

Name : _____ ()

Class : 4E1



Greenridge Secondary School

2nd Preliminary Examination 2005

Subject : Chemistry (5068)
Secondary Four Express
Paper 1

Date : 22 Sep 2005

Duration : 1 h

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INSTRUCTIONS TO CANDIDATES

Write in soft 2B pencil.

Do **not** use staples, paper clips, highlighters, glue or correction fluid.

Write your name, Centre number and candidate number on the answer sheet in the spaces provided unless this has been done for you.

There are **forty** questions on this paper. Answer **all** questions.

For each question there are four possible answers **A, B, C** and **D**.

Choose the one you consider correct and record your choice in soft pencil on the OTAS answer sheet provided.

Each correct answer will score one mark.

A mark will **not** be deducted for a wrong answer.

Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on **page 11**.

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

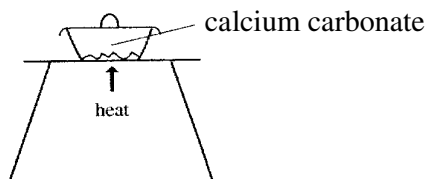
- 1 Which one of the following substances has particles close together but in a disorderly arrangement at 0°C?

Substance	melting point /°C	boiling point /°C
A	-80	-5
B	-20	5
C	0.5	90
D	5	200

- 2 A bottle of barium sulphate has been contaminated with some solid sodium sulphate. How can the sodium sulphate be removed from the barium sulphate?

- A Add water to the mixture and filter.
B Heat the mixture to 100°C and allow it to cool.
C Add concentrated nitric acid to the mixture and filter.
D Add aqueous lead (II) nitrate to the mixture and filter.

- 3 To obtain calcium oxide, calcium carbonate is heated strongly in a covered crucible.



The crucible is covered with a lid to prevent

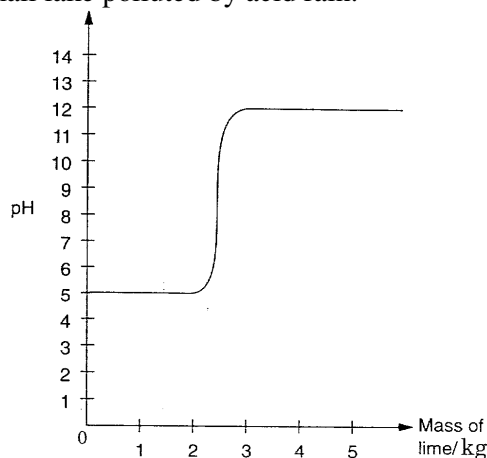
- A oxygen from reacting with calcium carbonate.
B calcium oxide forming.
C calcium carbonate escaping from the crucible.
D water vapour escaping from the crucible.
- 4 Which gas is obtained industrially by fractional distillation?
- I nitrogen
II hydrogen
III oxygen
- A I only
B I and II only
C I and III only
D I, II and III

- 5 The elements X and Y form the compound XY_3 . What is the correct electron arrangement of the atoms X and Y?

	electronic arrangement	
	atom of X	atom of Y
A	2,8,3	2,3
B	2,1	2,7
C	2,8,3	2,8,7
D	2,1	2,8,3

- 6 Which statement explains why magnesium oxide has a very high melting point?
- A Magnesium atoms and oxygen atoms are joined by strong double bonds.
 - B The crystal lattice of magnesium oxide resembles that of diamond.
 - C The magnesium ions are strongly attracted to the oxide ions.
 - D The reaction between magnesium and oxygen is strongly exothermic.
- 7 Diamond is a naturally occurring form of carbon. It is a macromolecule and therefore
- A contains ions in a crystalline lattice.
 - B conducts electricity when molten.
 - C contains covalent bonds between carbon atoms.
 - D has a molecular formula of C_{60} .
- 8 Metals are malleable and can be hammered into thin sheet. This is because the atoms in a metal
- A are arranged in layers and can slide over one another.
 - B can be squashed together as there is plenty of space between the atoms.
 - C have weak forces of attraction.
 - D can change in shape and size.
- 9 Detergent powders are made of ionic compounds. However, when you open a packet of detergent you can detect the sweet aroma of the detergent. The best explanation of this is that
- A air oxidizes the detergent to produce a volatile compound.
 - B detergent decompose in air to give off perfume.
 - C ionic compounds are volatile in nature.
 - D perfume is added to the detergent to make it smell good on our clothes.
- 10 A metal **M** forms a carbonate with the formula M_2CO_3 . The mass of 2.0 mole of the carbonate is 276 g. What is the relative atomic mass of **M**?
- A 23
 - B 39
 - C 78
 - D 85

- 11 Two different hydrocarbons each contain the same percentage by mass of hydrogen. It follows that they have the same
- A empirical formula.
 - B number of atoms in a molecule.
 - C number of isomers.
 - D relative molecular mass.
- 12 An oxidizing agent was observed to change from orange to green colour when reacted with a reducing agent. What is it most likely to be?
- A Acidified potassium manganate(VII) solution
 - B Acidified potassium dichromate (VI) solution
 - C Iron(III) chloride solution
 - D Potassium iodide solution
- 13 Ethanoic acid is a weak acid because it
- A does not contain any hydrogen ions.
 - B has a very low pH.
 - C is diluted.
 - D is not completely ionized.
- 14 The graph below shows the change in pH of the water when lime (calcium oxide) is added on a small lake polluted by acid rain.



What is the pH value of lime?

- A 2.5
- B 5
- C 9
- D 12

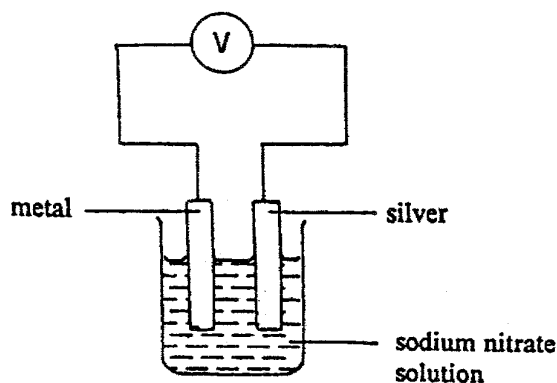
- 15 Dilute hydrochloric acid reacts with
- I copper metal to form copper(II) chloride and hydrogen gas.
 - II copper(II) carbonate to form copper(II) chloride, carbon dioxide gas and water.
 - III iron to form iron(II) chloride and hydrogen gas.
 - VI magnesium oxide to form magnesium chloride and oxygen gas.
- A I and II only
B II and III only
C II, III, and IV only
D I, II and III only
- 16 Which one of these salts can be prepared by titration?
- A Magnesium sulphate
B Lead(II) sulphate
C Potassium nitrate
D Silver nitrate
- 17 Some fertilisers have the label NPK on them to indicate that they contain the elements nitrogen, phosphorus and potassium. Which of the following mixture of compounds **cannot** be sold as an NPK fertiliser?
- A Ammonium chloride and potassium hydrogen phosphate
B Ammonium sulphate and potassium chloride
C Potassium hydrogen sulphate and ammonium hydrogen phosphate
D Sodium phosphate and potassium nitrate
- 18 Which of the following is **not** a use for sulphur dioxide?
- A Sterilising water
B Making bleaches
C Manufacturing sulphuric acid
D Preserving fruit drinks
- 19 In the car catalytic converter, nitrogen oxide
- A reacts with carbon dioxide.
B reacts with methane.
C is reduced to nitrogen.
D is oxidised to nitrogen.
- 20 Which of the following gases contribute to global warming?
- I carbon dioxide
 - II methane
 - III nitrogen dioxide
 - IV sulphur dioxide
- A I only
B I and II
C II and III
D III and IV

- 21 Which of the following statements about elements in the Periodic Table is **not** correct?
- A Group I elements are very reactive.
 - B Group II elements form positive ions.
 - C Group O elements are gases.
 - D Group IV elements form negative ions.
- 22 Which statement about the ions of the Group VII elements is correct?
- A All the ions contain seven electrons in the outer shell.
 - B All the ions contain equal numbers of protons and neutrons in the nucleus.
 - C All the ions contain more electrons than protons.
 - D All the ions have a single positive charge.
- 23 Which of the following statements about iron and graphite is/are correct?
- I They have high melting points.
 - II They are hard but brittle.
 - III They are conductors of electricity.
 - IV They have giant structures.
- A I and III only
 - B I and II only
 - C I, III and IV only
 - D III and IV only
- 24 A metal pipe normally carries cold water. By accident steam is passed through the pipe and it starts to react slowly. Which metal is the pipe made of?
- A Calcium
 - B Copper
 - C Iron
 - D Lead
- 25 A student investigating the reactivity of two unknown metals **X** and **Y** made the following observations through a series of experiments.
- I No visible reaction when a clean piece of **X** is dropped into iron(II) nitrate solution.
 - II No visible reaction when a clean piece of **Y** is dropped into copper(II) nitrate solution.
 - III No visible reaction when a clean piece of copper is dropped into iron (II) nitrate solution.
 - IV When a clean piece of **X** was dipped into copper(II) nitrate solution it became covered with a pink substance.

The student should therefore have concluded that in order of increasing reactivity, the four metals were

- A copper, **X**, **Y** and iron.
- B **Y**, copper, **X** and iron.
- C **Y**, **X** copper and iron.
- D copper, **Y**, **X** and iron.

- 26 Which of the following would produce bubbles of gas at both electrodes, when electrolysed using platinum electrodes?
- A Aqueous silver nitrate
 - B Aqueous sodium chloride
 - C Molten sodium chloride
 - D Concentrated aqueous copper(II) chloride
- 27 Which of the following involves the same number of moles of electrons for complete discharge during electrolysis?
- I 2 mol of Al^{3+} ions
 - II 2 mol of OH^- ions
 - III 3 mol of Cu^{2+} ions
 - IV 3 mol of O^{2-} ions
- A I and II only
 - B III and IV only
 - C I, II and III only
 - D I, III and IV only
- 28 Which one of the following metals will produce the largest voltage in the set-up below?



- A Copper
 - B Magnesium
 - C Gold
 - D Zinc
- 29 In the hydrogen-oxygen fuel cell,
- A electricity is used to generate hydrogen and oxygen.
 - B electricity is used to provide heat energy.
 - C hydrogen reacts with oxygen to generate electricity.
 - D hydrogen ions react with hydroxide ions to generate electricity.

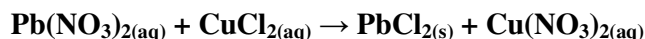
30 Which one of the following reactions is accompanied by a release of both heat and light energy?

- A $\text{H}^+_{(\text{aq})} + \text{OH}^-_{(\text{aq})} \rightarrow \text{H}_2\text{O}_{(\text{l})}$
 B $\text{CO}_3^{2-}_{(\text{aq})} + 2\text{H}^+_{(\text{aq})} \rightarrow \text{CO}_{2(\text{g})} + \text{H}_2\text{O}_{(\text{l})}$
 C $\text{CaO}_{(\text{s})} + \text{H}_2\text{O}_{(\text{l})} \rightarrow \text{Ca}(\text{OH})_{2(\text{aq})}$
 D $2\text{Mg}_{(\text{s})} + \text{O}_{2(\text{g})} \rightarrow 2\text{MgO}_{(\text{s})}$

31 Excess calcium carbonate was reacted with 100cm^3 of $1.0\text{mol}/\text{dm}^3$ dilute hydrochloric acid. Which one of the following will **not** increase the initial rate of the reaction between calcium carbonate and dilute hydrochloric acid?

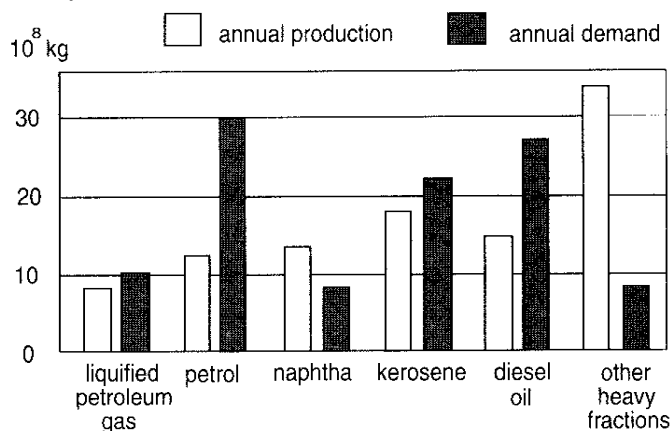
- A Increasing the mass of calcium carbonate used.
 B Using powdered calcium carbonate.
 C Increasing the concentration of the hydrochloric acid used.
 D Increasing the temperature of the reaction.

32 What alteration will increase the rate of precipitation of lead (II) chloride in the following reaction?



- A Boil lead (II) nitrate before adding copper (II) chloride
 B Increase the concentration of copper(II) nitrate solution.
 C Increase the concentration of lead (II) nitrate solution.
 D Increase the pressure to three times the normal atmospheric pressure.

33 The bar chart below showing the supply and demand of different fractions from an oil refinery.



What can we infer from the bar chart?

- I Demand for the various fractions is uneven.
 II The heavy fractions are more expensive than the lighter fractions.
 III The petrol fraction is the most expensive.

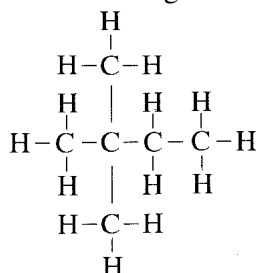
- A I and II only
 B I and III only
 C II and III only
 D I, II and III

34 Which of the following burns the most readily when ignited?

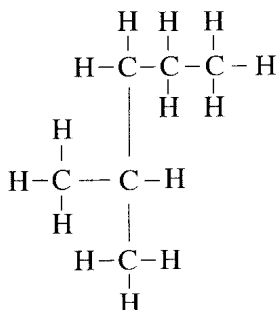
- A petrol
- B diesel oil
- C kerosene
- D naphtha

35 Which of the following structural formulae represent the same molecule?

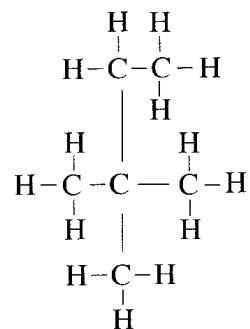
I



II



III



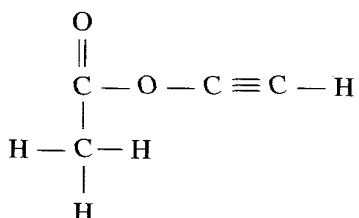
- A I and II only
- B I and III only
- C II and III only
- D I, II and III

36 The reaction between concentrated sulphuric acid and ethanol to give ethene is an example of sulphuric acid acting as

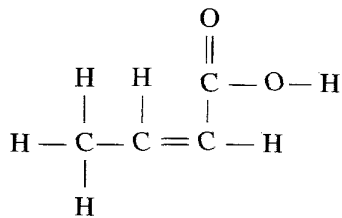
- A an acid.
- B an oxidising agent.
- C a dehydrating agent.
- D a drying agent.

- 37 Which of the following does **not** occur in the complete combustion of ethene in a plentiful supply of air?
- A forming of carbon-oxygen bonds
 - B forming of carbon-carbon single bonds
 - C production of water
 - D release of energy

- 38 The full structural formulae of compounds **X** and **Y** are shown below.



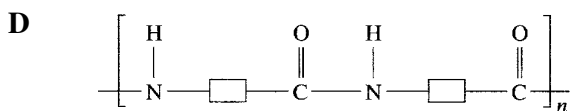
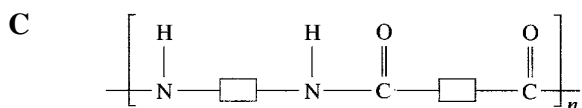
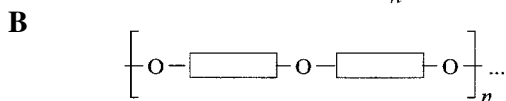
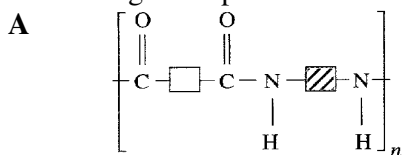
Compound X



Compound Y

The best method to distinguish between **X** and **Y** is by using

- A bromine water.
 - B sodium hydroxide solution.
 - C sodium carbonate solution.
 - D dilute sulphuric acid.
- 39 Which diagram represents the structure of protein?



- 40 Which of the following is an example of an addition polymer?
- A nylon
 - B poly(ethene)
 - C polyester
 - D starch

~ The End ~

The Periodic Table of the Elements

Group		I	II	III	IV	V	VI	VII	0
		1 H Hydrogen 1							4 He Helium 2
7 Li Lithium 3	9 Be Beryllium 4								
23 Na Sodium 11	24 Mg Magnesium 12								
39 K Potassium 19	40 Ca Calcium 20	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	64 Cu Copper 29	65 Zn Zinc 30
85 Rb Rubidium 37	88 Sr Strontium 38	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	103 Tc Technetium 43	101 Ru Ruthenium 44	106 Rh Rhodium 45	108 Ag Silver 47	112 Cd Cadmium 48
133 Cs Caesium 55	137 Ba Barium 56	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	201 Hg Mercury 80
226 Fr Francium 87	227 Ra Radium 88	227 La Lanthanum 57	227 Ce Cerium 58	227 Pr Praseodymium 59	227 Nd Neodymium 60	227 Pm Promethium 61	227 Sm Samarium 62	227 Eu Europium 63	227 Gd Gadolinium 64
		227 Y Yttrium 39	227 Sc Scandium 21	227 Ti Titanium 22	227 V Vanadium 23	227 Cr Chromium 24	227 Mn Manganese 25	227 Fe Iron 26	227 Co Cobalt 27
		227 Zr Zirconium 40	227 Nb Niobium 41	227 Mo Molybdenum 42	227 Tc Technetium 43	227 Ru Ruthenium 44	227 Rh Rhodium 45	227 Pd Palladium 47	227 Ag Silver 47
		227 Sn Tin 50	227 In Indium 49	227 Tl Thallium 81	227 Pb Lead 82	227 Bi Bismuth 83	227 Po Polonium 84	227 At Astatine 85	227 Rn Radon 86
		227 Sb Antimony 51	227 Te Tellurium 52	227 I Iodine 53	227 Xe Xenon 54	227 Kr Krypton 36	227 Br Bromine 35	227 F Fluorine 9	227 Ne Neon 10
		227 As Arsenic 33	227 Se Selenium 34	227 Cl Chlorine 17	227 Ar Argon 18	227 N Nitrogen 7	227 O Oxygen 8	227 F Fluorine 9	227 Ne Neon 10
		227 P Phosphorus 15	227 S Sulphur 16	227 Si Silicon 14	227 Al Aluminium 13	227 C Carbon 6	227 N Nitrogen 7	227 O Oxygen 8	227 F Fluorine 9
		227 Ge Germanium 32	227 Ga Gallium 31	227 Ge Germanium 32	227 Ga Gallium 31	227 C Carbon 6	227 N Nitrogen 7	227 O Oxygen 8	227 F Fluorine 9
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