DAPTO HIGH SCHOOL

YEAR 11 CHEMISTRY

Preliminary Mid-Course Examination 2009

General Instructions:

- Reading time – 5 minutes
- Working time – 1 ½ hours
- Write using blue or black pen
- Write your Student Number/Name at the top of every page
- Detach the periodic table found at the end of this paper and use it when required during the examination

TOTAL MARKS – 75

PART A
Total Marks (35)
Attempt ALL 35 questions, 1 mark for each question
Answer the questions on the multiple choice answer sheet provided
Allow about 30 minutes for this part of the examination

PART B
Total Marks (40)
Attempt ALL 11 short answer and extended response questions
Answer the questions on the answer sheet provided
Allow about 60 minutes for this part of the examination

This paper MUST NOT be removed from the examination room

STUDENT NUMBER/NAME: ……..

PART A

35 marks
Attempt ALL questions
Mark your answers on the answer sheet provided
Select the alternative **A**, **B**, **C**, **D** that **best** answers the question

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1. Which of the following groups contains ***mixtures*** only?
(A) sodium metal, fluorine gas, table salt
(B) vinegar, air, bronze
(C) soil, polystyrene, graphite
(D) ammonia gas, hydrogen chloride gas, carbon tetrachloride

2. Which of the following is an ionic compound?
(A) silicon (IV) oxide
(B) sulfur hexabromide
(C) beryllium phosphide
(D) boron nitride

3. The following data concerns the analysis of a sample of copper alloy.

Mass of the alloy	6.00 grams
Mass of the platinum electrode	18.00 grams
Mass of the electrode and electroplated copper	20.35 grams

The mass of the copper in the alloy and the percentage of the copper in the alloy is:
(A) 2.65 grams, 53%
(B) 12.35 grams, 86%
(C) 2.35 grams, 39%
(D) 2.35 grams, 16%

4. During filtration the substance that passes through the filter paper is called the:
(A) liquid
(B) solution
(C) residue
(D) filtrate

5. Which of the following groups contains only non-metal elements?
(A) Cl, Ca, Pd, P
(B) I, O, Xe, N
(C) Fe, Si, S, Po
(D) N, Br, Ar, Ba

6. Place the elements magnesium, lead, calcium, silver in order from the most to least reactive:
(A) lead, calcium, magnesium, silver
(B) magnesium, calcium, lead, silver
(C) calcium, magnesium, lead, silver
(D) calcium, magnesium, silver, lead

7. Which list of common substances contains only covalent compounds?
(A) O_3, P_4, NaCl, SO_4
(B) SO_4, NaCl, $CuSO_4$, KF
(C) H_2S, KF, CO_2, H_2
(D) H_2O, NH_3, N_2O, CO_2

8. Calcium forms the ion Ca^{2+}.

The electron configuration of the calcium ion would be:
(A) 2, 8
(B) 2, 8, 2
(C) 2, 8, 8, 2
(D) 2, 8, 8

9. The correct formula for the covalent compound nitrogen trichloride is:
(A) NCl_3
(B) 3NCl
(C) N_3Cl
(D) N3Cl

10. The substances containing only ***ionic*** bonds would be:
(A) NaH, $CuCl_2$,$MgSO_4$
(B) H_2, CO_2, NH_3
(C) AgBr, HBr, ClBr
(D) $CoCl_2$, $Co(NO_3)_2$, CO_2

11. The chemical equation to show the decomposition of copper carbonate is:
(A) $CuSO_4(s) \rightarrow CuO(s) + CO_2(g)$
(B) $CuCO_3(s) \rightarrow CuO(s) + CO_2(g)$
(C) $CuCO_3(s) \rightarrow CuO(s) + H_2O(l)$
(D) $CuSO_4(s) \rightarrow CuO(s) + CO(g)$

12. Metals have a good electrical conductivity, are malleable, ductile and generally have high melting points.

This can be explained best because of their:
(A) lattice structure
(B) proton and electron numbers
(C) ionic bonds
(D) delocalised electrons

13. The Periodic Table was developed over many years and with input from many different scientists.

The correct order for the contributions of four (4) scientists is:
(A) Mendeleev, Lavoisier, Dobereiner, Newlands
(B) Newlands, Dobereiner, Mendeleev, Lavoisier
(C) Lavoisier, Dobereiner, Newlands, Mendeleev
(D) Lavoisier, Newlands, Mendeleev, Dobereiner

14. Which of the following is a physical change?
(A) melting wax
(B) burning petrol
(C) boiling an egg
(D) cement setting

15. A certain solid is a non-conductor of electricity in the solid state, has a high melting point and is extremely hard and brittle.

This solid is likely to be:
(A) metallic
(B) an ionic compound
(C) a covalent network substance
(D) a covalent molecular substance

Questions 16 to 19 refer to the following table

Substance	**M.P. °C**	**B.P. °C**	**Density g/mL**	**Electrical Conductivity**	**Solubility g/100g**
(A)	273	891	5.7	120	0
(B)	-186	-169	0.037	0	2.9
(C)	1810	2943	1.5	2.1	0
(D)	421	1081	2.6	0	43.7

Which substance would probably be:

16. diamond

17. metallic

18. a halogen

19. a salt

20. Substance X is ***ionic***, and substance Y is a ***network covalent solid***.

What is one property that they would definitely share?
(A) electrical conductivity
(B) high melting point
(C) solubility in water
(D) colour

21. The equation which could represent the ***electrolysis*** of water is:
(A) $H_2O(l) \rightarrow H_2O(g)$
(B) $H_2O(l) \rightarrow 2H(g) + O(g)$
(C) $2H_2O(l) \rightarrow 2H_2(l) + O_2(l)$
(D) $2H_2O(l) \rightarrow 2H_2(g) + O_2(g)$

22. The element which is NOT a metal has an atomic number of:
(A) 11
(B) 29
(C) 67
(D) 85

23. The trend in atomic radius across the third period elements (from sodium to chlorine) is that it:
(A) increases only
(B) decreases only
(C) increases then decreases
(D) remains unchanged

24. The most abundant element found in compounds in the Earth's crust and hydrosphere is:
(A) nitrogen
(B) oxygen
(C) hydrogen
(D) carbon

25. An alloy is:
(A) an element
(B) a compound
(C) a mixture
(D) a pure substance

26. Aluminium was discovered well after iron because:
(A) there is more iron on Earth than aluminium
(B) iron is easier to extract from its ores than aluminium
(C) aluminium is less dense than iron
(D) iron rusts more easily than aluminium

27. The trend in electronegativity as you go down a group is that it:
(A) increases only
(B) increases then decreases
(C) decreases than increases
(D) decreases only

28. Which of the following represents the net ionic equations for the reaction between zinc and hydrochloric acid?
(A) $Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$
(B) Zinc + Hydrochloric acid $\rightarrow$ Zinc chloride + Hydrogen gas
(C) $Zn(s) + 2H^+(aq) \rightarrow Zn^{2+}(aq) + H_2(g)$
(D) $Zn(s) \rightarrow 2Zn^{2+} + 2e^-$

29. Of the following, the ***metal*** most likely to be able to react with water would be:
(A) calcium
(B) aluminium
(C) chromium
(D) beryllium

30. The equation $Al(s) \rightarrow Al^{3+} + 3e^-$ is best known as:
(A) reduction of aluminium
(B) decomposition of aluminium
(C) first ionisation every of aluminium
(D) oxidation of aluminium

31. The process whereby atoms gain elections is called:
(A) reduction
(B) precipitation
(C) oxidation
(D) combustion

32. The compound formed between Aluminium and Chlorine has the following formulae and name:
(A) $AlCl_3$, aluminium chlorite
(B) Al_3Cl, aluminium chloride
(C) $AlCl_3$, aluminium trichloride
(D) $AlCl_3$, aluminium chloride

33. Which elements belong to the same group as Boron?
(A) carbon, oxygen, nitrogen
(B) silicon, arsenic, polonium
(C) indium, gallium, aluminium
(D) carbon, aluminium, silicon

34. Which of the following is the balanced chemical equation between lithium and oxygen?
(A) $Li + O_2 \rightarrow Li_2O$
(B) $4Li + O_2 \rightarrow 2Li_2O$
(C) $2Li + O_2 \rightarrow Li_2O$
(D) $2Li + O_2 \rightarrow 2LiO$

35. What is the reducing agent in the reaction between aluminium and hydrochloric acid?
(A) aluminium
(B) hydrochloric acid
(C) hydrogen
(D) chlorine

END OF PART A

STUDENT NUMBER/NAME: ……..

PART B

40 marks
Attempt ALL questions
Answer the questions on the answer sheet provided

Marks

Question 36 (3 marks)
Draw electron dot diagrams for:

a) the compound formed between fluorine and oxygen **1**

b) the compound formed between Li and S **1**

c) ammonia, NH_3 **1**

Question 37 (2 marks)
A piece of steel wool is placed into a solution of copper sulfate. A displacement reaction occurs as follows:

$$Fe(s) + CuSO_4(aq) \rightarrow Cu(s) + FeSO_4(aq)$$

Write the ***oxidation*** and ***reduction <u>half equations</u>*** for this reaction. **2**

Question 38 (4 marks)
Describe what you would observe if you added a small amount of:
a) magnesium and
b) copper to:

i) cold water **2**

ii) hydrochloric acid **2**

Write equations for any chemical reactions that occur.

Question 39 (2 marks)
Bronze is a common alloy of copper. Common bronze is composed of copper and one other metal.

i) Identify the metal **1**

ii) Compare the properties of bronze and copper **1**

Question 40 (2 marks)
Atoms cannot have the following configurations: (1, 3) and (2, 7, 4).

State a reason for each incorrect configuration. **2**

Marks

Question 41 (4 marks)
The successive ionisation energies for the first eight electrons of an element, G, in units of MJ/mole are:

I_1	I_2	I_3	I_4	I_5	I_6	I_7	I_8
1.006	2.26	3.38	4.568	7.00	8.50	27.116	31.746

a) How many electrons are present in the valence shell of element G? **1**

b) What is the normal valency of element G? **1**

c) Is element G a metal or a non-metal? **1**

d) Write the symbol for a common ion of element G **1**

Question 42 (3 marks)
List three (3) observations that could be made when a chemical reaction has occurred. **3**

Question 43 (3 marks)
Balance the following chemical equations:

a) $Ca + H_2O \rightarrow Ca(OH)_2 + H_2$ **1**

b) $Al + O_2 \rightarrow Al_2O_3$ **1**

c) $Pb(NO_3)_2 + Cr \rightarrow Cr(NO_3)_3 + Pb$ **1**

Question 44 (5 marks)
In your studies you performed an experiment to separate a mixture of sand, salt and water.

i) Briefly outline the separation methods you used in this experiment. **2**

ii) Identify the properties of the different components of the mixture that this separation is based on. **3**

Question 45 (4 marks)
Explain why the boiling of water is a physical change while the electrolysing of water is a chemical change. Use diagrams showing any changes at the particle level to illustrate your answer. **4**

Marks

Question 46 (8 marks)
Describe an experiment that you performed to construct an activity series for some common metals. Your description should include:

- Aim **1**
- Method **3**
- Potential safety risks associated with this experiment and the measures you employed to minimise those risks. **4**

END OF PART B

END OF EXAMINATION