

Student Name: _____

CHEMISTRY

Unit 2 – Written Examination 2



2008 Trial Examination

Reading Time: 15 minutes

Writing Time: 1 hour and 30 minutes

QUESTION AND ANSWER BOOK

Structure of book

| <i>Section</i> | <i>Number of questions</i> | <i>Number of questions to be answered</i> | <i>Number of marks</i> | <i>Suggested times (minutes)</i> |
|----------------|----------------------------|---|------------------------|----------------------------------|
| A | 20 | 20 | 20 | 30 |
| B | 5 | 5 | 54 | 60 |
| | | | Total 74 | 90 |

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners and rulers
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape.
- No calculator is permitted in this examination.

Materials supplied

- Question and answer book of 13 pages.

Instructions

- Print your name in the space provided on the top of this page.
- All written responses must be in English.

Students are NOT permitted to bring mobile phones and/or any other electronic communication devices into the examination room.

SECTION A – Multiple-choice questions

Instructions for Section A

Answer **all** questions.

Choose the response that is **correct** for the question.

A correct answer scores 1, an incorrect answer scores 0.

Marks are **not** deducted for incorrect answers.

If more than 1 answer is completed for any question, no mark will be given.

Question 1

Water is a more polar molecule than hydrogen sulphide. This is best explained by:

- A. Hydrogen sulphide is a larger molecule than water.
- B. Sulphur atoms have stronger covalent bonds with hydrogen when compared with oxygen.
- C. Water is liquid at room temperature but hydrogen sulphide is gas.
- D. There is a large difference in electronegativity between oxygen and hydrogen atoms.

Question 2

If the specific heat capacity of water is $4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$, the required energy in kJ to raise the temperature of 10 moles of water from 25°C to 75°C is:

- A. 37.8
- B. 2100
- C. 2.1
- D. -2.1

Question 3

Which of the following is an assumption of the Kinetic Molecular Theory of Gases?

- A. Gas molecules move all the time in random directions.
- B. Gas molecules are very heavy and easily move.
- C. Gas molecules experience significant intermolecular forces of attraction or repulsion.
- D. Individual gas molecules occupy negligible volume and rarely move in straight lines.

Question 4

Helium boils at 4.22 K. What is this temperature in $^\circ\text{C}$?

- A. $-277.22 \text{ }^\circ\text{C}$
- B. $268.78 \text{ }^\circ\text{C}$
- C. $277.22 \text{ }^\circ\text{C}$
- D. $-268.78 \text{ }^\circ\text{C}$

SECTION A - continued

Question 5

900 mmHg is equal to how many kilopascals?

- A. 120 000 kPa
- B. 120 kPa
- C. 1.2×10^{-3} kPa
- D. 1200 kPa

Question 6

An adjustable gas storage tank is able to store natural gas at various volumes. 3.50×10^6 L of natural gas was stored at a temperature of 200 K and a pressure of 100 kPa. The pressure and temperature inside the storage tank were both doubled. What is the new volume of the gas storage tank?

- A. 3.50×10^6 L
- B. 3.50×10^{12} L
- C. 3.50×10^3 L
- D. 7.00×10^6 L

Question 7

The oxidation number of chromium in $K_2Cr_2O_7$ is.

- A. +2
- B. +3
- C. +6
- D. +7

Question 8

Pressure and temperature affect the solubility of a gas. Conditions for greatest solubility are:

- A. Pressure is high and temperature is high
- B. Pressure is low and temperature is high
- C. Pressure is low and temperature is low
- D. Pressure is high and temperature is low

Question 9

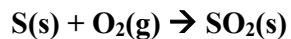
Which of the following processes occurs in the nitrogen cycle?

- A. Nitrolysis
- B. Denitroxycation
- C. Nitrification
- D. Nitrolytic degradation.

SECTION A - continued
TURN OVER

Question 10

Sulphur may react with oxygen gas according to the equation:



Which is the oxidising agent?

- A. Oxide ions
- B. Oxygen gas
- C. Sulphur ions
- D. Sulphur atoms

Question 11

At low temperature and high-pressure gases often exhibit non-ideal gas behaviour. This can be best explained by:

- A. The gas molecules have increased average levels of energy.
- B. The gas molecules are moving more rapidly and thus colliding more.
- C. The increased density of the gas molecules gives rise to non-negligible interactive forces between the gas molecules.
- D. All of the above.

Question 12

The concentration of a solution made from 29.6 g of Na_2CO_3 dissolved in 45 mL would be:

- A. 7.9 M
- B. 0.079 M
- C. 0.062 M
- D. 6.2 M

Question 13

Which of the following measures will protect against corrosion?

- i. Using a sacrificial anode with a less reactive metal
 - ii. Surface coating
 - iii. Immersion in saline (salt) solution
 - iv. Alloying
- A. i, ii and iii
 - B. i, ii and iv
 - C. all of the above
 - D. ii and iv

SECTION A - continued

Question 14

What volume of 0.35 M H_3PO_4 solution is required to neutralise a solution containing 12.0 g of NaOH?

- A. 2.86 L
- B. 8.57 L
- C. 0.857 ml
- D. 286 ml

Question 15

0.05 mol L^{-1} CH_3COOH solution could be described as a:

- A. Dilute weak acid
- B. Concentrated strong acid
- C. Concentrated weak acid
- D. Unable to determine from information given

Question 16

The empirical formula for a hydrocarbon containing 92.3 % carbon would be:

- A. CH_3
- B. C_2H_2
- C. CH_4
- D. CH

Question 17

The standard hydrogen electrode (SHE) consists of a platinum electrode immersed in a solution containing hydronium ions at a concentration of 1.0 M and a temperature of 25 °C. What is the pH of the SHE?

- A. -1.0
- B. zero
- C. 7
- D. 1.0

Question 18

Which of the following species contains a conjugate acid base pair?

- A. H_3PO_4 , HPO_4^{2-}
- B. H_2CO_3 , CO_3^{2-}
- C. CO_3^{2-} , HCO_3^-
- D. O^{2-} , H_2O

SECTION A - continued
TURN OVER