

Name : _____ ()

Class : 3E1



Greenridge Secondary School

End-of-Year Examination 2008

Subject : Pure Chemistry (5072)
Secondary Three Express
Paper 1

Date : 9 Oct 2008 (Thursday)

Duration : 1 h

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INSTRUCTIONS TO CANDIDATES

Write your name, index number and class in the spaces at the top of this page and on the OMR sheet.

**HAND UP OTAS SHEET and QUESTION PAPER SEPARATELY.
DO NOT STAPLE THEM TOGETHER.**

There are **40** questions in this paper. Answer **all** questions.
Choose the one you consider correct and record your choice in soft 2B pencil on the OTAS sheet.

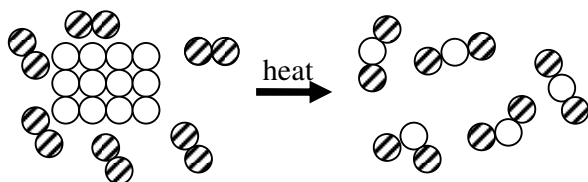
INFORMATION FOR CANDIDATES

Each correct answer is awarded 1 mark.
A copy of the Periodic Table is printed on page 11

This paper consists of 11 printed pages, including this page.

Answer **all** the questions in the OTAS sheet provided.

1. Sodium chloride has a boiling point of 1465°C and water has a boiling point of 100°C . A mixture of sodium chloride and water is heated from room temperature. At which temperature does the mixture begin to boil?
- A** 78°C
B 103°C
C 1465°C
D 1469°C
2. The diagram shows change occurring to the particles of a substance **X**.



Which word describes this change?

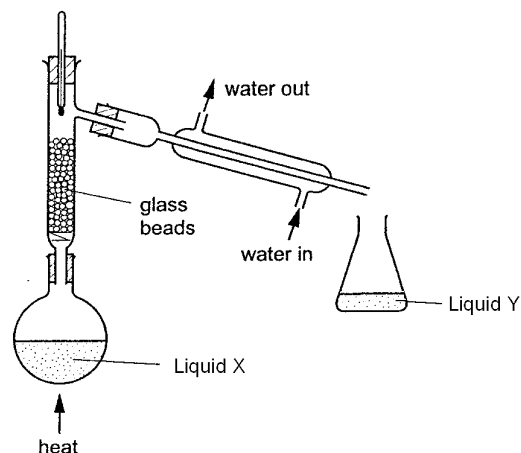
- A** combustion
B evaporation
C melting
D boiling
3. The boiling points of some elements are given below.

<u>Element</u>	<u>Boiling point/$^{\circ}\text{C}$</u>
Argon	-186
Nitrogen	-196
Oxygen	-183
Xenon	-108

These four gases are condensed into liquid air at -220°C and are separated by fractional distillation. When the temperature is increased by 36°C , which substance will remain as liquid?

- A** Nitrogen only
B Xenon only
C Oxygen and xenon only
D Nitrogen and oxygen only
4. Jenny performed a simple titration experiment to prepare sodium chloride. Dilute hydrochloric acid is added to 25.0 cm^3 of aqueous sodium hydroxide in a conical flask using phenolphthalein as indicator. Which would be the colour change during titration if excess acid has been added?
- A** blue to red
B violet to red
C pink to colourless
D green to purple

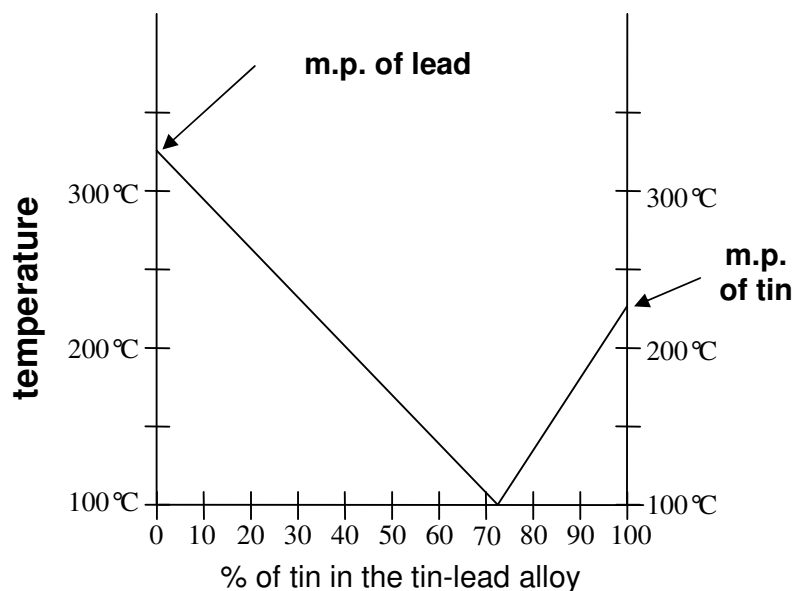
5. Liquid **X** boils over a range of temperature. Liquid **X** undergoes fractional distillation to produce liquid **Y** which has a fixed boiling point of 101.4°C.



Which of the following is correct about liquid **X**?

- A** Liquid **X** is a mixture of two liquids.
- B** Liquid **X** is a mixture of a solid and a liquid.
- C** Liquid **X** is a pure substance.
- D** Liquid **X** and liquid **Y** is the same substance.

The graph gives the melting points of mixtures of lead and tin.
Refer to the graph for Question 6 and 7.

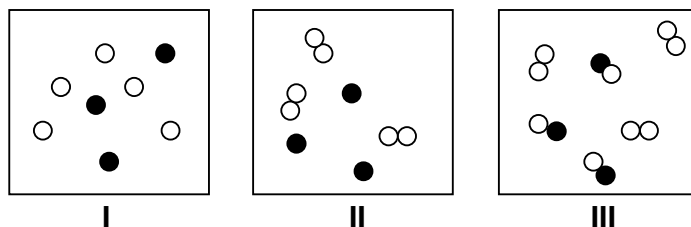


6. From the graph we can deduce that tin-lead alloy must have a melting point
- A** above that of tin.
 - B** below that of tin.
 - C** below that of lead.
 - D** between that of tin and lead.

7. A particular tin-lead alloy is made up of 60% lead and 40% tin. Which of the following could be the melting point of the alloy?
- A** 100 °C
B 180 °C
C 200 °C
D 220 °C

8. Which one of the following contains two covalent compounds?
- A** Water, carbon monoxide
B Limewater, calcium oxide
C Calcium oxide, calcium
D Sea water, air

9. Which diagram shows a mixture of a noble gas and a halogen?



- A** I only
B II only
C I and II only
D II and III only
10. An element **E** has an atomic number of 17 and mass number of 35. What is the atomic structure and formula of the **ion** of **E**?

	<u>neutrons</u>	<u>electrons</u>	<u>formula of ion</u>
A	17	17	E ⁺
B	17	18	E ⁻
C	18	17	E ⁺
D	18	18	E ⁻

11. Which one of the following sets consists only of the electronic structures of metals from the same period?

A	1	2	2.1
B	2.1	2.8.1	2.8.8.1
C	2.8.1	2.8.2	2.8.3
D	2.8.6	2.8.7	2.8.8

12. Which of the following element exists as diatomic molecules closely packed together at room temperature and pressure?

- A** ozone
B helium
C hydrogen
D iodine

13. Sodium has two isotopes, which may be represented as ${}_{11}^{23}\text{Na}$ and ${}_{11}^{24}\text{Na}$.
How does ${}_{11}^{24}\text{Na}$ atom differ from ${}_{11}^{23}\text{Na}^+$ ion?
- A It has 1 more proton and 1 more electron.
 - B It has 1 more proton, and 1 less electron.
 - C It has 1 more neutron and 1 more electron.
 - D It has 1 more neutron and 1 less electron.
14. What is the number of shared electrons in an ammonia molecule (NH_3)?
- A 1
 - B 2
 - C 3
 - D 6
15. A compound **X** is made up of two elements: a halogen and an element **Y**. Which one of the following properties of **X** indicates most clearly whether element **Y** is a metal or a non-metal?
- A **X** has a boiling point below 1000°C .
 - B **X** does not conduct electricity in solid state.
 - C **X** conducts electricity only in molten state.
 - D **X** is insoluble in water.
16. The atom of element **X** has the electronic configuration 2.6.
Which statement(s) about element **X** is/are correct?
- I It forms a basic oxide with sodium.
 - II It forms an acidic oxide with hydrogen.
 - III It forms an amphoteric oxide with zinc.
- A I only
 - B I and II only
 - C I and III only
 - D II and III only
17. Ethanoic acid (CH_3COOH) is a weak, monobasic organic acid.
Which of the following statement(s) is/are true of ethanoic acid?
- I Each molecule can produce only one hydrogen ion in water.
 - II It has a pH of 1.
 - III It reacts with sodium hydroxide to form salt and water only.
- A I only
 - B I and II only
 - C I and III only
 - D II and III only
18. In which of the following reactions does **not** produce effervescence?
- A calcium hydroxide with ammonium nitrate
 - B calcium carbonate with dilute hydrochloric acid
 - C calcium with dilute hydrochloric acid
 - D calcium oxide with dilute hydrochloric acid

19. Which of the following salts **cannot** be prepared by a reaction between a dilute acid and a metal?
- A calcium chloride
 - B copper (II) chloride
 - C magnesium sulphate
 - D zinc nitrate
20. Which substance is **not** used to prepare magnesium chloride by reaction with hydrochloric acid?
- A magnesium carbonate
 - B magnesium nitrate
 - C magnesium hydroxide
 - D magnesium oxide
21. What is the ionic equation for the neutralisation of aqueous sodium hydroxide with dilute nitric acid?
- A $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$
 - B $\text{Na}^+ + \text{NO}_3^- \rightarrow \text{NaNO}_3$
 - C $\text{Na}^+ + \text{OH}^- \rightarrow \text{NaOH}$
 - D $\text{NaOH} + \text{H}^+ \rightarrow \text{Na} + \text{H}_2\text{O}$
22. In which compound is nitrogen in its lowest oxidation state?
- A N_2O
 - B NH_3
 - C NO
 - D NO_2
23. What happens when a chlorine atom, Cl, is changed into a chloride ion, Cl^- ?
- A It is oxidised.
 - B It is reduced.
 - C It loses a proton.
 - D It loses an electron.
24. In which change has oxidation taken place?
- A $\text{CO}_2 \rightarrow \text{CO}_3^{2-}$
 - B $\text{NO}_2 \rightarrow \text{NO}_3^-$
 - C $\text{SO}_2 \rightarrow \text{SO}_3^{2-}$
 - D $\text{SO}_3 \rightarrow \text{SO}_4^{2-}$
25. Which one of the following metals does **not** produce a soluble salt and hydrogen gas when reacted with dilute hydrochloric acid?
- A potassium
 - B zinc
 - C calcium
 - D lead
26. When zinc is added to a solution of a metal sulphate, the metal is deposited and zinc ions are produced in solution. The metal deposited could be
- A sodium.
 - B calcium
 - C aluminium.
 - D iron.

27. Aluminium drying pans are commonly used in kitchens.



Which one of the following properties of aluminium has **no** relevance to its choice as a material for this purpose?

- A It is a good conductor of electricity.
- B It is a good conductor of heat.
- C It is resistant to corrosion.
- D It has a high melting point.

28. A newly discovered element **X** is believed to have a relative chemical reactivity somewhere between potassium and sodium. Which of the following statement would be true for element **X**?

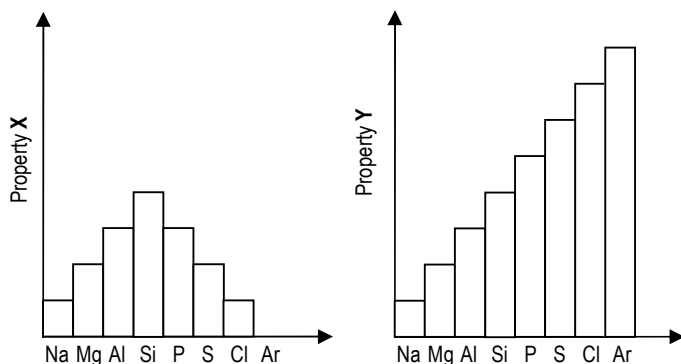
- I **X** reacts explosively with water.
- II **X** liberates hydrogen from dilute hydrochloric acid.
- III **X** displaces sodium from an aqueous sodium chloride.

- A I and II only
- B II and III only
- C I and III only
- D I, II and III.

29. Which set of properties are those of Group II oxide?

	conductivity of solid	conductivity of molten compound	conductivity of aqueous solution
A	Good	Good	Good
B	Good	Good	Insoluble in water
C	Poor	Good	Good
D	Poor	Good	Insoluble in water

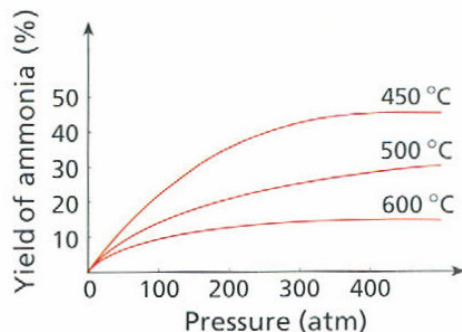
30. The bar chart shows the Period 3 elements from sodium to argon.



What are the properties **X** and **Y** shown on the two charts?

- | | <u>Property X</u> | <u>Property Y</u> |
|----------|-------------------|-----------------------------|
| A | valency | number of valence electrons |
| B | valency | oxidation state |
| C | oxidation state | valency |
| D | oxidation state | number of valence electrons |

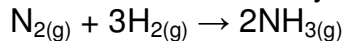
31. Which statement about a new element, which has **seven** outer electrons in its atoms, is correct?
- A** It is a good conductor of electricity in molten state.
B It forms a covalent compound with hydrogen.
C It forms a positive ion.
D It forms covalent compounds with transition elements.
32. Which statements concerning transition elements are correct?
- I They have higher densities than Group I metals.
 II They are more reactive than Group I metals.
 III They form coloured compounds.
- A** I and II only
B I and III only
C II and III only
D I, II and III
33. Which statement(s) concerning the atoms of the Group VI elements is/are correct?
- I Each contains an even number of electrons.
 II Each contains equal number of protons and electrons.
 III Each has an oxidation state of -2 .
- A** I only
B I and II only
C II and III only
D I, II and III
34. In the Haber process, the quantity of ammonia produced is determined by pressure, temperature and catalyst used. Below is a graph of yield of ammonia at different temperatures and pressures.



The yield of ammonia can be increased by

- A** using potassium as a catalyst
B using sulphuric acid as a catalyst
C increasing the pressure to 300 atmospheres
D increasing the temperature of the reaction to 1000 °C

35. Ammonia is manufactured by the Haber process using an iron catalyst:

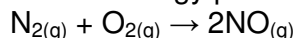


Which of the following statements is **not** correct?

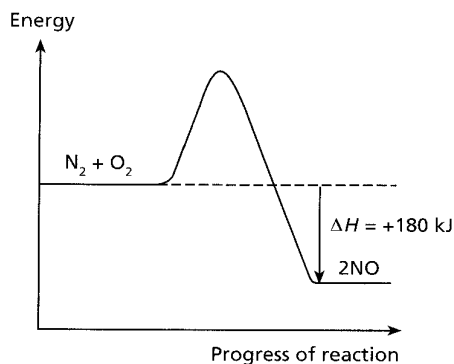
- I It is not possible to obtain a 100% yield of ammonia by Haber process.
- II A high temperature will increase the yield of ammonia.
- III The iron catalyst is used to increase the yield of the reaction.

- A I only
- B I and II only
- C II and III only
- D III only

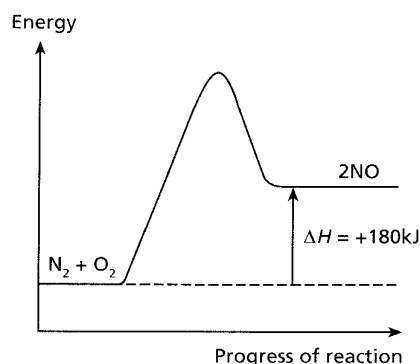
36. Which of the energy profile diagrams below represents the following reaction?



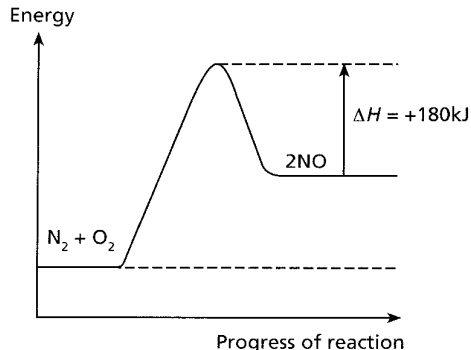
$$\Delta H = +180 \text{ kJ}$$



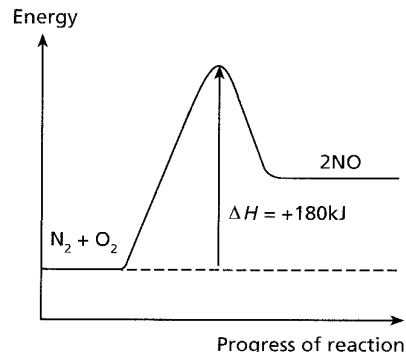
A



B



C



D

37. Molecules present in car exhaust fumes include carbon dioxide, carbon monoxide, nitrogen and nitrogen dioxide. Which of them is present in largest percentage?

- A Carbon dioxide
- B Carbon monoxide
- C Nitrogen
- D Nitrogen dioxide

38. Which of the following gases **cannot** be removed from the exhaust gases of a petrol powered car by its catalytic converter?

- A Carbon dioxide
- B Hydrocarbons
- C Carbon monoxide
- D Nitrogen dioxide

39. Which statements about the pollutant carbon monoxide are correct?
- I It is a colourless, odourless gas.
 - II It is formed by incomplete combustion of natural gas.
 - III It reacts with white blood cells in the blood.
 - IV It is an acidic gas.
- A** I and II only
B II and III only
C I and III only
D I, II and IV only
40. What is a correct statement about air?
- A** it contains 79 % oxygen and 21 % nitrogen
 - B** it is a mixture of elements
 - C** it contains carbon dioxide from the incomplete combustion of petrol
 - D** it is a mixture of elements and compounds

~ End of Paper ~

