

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

End-of-Year Examination 2014
Secondary Three

Chemistry

Paper 1

Multiple Choice

Wednesday

1st October 2014

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 9 printed pages.

Setter: ZJY

NANYANG GIRLS' HIGH SCHOOL

For question 1 and 2, please refer to **Fig. 1** below.

Fig. 1 shows how the temperature of a substance changes with time as it undergoes phase changes.

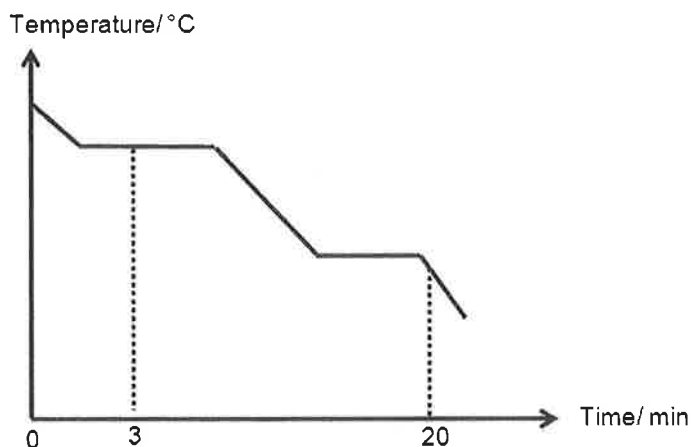


Fig. 1

1 What is the process occurring at the 3rd minute?

- A Boiling
- B Melting
- C Freezing
- D Condensation

2 Which diagram shows the arrangement of particles at the 20th minute?

- A
- B
- C
- D

3 How many compounds are there in a sample of sodium chloride solution?

- A 1
- B 2
- C 3
- D 4

4 The table below shows the R_f values of dyes G to J in two different solvents.

Solvent \ Dye	G	H	I	J
Ethanol	0.76	0.52	0.76	0.13
Hexane	0.35	-	0.48	0.35

A sample of food colouring containing all four dyes was subjected to chromatography using ethanol first. The resulting chromatogram was then placed in hexane for another run.

How many spots will be present in the final chromatogram?

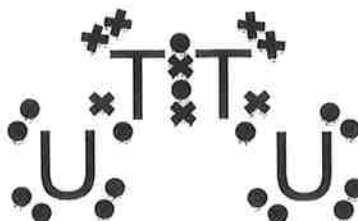
- | | | | |
|---|---|---|---|
| A | 7 | C | 4 |
| B | 5 | D | 3 |

5 An unknown compound K conducts electricity when dissolved in water and is a gas at room temperature.

Which of the following statements regarding K is true?

- A K has mobile ions.
- B K has covalent bonds.
- C K has giant lattice structure.
- D K has delocalised electrons.

6 A compound has the following Lewis Dot diagram. T and U are from the 2nd Period of the periodic table.



Pure samples of both elements will have the formulas of

- | | | | |
|---|-----------------------------------|---|-----------------------------------|
| A | T and U | C | T ₃ and U ₂ |
| B | T ₂ and U ₂ | D | T ₂ and U |

Refer to **Table 1** for questions 7 and 8.

Table 1 below shows some information regarding particles **P** to **S**.

	Nucleon number	Number of electrons	Number of neutrons
P	88	38	50
Q	86	38	48
R	85	36	48
S	84	36	48

Table 1.

7 Which of the particles **P** to **S** are isotopes of each other?

- | | | | |
|----------|-----------------------|----------|----------------------------------|
| A | P and Q | C | R and S |
| B | P and S | D | Q , R and S |

8 Which particle is an ion?

- | | | | |
|----------|----------|----------|----------|
| A | P | C | R |
| B | Q | D | S |

9 A sample of a gas was bubbled through concentrated sulfuric acid and tested using moist red litmus.

Which of the following statements is always true for any gas?

- A** The litmus will turn blue.
B The litmus will not turn blue.
C If moist blue litmus was used, it will turn red.
D The litmus will be bleached.

10 In a reaction with an acid, copper(II) nitrate was produced together with a gas.

What was the other reactant?

- | | | | |
|----------|------------------|----------|----------------------|
| A | Copper | C | Copper(II) sulfate |
| B | Copper(II) oxide | D | Copper(II) carbonate |

11 Oxalic acid, $C_2H_2O_4$, reacts with calcium hydroxide to form salt calcium oxalate, CaC_2O_4 .

What is the formula of salt formed when oxalic acid reacts with titanium(IV) hydroxide?

- | | | | |
|----------|--------------|----------|-----------------|
| A | $Ti_2C_2O_4$ | C | $Ti(C_2O_4)_2$ |
| B | $Ti_4C_2O_4$ | D | $Ti(C_2HO_4)_2$ |

12 In the preparation of pure dry samples of each of the following salts, which one does not require heating?

- | | | | |
|----------|------------------|----------|-------------------|
| A | Silver iodide | C | Barium chloride |
| B | Rubidium sulfate | D | Magnesium nitrate |

For questions 13 and 14, refer to **Table 2.** below.

Table 2. shows information regarding five monobasic acids.

Acid	Concentration of acid in 10^{-3} mol/dm^3	Concentration of H^+ in 10^{-3} mol/dm^3	pH
HV	10.0	10.0	2.00
HW	2.00	2.00	2.69
HX	6.00	2.00	2.69
HY	0.0500	0.0500	4.30
HZ	0.100	0.0500	4.30

Table 2.

13 Which of the acids are weak acid(s)?

A HV

B HY and HZ

C HX and HZ

D HX and HW

14 A dibasic acid was completely dissociated in water to form a solution with pH 2.00. What is the concentration of acid in 10^{-3} mol/dm^3 ?

A 2.00

B 10.0

C 5.00

D 20.0

15 In order to prepare pure sodium nitrate crystals, a student titrated sodium hydroxide to potassium nitrate and crystallised the resulting solution. In the end, the product obtained was contaminated.

He wants to attempt the experiment again. Which of the following will help him improve the purity of his product?

A Add excess sodium hydroxide.

B Change potassium nitrate to nitric acid.

C Change sodium hydroxide to sodium chloride.

D Change sodium hydroxide to sodium carbonate.

16 Which of the following ionic equations is correct?

A $\text{SO}_3(\text{g}) + \text{H}_2\text{O}(\text{l}) \rightarrow 2\text{H}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$

B $2\text{KCl}(\text{aq}) + \text{F}_2(\text{g}) \rightarrow \text{Cl}_2(\text{g}) + \text{F}^-(\text{aq})$

C $\text{MnCl}_2(\text{aq}) + \text{F}_2(\text{g}) \rightarrow 2\text{F}^-(\text{aq}) + \text{Mn}^{2+}(\text{aq}) + \text{Cl}_2(\text{g})$

D $\text{Ag}_2\text{S}(\text{s}) + 2\text{H}^+ + \text{NO}_3^- \rightarrow 2\text{Ag}^+(\text{aq}) + \text{S}(\text{s}) + \text{NO}_2(\text{g}) + \text{H}_2\text{O}$

17 Which of the following mixtures is a green solution?

A Aqueous iron(II) nitrate and zinc sulfate

B Aqueous copper(II) nitrate and sodium chloride

C Aqueous iron(III) sulfate and aqueous ammonia

D Aqueous iron(II) chloride and aqueous ammonia

- 18** In order to test for presence of aluminum ion, what are the chemicals required?
- A** Aqueous ammonia only.
B Aqueous sodium hydroxide and nitrate ions.
C Aqueous ammonia and dilute hydrochloric acid.
D Aqueous sodium hydroxide and dilute hydrochloric acid.
- 19** In a reaction, a pungent gas produced changed the colour of moist blue litmus. Which are the possible identities of the gas?
- I** Oxygen
II Chlorine
III Ammonia
IV Sulfur dioxide
- A** III only
B I and IV only
C II and IV
D II, III and IV only
- 20** When an unknown substance **M** was added to a solution **N**, reaction occurs but stops quickly. Which could be the possible identities of **M** and **N**?

	M	N
A	Zinc	Hydrochloric acid
B	Silver	Hydrochloric acid
C	Magnesium chloride	Sulfuric acid
D	Calcium carbonate	Sulfuric acid

- 21** Three bottles of unknown solutions were mixed up before they were labeled. The three solutions are sodium hydroxide, calcium chloride and ammonium nitrate. In order to identify the three solutions, a student added them to each other and recorded his observations in the table below.

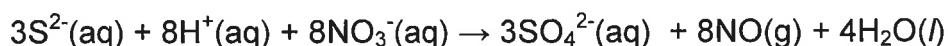
	Solution 1	Solution 2
Solution 1		White precipitate
Solution 2	White precipitate	
Solution 3	No visible change	Pungent gas

Which of the following shows the correct identity of the three solutions?

	1	2	3
A	Calcium chloride	Sodium hydroxide	Ammonium nitrate
B	Calcium chloride	Ammonium sulfate	Sodium hydroxide
C	Sodium hydroxide	Calcium chloride	Ammonium nitrate
D	Ammonium sulfate	Calcium chloride	Sodium hydroxide

- 22 What is the mass of copper atoms in a sample of copper(II) nitrate containing 7.90×10^{22} nitrogen atoms?
- A 3.69g
B 4.21g
C 8.42g
D 16.8g
- 23 In the reaction below, 900 cm^3 of gas was produced in total.
- $$2\text{N}_2\text{O}_5(\text{g}) \rightarrow 4\text{NO}_2(\text{g}) + \text{O}_2(\text{g})$$
- What is the volume of N_2O_5 reacted?
- A 360 cm^3
B 450 cm^3
C 900 cm^3
D 1800 cm^3
- 24 1.30 g of lead(II) nitrate was dissolved in 600 cm^3 of water. What is the concentration of nitrate ions in the solution obtained?
- A 0.0155 g/dm^3
B 0.812 g/dm^3
C 2.17 g/dm^3
D 2.60 g/dm^3
- 25 0.128 g of a metal hydroxide ROH was required to neutralise 14.0 cm^3 of a 0.190 mol/dm^3 dibasic acid. What is the identity of R ?
- A Li
B Na
C Al
D Sr
- 26 How many moles of potassium chloride will contain the same number of ions as 0.940 mol of copper(II) nitrate?
- A 0.313 mol
B 0.470 mol
C 0.940 mol
D 1.41 mol

- 27 In the reaction below, which substance is the reducing agent and which substance is oxidized?



	Reducing agent	Oxidized
A	NO_3^{-}	S^{2-}
B	S^{2-}	S^{2-}
C	S^{2-}	NO_3^{-}
D	NO_3^{-}	NO

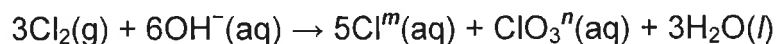
- 28 When sodium hydroxide was added drop wise to a solution of iron(II) bromide, green precipitate was obtained which turned brown after 5 minutes.

Which of the following statements is correct?

- A Sodium hydroxide was reduced.
 B Iron(II) hydroxide was oxidized by oxygen.
 C Iron(II) bromide was oxidized to green precipitate by oxygen.
 D Iron(II) bromide was reduced and sodium hydroxide was oxidized.
- 29 Which of the following is not a redox reaction?

- A $2\text{Al}_2\text{O}_3 \rightarrow 4\text{Al} + 3\text{O}_2$
 B $\text{K} + \text{AgNO}_3 \rightarrow \text{Ag} + \text{KNO}_3$
 C $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
 D $2\text{H}_2\text{CO}_3 + \text{VCl}_4 \rightarrow \text{V}(\text{CO}_3)_2 + 4\text{HCl}$

- 30 The reaction below is a redox reaction.



What are the possible values of m and n ?

	m	n
A	-2	-2
B	-1	+5
C	-1	-1
D	0	-2

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															
23 Na sodium 11	24 Mg magnesium 12															
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	70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	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	- Tc technetium 43	101 Ru ruthenium 44	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	127 I iodine 53	128 Te tellurium 52	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	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	- Po polonium 84	- Rn radon 86
- Fr francium 87	- Ra radium 88	- Ac actinium 89														

*58-71 Lanthanoid series	140 Ce cerium 58	141 Pr Praseodymium 59	144 Nd neodymium 60	— Pm promethium 61	150 Sm samarium 62	152 Eu europium 63	157 Gd gadolinium 64	159 Tb terbium 65	162 Dy dysprosium 66	165 Ho holmium 67	167 Er erbium 68	169 Tm thulium 69	173 Yb ytterbium 70	175 Lu lutetium 71
	232 Th thorium 90	— Pa protactinium 91	238 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
	†90-103 Actinoid series													

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).

