Blakehurst High School

Year 12 Half Yearly Examination 2003

2U Chemistry

Time allowed: 1½ hours plus 5 minutes reading time.

Instructions:

Attempt **all** questions

This paper has 2 parts:

Part A: 10 multiple choice questions – Answer on the grid provided.

Part B: 40 marks - Answer in the spaces provided.

SHOW ALL WORKING

Part A For each question (1 - 10) choose the best of the four possible answers and indicate your choice by filling in the appropriate space on the Answer Sheet provided. Fill in only ONE choice for each question using a ball point or ink pen. If you change your mind, draw a cross through your first mark completely.

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

(A) Polymerisation

(B) Hydration

(C) Neutralisation

(D) Dehydration

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

(A) Catalytic cracking

(B) Polymerisation

(C) Fermentation

(D) Esterification

3. 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

4. In an experiment, a student found that when 0.10g ethanol burnt it raised the temperature of 100g water from 22.0^0C to 27.5^0C. The student calculated the molar heat of combustion of ethanol. (specific heat of water is 4.18 J/^{0}C/g) to be:

(A) 2.29×10^3 J.

(B) 9.196×10^3 J.

(C) 2.29×10^4 J.

(D) 1.058×10^6 J.

5. In the reaction $_7N^{14} + X \rightarrow {}_9Y^{18}$, the identities of X and Y are:

(A) $_2He^4$ and F

(B) $_2He^4$ and O

(C) $_2P^4$ and F

(D) $_2P^4$ and O

6. Which of the following is not an acid/base reaction?

(A) $CH_3COOH_{(l)} + H_2O_{(l)} \longrightarrow CH_3COO^-_{(aq)} + H_3O^+_{(aq)}$

(B) $NH_4^+_{(aq)} + H_2O_{(l)} \longrightarrow NH_{3(l)} + H_3O^+_{(aq)}$

(C) $Mg^{2+}_{(aq)} + CO_3^{2-}_{(aq)} \longrightarrow MgCO_{3(s)}$

(D) $OH^-_{(aq)} + NH_{3(l)} \longrightarrow NH^{2-}_{(aq)} + H_2O_{(l)}$

7. 12 grams of an unknown gas occupies 17.0 L at 0^oC and 100 kPa. The weight of one mole of this gas, in grams, is:

(A) 16. (B) 9. (C) 12. (D) 18.

8. Ethanol, C_2H_5OH, of molar mass 46 g, reacts with oxygen according to the equation:

$$C_2H_5OH_{(l)} + 3O_{2(g)} \longrightarrow 2CO_{2(g)} + 3H_2O_{(l)}$$

The volume of carbon dioxide produced at 0^oC and 100 kPa when 0.05 mole of ethanol undergoes combustion will be:

(A) 2.27L (B) 6.72 L (C) 11.2L (D) 22.7 L

9. Carbon dioxide and water react as shown below:

$$H_2O_{(l)} + CO_{2(g)} \leftrightarrow H_2CO_{3(aq)} + \text{heat}$$

The method, which would not be suitable for determining the equilibrium position, is the measurement of:

(A) the pH.

(B) the pressure.

(C) the temperature.

(D) the total mass.

10. Which of the following statements best indicates the difference between a strong acid HX and a weak acid HY?

(A) HX will have a more acrid smell than HY.

(B) NaOH will react more slowly with HX than with HY.

(C) HX will react with gold, but HY will not.

(D) A 1.0 M solution of HX will be a better electrolyte than a 1.0 M solution of HY.

Section B Write your answers in the spaces provided.

11. Compare the reactivities of the alkenes with the corresponding alkanes to a solution of bromine in water. (**3**)

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

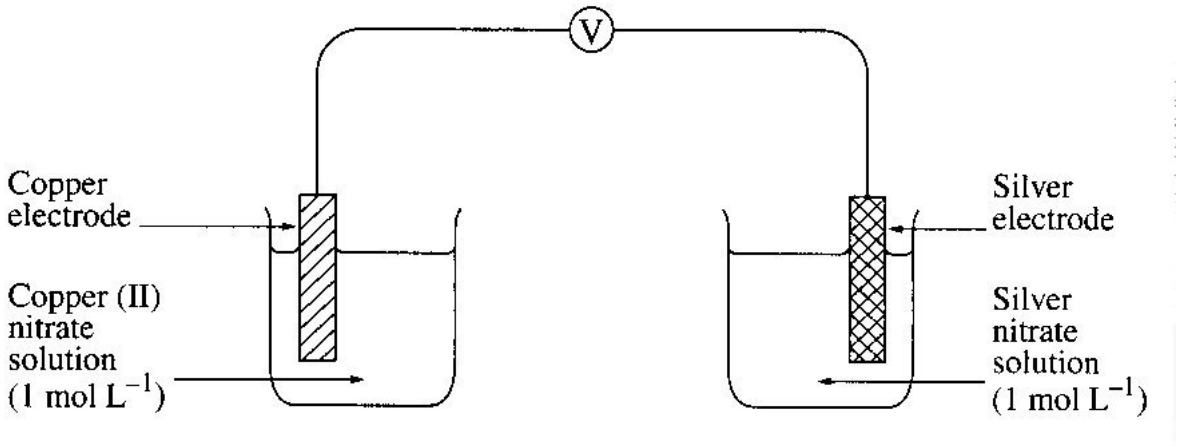
(b) Using geometric formulas, give the reaction for this process. (**1**)

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

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

13. You made ethanol from sugar (sucrose) in the laboratory and monitored the mass changes. Describe this process and draw and label the apparatus you used to separate the ethanol from it. (**4**)

14. Examine the cell shown below.



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

(b) Describe how you made a salt bridge in the laboratory (**1**)

(c) Write the two half reactions and the overall reaction, and calculate the voltage produced by it. (**3**)

(d) On the diagram above, use an arrow to clearly indicate the **direction** of flow of electrons. (**1**)

15. Identify three factors which can affect the equilibrium in a reversible reaction. (**3**)

16. Describe the use of the pH scale in comparing acids and bases. (**2**)

17. Distinguish between a strong and concentrated acid, giving examples. (**2**)

18. Pollutants may significantly influence the pH of rainwater, producing "acid rain". (**5**)

(a) Name two pollutants which might cause rain to be acidic.

(b) State one industrial process in which one of these pollutants might be formed. Suggest a possible method by which the amount of this pollutant may be decreased.

(c) Write an equation to show how one of these pollutants reacts with water to form acid rain.

19. What is the pH of a 0.02 M solution of H_2SO_4? (**1**)

20. Ammonium chloride, NH_4Cl is an acidic salt in water.
Write a balanced equation to show how ammonium chloride is acidic. (**2**)

21. In a titration, 25.0 mL of sodium hydroxide was placed in a flask. It was found that an average of 14.6 mL of 0.06 M H_2SO_4 was needed to neutralise the sodium hydroxide. (**4**)

(a) Name the equipment used to transfer the sodium hydroxide to the flask.

(b) Determine the concentration of the sodium hydroxide.

22. Consider the equilibrium: **(3)**

$HAsO_{2(aq)} + Br^-_{(aq)} \leftrightarrow HBr_{(aq)} + AsO_2^-{}_{(aq)}$

(a) Name one base in this equilibrium.

_____

(b) What effect, if any, would the addition of HBr have upon the position of equilibrium? Explain.

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Blakehurst High School Y12 Chemistry H/Y 2003 - Marking Criteria

Q 1-10 Multiple Choice, 1 mark each.
1. D 2. C 3. A 4. D 5. A 6. C 7. A 8. A 9. D 10. D

Q 11

Criteria	Marks
Describes alkanes and alkenes, in relation to bonding. Describes the reactions with bromine water. Gives reaction of alkenes with bromine.	3
Two of the above.	2
One of the above	1

Q12 (a)

Criteria	Marks
Correctly names the process	1

(b)

Criteria	Marks
Draws correct geometric formula	1

(c)

Criteria	Marks
Names a source of ethene	1
Describes an important step in the separation of ethene from other substances.	1

(d)

Criteria	Marks
Name two objects or materials that are made from polyethene.	1

Q13

Criteria	Marks
Describes the process of fermentation	1
Describes one method of determining mass loss during the process	1
Draws and labels distillation apparatus	2

Q14 (a)

Criteria	Marks
Draws salt bridge touching both liquids.	1

(b)

Criteria	Marks
States a method of making a suitable salt bridge.	1

(c)

Criteria	Marks
Writes two half equations, a fully balanced equation and calculates the voltage.	3
As above but omits one step or makes one error.	2
As above but omits two steps or makes two errors	1

(d)

Criteria	Marks
Arrow correctly drawn.	1