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Mrs S. Mathis
Mrs A. Paterson

PYMBLE LADIES' COLLEGE

SEMESTER 2, 2006

YEAR 11 ~ CHEMISTRY

EXAMINATION

TIME ALLOWED: 2 HOURS

TOTAL MARKS: 80

DIRECTIONS TO CANDIDATES

ANSWER ALL QUESTIONS IN THE ANSWER BOOKLETS
There are THREE answer booklets.
Write your name in the space at the top of each answer sheet.

PART A: **15 multiple choice questions, each worth one mark.**
Indicate your answers on the multiple choice answer sheet.

PART B: **13 extended response questions. (Total of 65 marks)**
Marks for each question are indicated
Answer each question in the space provided.

Please circle the name of your teacher on the first page of each answer booklet.

A separate Periodic Table and data sheet are provided.

PART A

Total Marks – 15
Attempt ALL questions

Select the alternative that best answers the question.
Mark your answers on the Multiple Choice Answer Sheet provided.
[Allow about 25 minutes for this part]

Question 1.

A mixture of substances is separated into its pure components. The mixture is made up of sand, salt and wood chips.
Which series of techniques would produce a pure sample of salt?

A. sieving, solution, evaporation of residue
B. solution, filtration, evaporation of residue
C. solution, skimming, filtration, collection of residue
D. solution, filtration, evaporation of filtrate

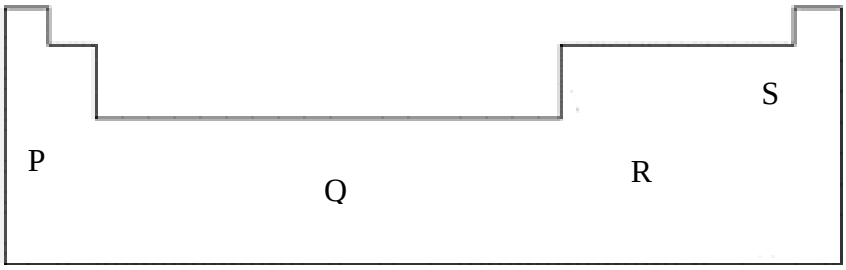
Question 2.

How is "Gravimetric Analysis" best defined?

A. The analysis of a mixture to determine its percentage composition
B. The analysis of a compound by weighing.
C. The separation of a mixture to determine it's components
D. The process to determine the amount of waste products.

Question 3.

The diagram below represents the Periodic table.



Which response correctly identifies the elements as metals, non-metals and semi-metals?

	P	Q	R	S
A.	Metal	Non-metal	Semi-metal	Metal
B.	Non-metal	Non-metal	Metal	Metal
C.	Metal	Metal	Semi-metal	Non-metal
D.	Non-metal	Metal	Non-metal	Non-metal

Question 4.

An element has the following properties:

Boiling point: 883 ºC
Melting Point: 97.7 ºC
Conductivity: High
Reactivity: High

How could the appearance of this element be described?

A. It is a shiny silver-white solid.
B. It is a viscous liquid.
C. It is a yellow powdery solid.
D. It is a colourless odourless gas.

Question 5.

Which of the following metals will react most readily with a dilute solution of sulfuric acid?

A. Tin
B. Iron
C. Nickel
D. Calcium

Question 6.

Select the correct statement concerning the trends from left to right across the third period of the periodic table.

A. Melting point increases
B. Electronegativity increases
C. Ionisation energy decreases
D. Electrical conductivity increases

Question 7.

Who was the scientist who first realised that each atom has a small positive nucleus?

A. Rutherford
B. Thomson
C. Bohr
D. Aristotle

Question 8.

What are the forces called that hold alloys together?

A. Ionic bonds
B. Metallic bonds
C. Covalent bonds
D. Dispersion forces

Question 9.

Sodium chloride (table salt) is very soluble in water (H_2O) but is much less soluble in ethanol (CH_3CH_2OH). What is the reason for this?

A. The covalent bond in sodium chloride is not easily disrupted by the ethanol
B. Water molecules are able to surround the salt ions forming stable ion – dipole bonds
C. Ethanol is a non-polar molecule and as such cannot dissolve ionic substances
D. Water molecules form strong covalent bonds with the salt molecules

Question 10.

When 50mL of a magnesium sulfate, $MgSO_4$, solution is added to 50mL of a solution of barium chloride, $BaCl_2$, a white precipitate forms. When magnesium sulfate solution is added to potassium chloride, KCl, solution, no precipitate forms. On the basis of this information, What precipitate is formed?

A. $BaSO_4$
B. MgCl
C. Ba_2SO_4
D. $MgCl_2$

Question 11.

Which of the following compounds, when dissolved in water, would **not** produce a solution which could conduct electricity?

A. HCl
B. NaBr
C. NH_4NO_3
D. CH_3CH_2OH

Question 12.

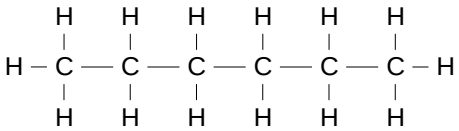
1.0L of a solution contains 0.20mol magnesium nitrate and 0.20mol aluminium nitrate. The concentration of:

A. negative ions is 0.40mol/L.
B. positive ions is 0.40mol/L.
C. aluminium ions is 0.60mol/L.
D. all ions is 0.40mol/L.

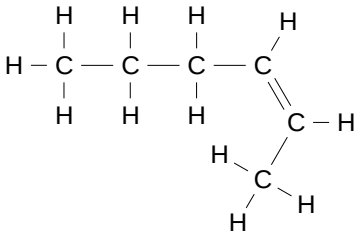
Question 13.

Which of the structures illustrated below represents 2-hexene?

A.



B.



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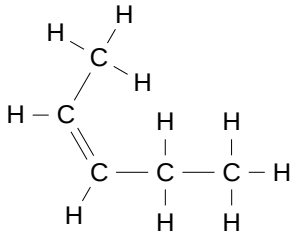
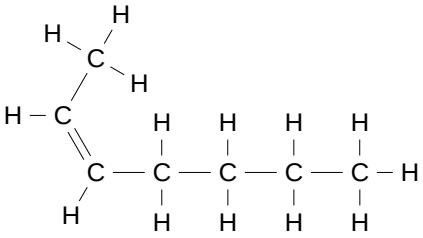


D.



Question 14.

Which physical force is present between adjacent molecules of an alkane?

A. hydrogen bond
B. dipole-dipole force
C. dispersion forces
D. chemical bond

Question 15.

Which equation represents the process of photosynthesis?

A. $6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$

B. $6O_2 + C_6H_{12}O_6 \longrightarrow 6CO_2 + 6H_2O$

C. $12\ CO_2 + 11H_2O \longrightarrow C_{12}H_{22}O_{11} + 12O_2$

D. $12O_2 + C_{12}H_{22}O_{11} \longrightarrow 12CO_2 + 11H_2O$

Name :……

Please circle: Mr P. Krautil Mrs S. Mathis Mrs A. Paterson

Pymble Ladies' College

Chemistry

Year 11, 2006

ANSWER BOOKLETS

General Instructions

- There are three answer booklets.
- Write your name at the top of EACH page.
- Answer ALL multiple choice questions on this Answer Sheet.

PART A

Use a pencil to fill in the circle indicating your answer.
If you need to change an answer put a cross through the incorrect response and then fill in your choice

Start here →	1.	A ○	B ○	C ○	D ○
	2.	A ○	B ○	C ○	D ○
	3.	A ○	B ○	C ○	D ○
	4.	A ○	B ○	C ○	D ○
	5.	A ○	B ○	C ○	D ○
	6.	A ○	B ○	C ○	D ○
	7.	A ○	B ○	C ○	D ○
	8.	A ○	B ○	C ○	D ○
	9.	A ○	B ○	C ○	D ○
	10.	A ○	B ○	C ○	D ○
	11.	A ○	B ○	C ○	D ○
	12.	A ○	B ○	C ○	D ○
	13.	A ○	B ○	C ○	D ○
	14.	A ○	B ○	C ○	D ○
	15.	A ○	B ○	C ○	D ○

Name :……

PART B

Total marks – 65
Attempt ALL questions 16 – 28
Show all relevant working in questions involving calculations.
[Allow about 1 hour and 30 minutes for this part]

Question 16. **[9 marks]**

(a) The atomic number of carbon-12 is 6. What information does this provide? 1

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(b) In carbon -12 what does the "12" represent? 1

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(c) Draw an electron dot diagram for carbon dioxide. 1

(d) Write an ionic equation to show sodium producing a sodium ion. 1

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(e) When sodium reacts with chlorine, describe the type of bond formed. 2

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(f) Compare (similarities and differences) the structure of a metal and an ionic substance. 3

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Question 17. **[3 marks]**

It is not possible to decompose sodium carbonate in the laboratory but it is possible to decompose copper carbonate.

(a) Write an equation for the decomposition of copper carbonate. 1

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(b) In terms of bonding, explain why sodium carbonate does not decompose and yet copper carbonate does. 2

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Question 18. **[4 marks]**

Two elements, R and X were tested and had some of their physical and chemical properties determined.

Property		**R**	**X**
Appearance		Lustrous; silvery	Lustrous; silvery
Ionisation energy (kj/mol)	1st 2nd 3rd	418 3070 4600	502 966 3390
Reaction with water		Reacts violently	Reacts violently

(a) Identify R and X from the following list: copper, barium, lead, gold, potassium, boron. Justify your answer. 3

R = ..……

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X = ……

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(b) Write a balanced equation for the reaction of R with water 1

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Question 19. **[4 marks]**

3.0 g of zinc was reacted with excess sulfuric acid. Hydrogen gas was released in this process.

(a) Write a balanced equation for this reaction. 1

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(b) Calculate the volume of hydrogen gas formed at 100kPa and 25° C 2

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(c) Calculate the number of molecules of hydrogen gas present in (b) 1

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Question 20. **[4 marks]**

Describe an experiment you performed to determine the empirical formula of an ionic compound. Include what measurements you made, major sources of error and your risk assessment.

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Question 21. **[3 marks]**

The three metals; iron, aluminium and copper were extracted and used extensively at different times during mans' history.

(a) Place the metals in the correct order of extraction and use throughout history and 1
(b) Explain why you placed them in that order. 2

1st ……

2nd ……..……..

3rd ……

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Question 22. **[5 marks]**

An organic compound known to contain carbon, hydrogen and chlorine was analysed and found to consist of 24.24% carbon and 4.04% hydrogen by mass. Its molar mass was 99g/mol.

(a) Determine its empirical formula 3

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(b) What is its molecular formula? 2

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Question 23. **[4 marks]**

(a) Draw a structural diagram of ammonia and name the molecular shape. 2

(b) Explain how molecular shape is involved in determining the polarity of a molecule. 2

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Question 24. **[5 marks]**

The following list contains substances which exhibit a range of bonding types.

Methanol (CH_3OH)	Potassium hydroxide (KOH)
Silicon dioxide (SiO_2)	Phosphorus trichloride (PCl_3)
Hydrogen sulphide (H_2S)	Ethane (CH_3CH_3)

(a) Name a substance from the list in which the only intermolecular forces are: 2

i) Dispersion forces ……..

ii) Dipole-dipole forces (but NOT hydrogen bonds) and dispersion forces

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(b) Choose one substance which would show HYDROGEN BONDING. Draw a structural diagram including at least three molecules to show how the hydrogen bonding occurs. 3

Question 25. **[6 marks]**

(a) A small dog needs 50 L of water to be bathed.

To ensure that the dog is comfortable the water should be at a temperature of 35 ºC. If the water was initially at a temperature of 14 ºC, calculate the quantity of heat required to raise the temperature of the water. 3

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(b) Water is an effective temperature moderating substance.
Explain, using two examples, why this property is important to living things. 3

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Question 26. **[5 marks]**

When solutions of potassium iodide and lead nitrate are mixed a yellow precipitate is produced. In one experiment 250 ml of 2 mol.L^{-1} lead nitrate solution is mixed with excess potassium iodide solution.

(a) Write a net ionic equation for the reaction 2

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(b) Calculate the mass of lead iodide produced. 3

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Name :……

Question 27. **[5 marks]**

The structure of 3 allotropes of carbon are pictured below.

(a) What is an allotrope? 1

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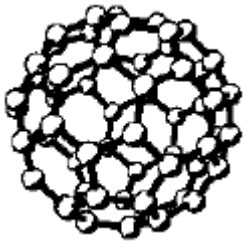
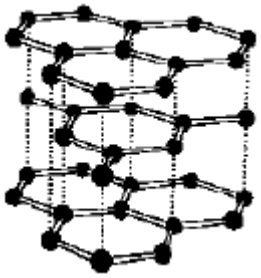
(b) Identify the 3 forms of carbon illustrated below. 2





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(c) Compare ONE property of any two allotropes in terms of their bonding. 2

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Question 28. **[8 marks]**

The combustion of fuels is always exothermic. These reactions produce usable energy.

(a) One alkane present in Paraffin is eicosane ($C_{23}H_{48}$). Its Heat of combustion is 40 kJ/g. Calculate its Molar Heat of Combustion. 1

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(b) Write an equation for the complete combustion of the eicosane. 1

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(c) Explain why an exothermic reaction releases energy in terms of bonds making and bond breaking. 2

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(d) If the activation energy required for the combustion of Eicosane is 5000 kJ , draw an energy profile to illustrate the energy changes when this component of paraffin wax is burned. 3

(e) On your energy profile above clearly show how the profile would differ if the combustion reaction was performed using a catalyst.
Label and use a different colour or a dotted line to ensure each section is clearly indicated. 1

---- END OF PAPER ----