volume of carbon dioxide gas is produced when 5.0 g sodium carbonate are reacted with 50 mL 0.5M hydrochloric acid at 25^0C and 101.3kPa. **2m**

(c) Some of the carbon dioxide forms an equilibrium with carbonic acid in solution. Show this as a balanced reaction. **1m**

(d) Describe the effect on this equilibrium if the pressure of the carbon dioxide was increased. **1m**

17. Give the reaction for, and name the ester produced from, ethanoic acid and butanol. **2m**

Blakehurst High School Yr12 Chemistry h/y 2002 Marking Guidelines

Question	A	B	C	D
1				X
2			X	
3				X
4	X			
5			X	
6			X	
7			X	
8	X			

9

Criteria	Mark
Compares the reactions and gives balanced equations	3
Compares reaction between bromine and alkenes with alkanes	2
Demonstrates structural difference between alkanes and alkenes Or Describes reaction between bromine and alkenes	1

10 a

Criteria	Mark
Polymerisation	1

10 b

Criteria	Mark
Gives correct polymerisation reaction	1

10 c

Criteria	Mark
Names a source and gives one chemical detail about the process involved	2
Names a source of ethene	1

10 d

Criteria	Mark
Must give two uses	1

11

Criteria	Mark
Outlines the process and draws the apparatus and gives reactions	4
Outlines the process and draws the apparatus	3
Draws and labels some of the apparatus Or Describes the process giving most of the chemicals involved	2
Names one piece of apparatus and draws it Or Names two chemicals involved	1

12 a

Criteria	Marks
Correctly draws in the salt bridge	1

12 b

Criteria	Marks
Names an eletrolyte and a suitable medium And Explains how they are applied	2
Names an eletrolyte and a suitable medium Or Explains how they are applied	1

12 c

Criteria	Mark
Gives balanced reaction and overall voltage	3
Gives both half equations and voltages	2
Gives one half equation and its voltage	1

12 d

Criteria	Mark
States reversed reaction	1

13

Criteria	Mark
Names another cell and compares it in terms of one of the features And Makes a judgement on the comparison	4
Names another cell and compares it in terms of all of the features	3
Names another cell and compares it in terms of some of the features	2
Names another cell and compares it in terms of one of the features	1

14 a

Criteria	Mark
Draws a fully labeled diagram	
Draws and labels an incomplete diagram	
Draws and labels a basic diagram	

14 b

Criteria	Mark
Balanced equation	1

14 c

Criteria	Mark
Correct answer with working	3
Partially correct	2
One correct calculation in the working	1

14 d

Criteria	Mark
Gives two reasons	
Gives one reason	

15

Criteria	Mark
Describes the process for extracting the indicator from a named plant And Describes how it is tested	3
Describes the process for extracting the indicator from a named plant	2
Names one natural indicator Or Names one plant producing an indicator	1

16 a

Criteria	Mark
Balanced reaction	1

16 b

Criteria	Mark
Gives correct answer with working	2
Correctly calculates one part	1

16 c

Criteria	Mark
Gives balanced reaction	1

16 d

Criteria	Mark
Correct effect	1

17

Criteria	Mark
Correct balanced reaction and names the ester	2
Partial reaction Or Names the ester	1