

Class	Register Number	Name
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南洋女子中學校
NANYANG GIRLS' HIGH SCHOOL

End-of-Year Examination 2013
Secondary Three

Chemistry

Paper 1

Multiple Choice

Wednesday

9th October 2013

45 minutes

0800-0845

Additional materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Do not open this booklet until you are told to do so.

Write in soft pencil.

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

Write your name, class and register number on the Multiple Choice Answer Sheet provided.

There are **thirty** questions in 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 answer sheet.

INFORMATION FOR CANDIDATES

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.

This document consists of **12** printed pages.

Setter: ET

NANYANG GIRLS' HIGH SCHOOL

- 1 The approximate pH values of aqueous solutions of four substances commonly used in cooking are shown.

Which substance could be taken to neutralize excess acid in the stomach?

	Substance	pH
A	baking soda	9
B	salt	7
C	lemon juice	4
D	vinegar	3

- 2 In which reaction is hydrochloric acid **not** behaving as an acid?

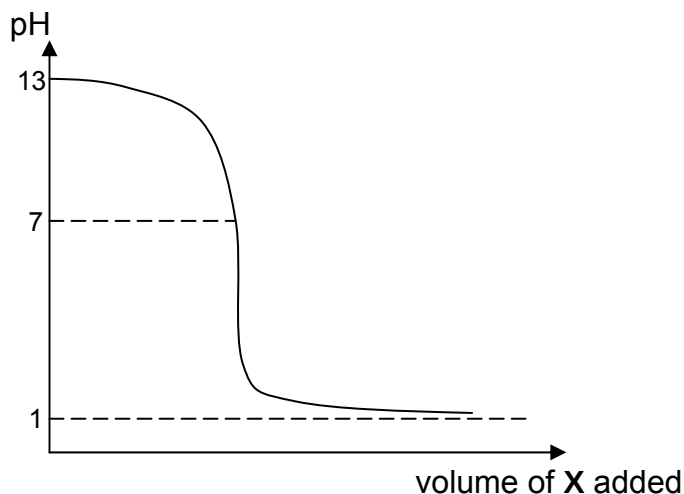
- A $\text{HCl(aq)} + \text{AgNO}_3\text{(aq)} \rightarrow \text{AgCl(s)} + \text{HNO}_3\text{(aq)}$
 B $2\text{HCl(aq)} + \text{CaCO}_3\text{(aq)} \rightarrow \text{CaCl}_2\text{(aq)} + \text{CO}_2\text{(g)} + \text{H}_2\text{O(l)}$
 C $2\text{HCl(aq)} + \text{Fe(s)} \rightarrow \text{FeCl}_2\text{(aq)} + \text{H}_2\text{(g)}$
 D $6\text{HCl(aq)} + \text{Fe}_2\text{O}_3\text{(s)} \rightarrow \text{FeCl}_3\text{(aq)} + 3\text{H}_2\text{O(l)}$

- 3 Which of the following are true about calcium hydroxide solution?

- 1 It conducts electricity.
 2 It liberates ammonia gas when heated with an ammonium salt.
 3 It turns Universal Indicator red.
 4 It liberates carbon dioxide from sodium carbonate solution.

- A 1 and 2 only
 B 1 and 3 only
 C 3 and 4 only
 D 1, 2 and 3 only

- 4 A titration experiment between two aqueous solutions, **X** and **Y** was carried out. The pH value of the solution was monitored using the data logging. A graph of pH of the solution against the volume of **X** was plotted as shown.



What are the possible identities of **X** and **Y**?

	X	Y
A	Na_2CO_3	KOH
B	HCl	KOH
C	H_2SO_4	CaCO_3
D	NH_3	HNO_3

- 5 Salt **PQ** is to be prepared by reacting the carbonate of **P** with the acid **HQ**. The titration method is to be used to carry out the preparation.

What are the solubilities of the carbonate, the acid and the salt?

	The carbonate of P	The acid HQ	The salt PQ
A	insoluble	soluble	insoluble
B	insoluble	soluble	soluble
C	soluble	insoluble	insoluble
D	soluble	soluble	soluble

- 6 Which of the following **does not** show the appropriate reagents used for the preparation of the named salts?

	Salt	Reagents
A	Lead(II) sulfate	Lead(II) carbonate + Hydrochloric acid
B	Barium sulfate	Barium nitrate + Sulfuric acid
C	Sodium nitrate	Sodium hydroxide + Nitric acid
D	Magnesium chloride	Magnesium + Hydrochloric acid

- 7 Neymar was given an unknown fertiliser **X**. He conducted several tests and his observations are shown below.
- Dissolving **X** in water and mixing the resultant solution with acidified silver nitrate gave a white precipitate.
 - Dissolving **X** in water and mixing the resultant solution with acidified barium nitrate did not give a white precipitate.
 - Adding **X** to a beaker of aqueous lithium hydroxide and warming the mixture gave a gas which turns moist litmus paper blue.

Which compound would be **X**?

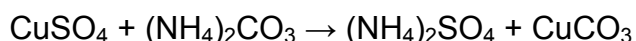
- A** ammonium sulfate
- B** ammonium chloride
- C** calcium chloride
- D** calcium sulfate

- 8 As shown below, a student performed a number of tests on an aqueous solution of lead(II) nitrate.

Which test must be repeated because the student's observation was wrong?

	Test	Observation
A	Add aqueous sodium hydroxide and aluminium foil. Warm gently.	A gas was given off which turned red litmus paper blue.
B	Add aqueous zinc sulfate.	A white precipitate was formed.
C	Add aqueous barium chloride.	A yellow precipitate was formed.
D	Add aqueous sodium hydroxide.	A white precipitate was formed.

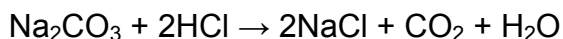
- 9 In an experiment, 2.00 cm³ of 1.00 mol/dm³ aqueous copper(II) sulfate was mixed with 4.00 cm³ of 1.00 mol/dm³ aqueous ammonium carbonate. The chemical equation for this reaction is shown below.



What did the reaction flask contain after the reaction was completed?

- A** green precipitate and a blue solution
- B** white precipitate and a blue solution
- C** green precipitate and a colourless solution
- D** a colourless solution only

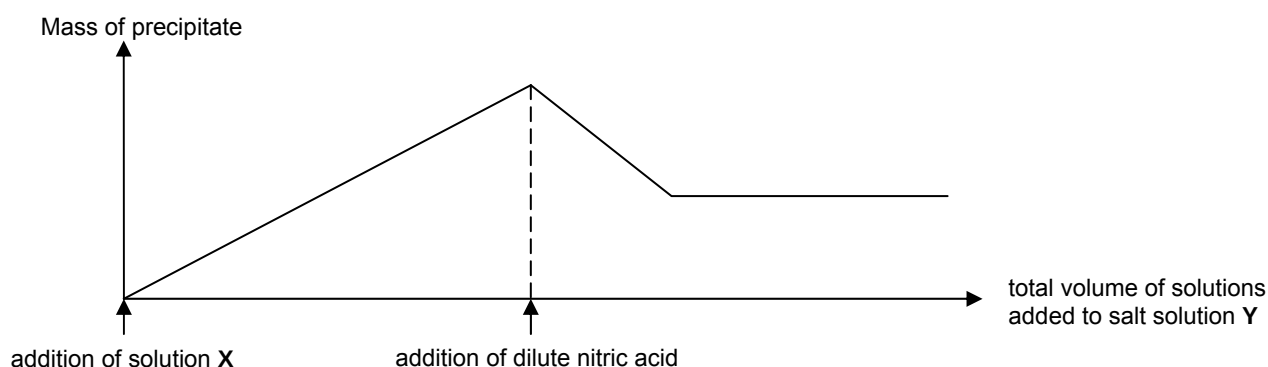
- 10 Three products are formed when sodium carbonate solution is added to a beaker of dilute hydrochloric acid, as shown by the equation below.



Which will be the results for tests carried out on the products?

	Reaction with calcium nitrate solution	Moist red litmus paper
A	No visible reaction	Remains red
B	No visible reaction	Turns blue
C	White precipitate formed	Remains red
D	White precipitate formed	Turns blue

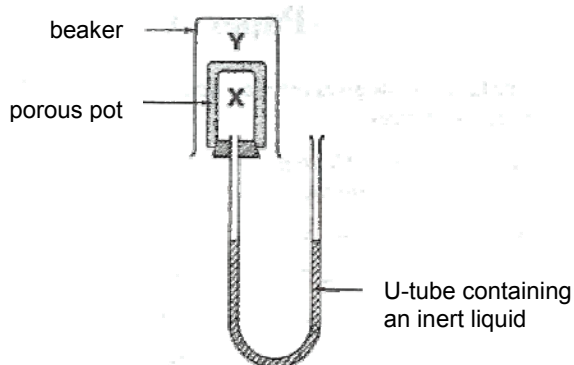
- 11 In a chemistry experiment, solution X is gradually added to a salt solution Y, followed by addition of nitric acid solution. The graph shows how the mass of the precipitate formed changes with the addition of the different solutions.



Which of the following would produce the graph shown above?

	Solution X	Ions present in salt solution Y
A	aqueous silver nitrate	sulfate ion and carbonate ion
B	aqueous silver nitrate	nitrate ion and carbonate ion
C	aqueous barium nitrate	iodide ion and carbonate ion
D	aqueous barium nitrate	sulfate ion and carbonate ion

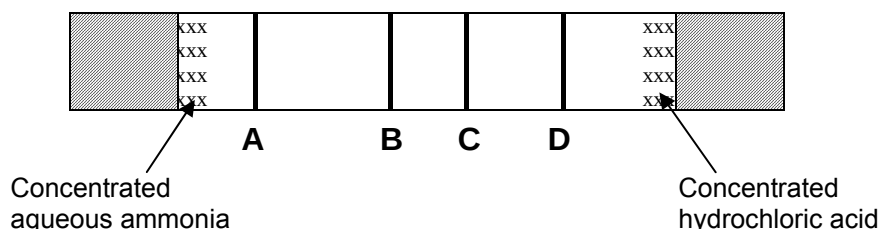
- 12** The apparatus below consists of a porous pot containing a gas **X** which is then surrounded by a gas **Y** in a beaker.



Which one of the following pairs of gases would cause an upward movement of the liquid in the right-hand limb of the U-tube?

	Gas X	Gas Y
A	H ₂	NH ₃
B	NH ₃	CO ₂
C	O ₂	H ₂
D	O ₂	CO ₂

- 13** Plugs of cotton wool soaked respectively in concentrated aqueous ammonia and concentrated hydrochloric acid are inserted at the same time into the open ends of a horizontal tube as shown in the diagram below. The ends of the tube are sealed. After a short lapse of time, a white deposit of ammonium chloride is observed.

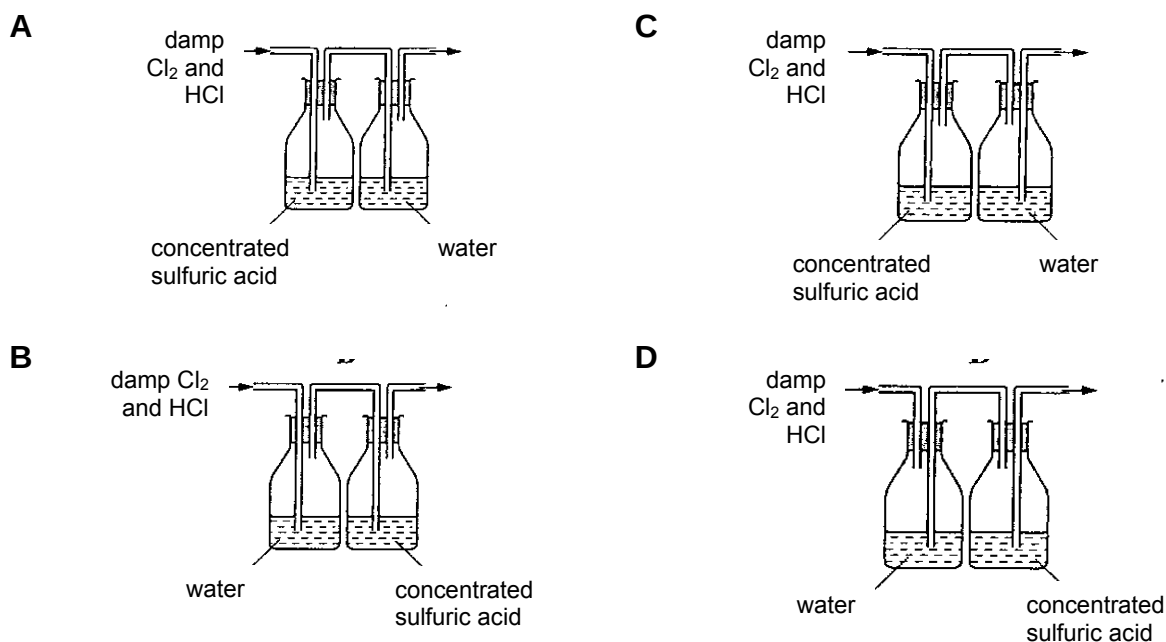


Where is the solid deposit likely to be observed?

- 14** Which one of the following would be the most suitable method for separating mixture of methylbenzene (boiling point 111°C) and cyclohexane (boiling point 81°C)?

- A** evaporation
- B** fractional distillation
- C** filtration
- D** sublimation

- 15** Hydrogen chloride is very soluble in water, whereas chlorine is only slightly soluble in water. Both gases can be dried using concentrated sulfuric acid. Which diagram represents the correct method of obtaining dry chlorine from damp chlorine containing a small amount of hydrogen chloride?



- 16** Consider the following data:

Particles	Nucleons	Protons
P^{3+}	27	13
Q^{2+}	27	12
R^{3+}	28	13
S^{2+}	29	12

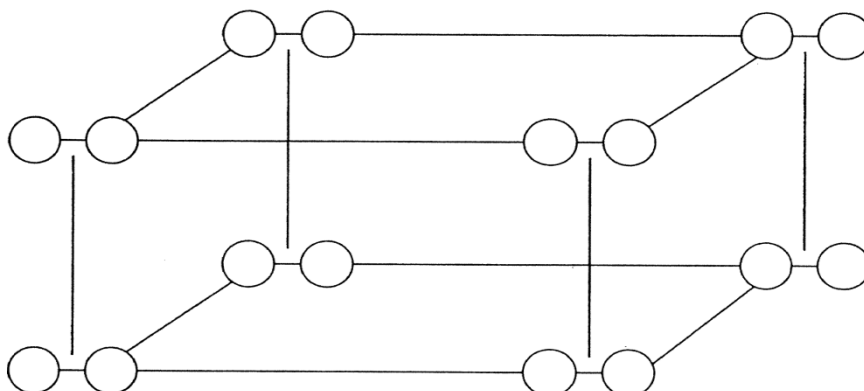
Which of the particles are isotopes of the same element?

- A** P^{3+} R^{3+}
B P^{3+} S^{2+}
C Q^{2+} R^{3+}
D R^{3+} S^{2+}

- 17** Which ion has the same number of protons as the hydroxide ion?

- A** O^{2-}
B F^-
C Na^+
D Mg^{2+}

- 18 When an atom becomes an ion, its number of protons remains the same whereas its number of electrons changes. Considering the forces of attraction between protons in the nucleus and valence electrons, what would be expected when an oxygen atom becomes an ion?
- A The ion has the smaller diameter than the atom.
B The ion has a larger diameter than the atom.
C The nucleus becomes larger.
D The nucleus becomes smaller.
- 19 Which of the following properties indicates most clearly whether the bonds in a compound are ionic or covalent?
- A The compound is a crystalline solid at room temperature.
B The compound is almost insoluble in water.
C The compound conducts electricity when molten.
D The compound does not conduct electricity when solid.
- 20 The diagram represents the structure of a solid crystal.

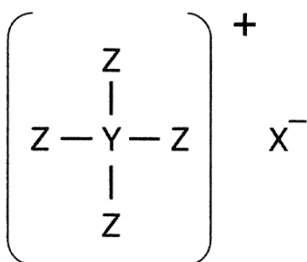


- Which of the following substances is best represented by the above structure?
- A graphite
B ice
C iodine
D sodium chloride
- 21 Element X has a proton number of 6 and element Y has a proton number of 9. What is the likely formula of the compound formed between X and Y?
- A XY_3
B XY_4
C X_2Y
D X_2Y_3

22 Which one of the following has the greatest number of delocalised electrons per atom?

- A** aluminium
- B** graphite
- C** magnesium
- D** sodium

23 An ionic compound containing atoms of the elements **X**, **Y** and **Z** has the following formula.



Which elements could **X**, **Y** and **Z** represent?

- | | X | Y | Z |
|----------|----------|----------|----------|
| A | F | C | Br |
| B | Cl | N | H |
| C | Br | S | Cl |
| D | H | Al | Cl |

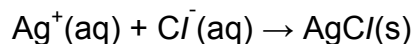
24 If the number of similar particles in one mole is **x**, the number of chlorine molecules in 35.5 g of gaseous chlorine is

- A** 0.5x
- B** x
- C** 2x
- D** 35.5x

25 The mass of one mole of a chloride formed by a metal **Y** is 74.5 g. The formula of the chloride could be

- A** Y_3Cl
- B** Y_2Cl
- C** YCl
- D** YCl_2

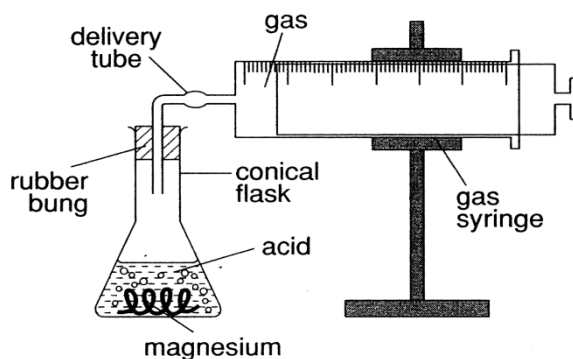
- 26 Silver ions react with chloride ions.



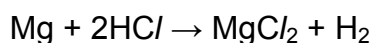
It is found that 5.0 cm^3 of a 0.100 mol/dm^3 solution of the chloride of metal X needs 10.00 cm^3 of 0.1 mol/dm^3 silver nitrate for complete reaction.

What is the formula of the chloride?

- A XCl_4
 B XCl_2
 C XCl
 D X_2Cl
- 27 The diagram shows an experiment to determine the molar gas volume of hydrogen, which is the volume of one mole of hydrogen gas under room conditions.



The equation for the reaction to produce hydrogen is shown as follows.



At the end of the reaction, $x \text{ g}$ of magnesium was used up and $y \text{ dm}^3$ of hydrogen gas was collected. Which of the following shows the correct working to determine the molar volume of hydrogen under room conditions?

- A $\frac{x}{24y}$
 B $\frac{y}{24x}$
 C $\frac{24x}{y}$
 D $\frac{24y}{x}$

- 28 40 cm³ of a gaseous oxide of nitrogen were decomposed completely into 40 cm³ of nitrogen and 20 cm³ of oxygen at the same temperature and pressure. What is the formula of the oxide?
- A N₂O
B NO
C N₂O₃
D N₂O₅
- 29 Which solution contains the greatest number of moles of Na⁺ ions?
- A 5 cm³ of 0.2 mol/dm³ NaCl
B 5 cm³ of 0.2 mol/dm³ Na₃PO₄
C 10 cm³ of 0.1 mol/dm³ NaOH
D 10 cm³ of 0.1 mol/dm³ Na₂SO₄

- 30 Aqueous sodium carbonate reacts with sulfuric acid as shown in the equation below.



In an experiment, 0.0500 mol of sodium sulfate is recovered from the aqueous solution. Given that aqueous sodium carbonate is the limiting reagent, what is the concentration of 25.0 cm³ aqueous sodium carbonate, in mol/dm³, that reacts with 25.0 cm³ of sulfuric acid?

- A $\frac{0.0500 \times 25.0}{1000}$
B $\frac{0.0500 \times 1000}{25.0}$
C $\frac{0.0500 \times 30.0}{1000}$
D $\frac{0.0500 \times 1000}{30.0}$

End of paper

The Periodic Table of the Elements

Group																				
I	II	1 H hydrogen 1										III	IV	V	VI	VII	0			
		Key relative atomic mass atomic symbol name atomic number																		
7 Li lithium 3	9 Be beryllium 4														11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10
23 Na sodium 11	24 Mg magnesium 12														27 Al aluminium 13	28 Si silicon 14	31 P phosphorus 15	32 S sulfur 16	35.5 Cl chlorine 17	40 Ar argon 18
39 K potassium 19	40 Ca calcium 20	45 Sc scandium 21	48 Ti titanium 22	51 V vanadium 23	52 Cr chromium 24	55 Mn manganese 25	56 Fe iron 26	59 Co cobalt 27	59 Ni nickel 28	64 Cu copper 29	65 Zn zinc 30	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36				
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	99 Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54				
133 Cs caesium 55	137 Ba barium 56	139 La lanthanum 57	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	197 Au gold 79	201 Hg mercury 80	207 Pb lead 82	209 Bi bismuth 83	— Po polonium 84	— At astatine 85	— Rn radon 86				
— Fr francium 87	— Ra radium 88	— Ac actinium 89	— Th thorium 90	— Pa protactinium 91	— U uranium 92	— Np neptunium 93	— Pu plutonium 94	— Am americium 95	— Cm curium 96	— Bk berkelium 97	— Cf californium 98	— Es einsteinium 99	— Fm fermium 100	— Md mendelevium 101	— No nobelium 102	— Lr lawrencium 103				