

BAULKHAM HILLS HIGH SCHOOL

HALF YEARLY EXAMINATION

2009

YEAR 11

CHEMISTRY

GENERAL INSTRUCTIONS

- Reading time - 5 mins
- Working time - 1 ½ hours
- Write, using black or blue pen only
- Draw diagrams using pencil
- Show all working

TOTAL MARKS: 65

Section I (15 marks)

15 Multiple Choice Questions worth 1 mark each

Section II (50 marks)

All questions are compulsory

Answer questions in the allotted spaces

Section I - 10 Multiple Choice Questions worth 1 mark each

1. In which of the four “spheres” is carbon one of the most abundant elements?

- a) Atmosphere
- b) Biosphere
- c) Hydrosphere
- d) Lithosphere

2. Which is the correctly balanced equation?

- a) $\text{FeS} + 2\text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2\text{S}$
- b) $\text{Cu} + 3\text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + 2\text{NO}_2 + 2\text{H}_2\text{O}$
- c) $\text{Al}_2(\text{SO}_4)_3 + 4\text{NaOH} \rightarrow 2\text{Al}(\text{OH})_3 + 2\text{Na}_2\text{SO}_4$
- d) $\text{Cu}(\text{OH})_2 \rightarrow \text{CuO} + 2\text{H}_2\text{O}$

3. The chemical formula for manganese (IV) oxide is

- a) MnO_4
- b) Mn_2O_4
- c) MnO_2
- d) Mn_2O

4. The following data was collected about the elements M, N, O and P.

Element	Melting Point (°C)	Boiling Point (°C)	Density (g/cm ³)	Electricity Conductivity ($\mu\Omega^{-1}\text{m}^{-1}$)
M	1410	3267	2.03	10^{-3}
N	1064	2808	19.3	44
O	114	184	4.95	10^{-13}
P	3984	4830	2.26	0.07

Which one of the four elements above is the only metal?

- a) M
- b) N
- c) O
- d) P

5. The list of only metallic elements is:

- a) barium, calcium, radon and lead
- b) copper, lead, iron and chlorine
- c) sodium, cobalt, lithium and potassium
- d) chlorine, bromine, oxygen and silicon

6. Choose the combination that gives the correct state for each element in the table below (at 25°C and atmospheric pressure).

ELEMENTS

	Solid	Liquid	Gas
a)	Lithium	Bromine	Mercury
b)	Lithium	Mercury	Chlorine
c)	Barium	Mercury	Boron
d)	Chlorine	Bromine	Iodine

7. Consider the three elements listed below.

Element	Number of Protons	Number of Neutrons	Mass Number	Electron Configuration
Beryllium	4	6	9	2,2
Magnesium	12	12	24	2,8,2
Calcium	20	20	40	2,8,8,2

These elements exhibit similar chemical behaviour. The factor in the table which is responsible for this similarity is:

- a) the number of electrons in the *first* shell of each element
b) the mass number for each element
c) the number of electrons in the *valence* (outer) shell of each element
d) the number of protons in each atom
8. Metals are better conductors of electricity than non-metals because
- a) metallic bonds are stronger than covalent bonds
b) metals have a higher melting point than non-metals
c) metals have delocalised valence electrons
d) metal atoms are smaller than non-metal atoms
9. Which substance of the following list DOES NOT exist as molecules?
- a) NaCl
b) H₂O
c) HCl
d) Xe
10. The electrolysis of water is
- a) a physical change because two new substances are formed
b) a chemical change because no new substances are formed
c) a physical change because no new atoms are formed
d) a chemical change because two new substances are formed
11. An example of a physical change is
- a) rusting of iron
b) burning natural gas
c) decomposing grass
d) melting ice

12. Which of the following shows the observed effect of light on silver salts as well as an application of the use of this reaction?

	Observed Effect	Application
a)	Goes opaque	In photography
b)	Goes grey	In sun screens
c)	Goes opaque	In sun screens
d)	Goes grey	In photography

13. The properties of substances are related to the type of bonding present. Select the most correct statement:

- a) all covalent substances have low melting points
- b) covalent substances are generally poor conductors of heat and electric currents
- c) ionic substances are good electrical conductors in the solid state
- d) all ionic substances are soluble in water

14. Four substances were examined and their properties displayed in the following table:

Substance	Melting Point (°C)	Electrical Conductivity When Molten	Electricity Conductivity When Solid
W	81°	Nil	Nil
X	850°	Good	Nil
Y	660°	Good	Good
Z	0°	Very poor	Nil

Which substance(s) are likely to be covalent molecular?

- a) W only
- b) W and Z
- c) X and Y
- d) Y and Z

15. Consider the elements labelled A, B, C, D and E found in the Periodic Table as shown above. What would be the type of bonding found in Element B?

A							
	B				D	C	
						E	

- a) Molecular covalent
- b) Covalent network
- c) Conic
- d) Metallic

Name: Teacher:

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Place a (X) in the box that corresponds to the best answer

Question				
1				
2				
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Marks	
Section I	/15
Section II	/50
Total	/65

Section II - 50 Marks

Write your answers for Section II in the spaces provided.

Marks

Question 16

Humans use naturally occurring mixtures to extract useful substances.

- a) Identify one example of a mixture than can be obtained either from the lithosphere, hydrosphere, biosphere or atmosphere. **1**

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- b) Outline the separation method used to separate your chosen mixture. **1**

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- c) Describe the physical properties that allow the above separation process to be used. **1**

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- d) Give two uses for the products separated from your mixture. **1**

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Question 17

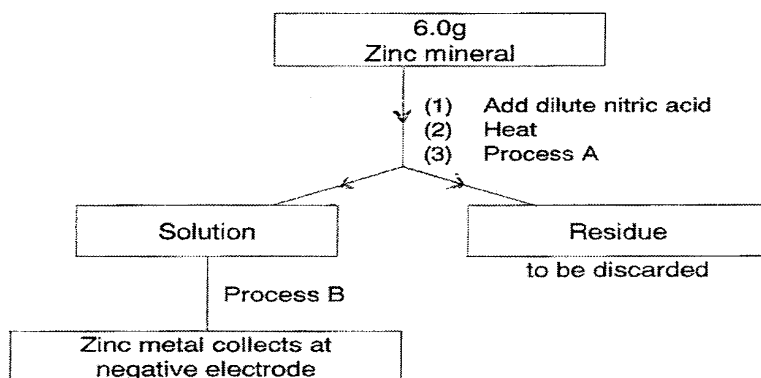
Marks

Identify the difference between a mixture and a compound in terms of the particle theory.
Use a diagram and a key to illustrate your answer.

2

Question 18

A zinc mineral was analysed as shown in the flow chart below.



Initial mass of electrode = 18.98g

Final mass of electrode and deposited zinc = 20.18g

a) Name Process A **1**

b) Calculate i) The mass of zinc deposited at the negative electrode **1**

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ii) Percentage by weight of zinc in the mineral **1**

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Question 18 (continued)

Marks
1

- c) What assumption is made in calculating the percentage mass of zinc using the above method of analysis?

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Question 19

For each of the substances listed, determine their state (solid, liquid or gas) at room temperature.

2

Substance	State at Room Temperature	Melting Point (Degrees Celsius)	Boiling Point (Degrees Celsius)
Element X		-71	-62
Compound Z		-90	84

Question 20

Read the description of four elements listed below.

Element A is a hard crystalline solid. Its melting point is 1410°C.
The element is used extensively as an electrical semi conductor.
It is a conductor of heat

Element B is a dense purple solid which fumes in air. It melts at 113.5°C
While its vapours are poisonous and cause irritation to the eyes and throat,
it is a trace element essential to humans

Element C is soft and shiny. It dulls in air and has a melting point of 769°C.
The element is a conductor of heat and electricity and reacts with water.

Element D is a dense, yellow solid with a brilliant lustre. It is malleable and ductile
and an excellent conductor of both heat and electricity. It melts at 1064°C.
This element is usually found uncombined in nature.

- a) From the description of the elements, classify them as metals, semi metals or non metals. **1**

Element A Element B

Element C Element D

- b) Given that the elements are silicon, gold, strontium and iodine match them symbols to the descriptions of the elements. **1**

Element A Element B

Element C Element D

Question 21

Marks

The table below gives physical properties for a number of metals. Use this table to answer the questions below.

Metal	Density (g cm⁻³)	Melting Temperature (°C)	Electrical Conductivity (MS m⁻¹)	Thermal Conductivity (J s⁻¹ m⁻¹ K⁻¹)	Tensile Strength
V	8.96	1085	57.9	401	high
W	11.4	327	4.8	37	low
X	1.74	650	23	156	low
Y	2.7	660	38	237	moderate
Z	7.86	1535	10.3	80	very high

Based only on the information given in the table, which metal would be most suitable for the following purpose? Give a reason for your answer.

- a) The construction of a lightweight frame for a house? **2**

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- b) The making of saucepans? **2**

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Question 22

Complete the table below to show how valence electrons are involved in chemical bonding. **3**

Bonding Type	Role of Valence Electrons in Bonding
Covalent Bonding	
Ionic Bonding	
Metallic Bonding	

Question 23

Marks

Select an atom from the Periodic Table that forms a negative ion. Explain the process that occurs in order for that ion to form. Draw the Lewis Structure of your chosen atom and of the ion formed.

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Question 24

Use the Lewis dot structures to represent the following:

a) Hydroxide ion OH^-

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b) Carbon Dioxide CO_2

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Question 25

Marks

Consider the following processes:

- i) melting of table salt**
- ii) decomposition of sugar, forming carbon**

Identify each as either a physical or chemical change and describe the process in terms of bonds and particles. **3**

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Question 26

Copper Carbonate can be decomposed using heat.

- a) Draw a diagram of the arranged equipment necessary to decompose copper carbonate and identify the gas produced in the reaction. **2**

- b) Write a symbol equation for the reaction. **1**

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c) Explain why copper carbonate decomposes on heating whereas sodium carbonate does not. **2**

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Question 27

Explain why boiling is an example of a physical change whilst electrolysis is an example of a chemical change. **4**

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Question 28

H₂O is an empirical formula and a molecular formula for water however NaCl is only an empirical formula for sodium chloride. Explain. **3**

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Question 31

Marks

Identify the kinds of bonds between atoms that are present for each of the solids given below.

a) Magnesium Hydroxide $\text{Mg}(\text{OH})_2$ (s) **1**

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b) Iron Sulfide FeS (s) **1**

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End of Exam