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

Section	*Number of questions*	*Number of questions to be answered*	*Number of marks*	*Suggested times (minutes)*
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 J g^{-1} $^oC^{-1}$, the required energy in kJ to raise the temperature of 10 moles of water from 25ºC to 75ºC 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 °C?

A. -277.22 °C

B. 268.78 °C

C. 277.22 °C

D. -268.78 °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 degredation.

Question 10

Sulphur may react with oxygen gas according to the equation:

$$S(s) + O_2(g) \rightarrow SO_2(s)$$

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 ofen 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

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 ºC. 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

