



# Information Document

## Chemistry

### *CHE-500.A05*

#### Theory Examination – Secondary 5

### Structure

This theory examination evaluates mastery and use of subject-specific knowledge as well as competencies 2 and 3 of the *Chemistry* program. It consists of 25 questions in two sections worth a total of 100 marks.

### Types of Questions and Percentage Value for General Concepts Evaluated

General Concept Section of Exam	Gases (28%)	Energy Changes in Reactions (28%)	Reaction Rate (12%)	Chemical Equilibrium (32%)
Part A (Multiple-Choice) (40%)	4 questions	1 question	2 questions	3 questions
Part B (Constructed-Response) (60%)	3 questions	6 questions	1 question	5 questions

*Note: Each question is worth four marks.*

*Significant figures will be evaluated on two questions.*

### Provided Documents

*Administration and Marking Guide*

*Student Booklet*

*Answer Booklet*

**Secondary 5 – CHE-500.A05 (Cont'd)**

## **Competencies and Criteria Evaluated**

### Competencies

- *Makes the most of his/her knowledge of chemistry.*
- *Communicates ideas relating to questions involving Chemistry, using the languages associated with science and technology*

### Criteria Evaluated

- *Mastery of subject-specific knowledge targeted in the Progression of Learning:  
Gases, Energy Changes in Reactions, Reaction Rates, Chemical Equilibrium and Measurement Techniques.*
- *Relevant use of knowledge of chemistry*
- *Appropriate formulation of explanations or solutions*

## **Time Allotted**

3 hours (An additional 15 minutes may be allotted if needed.)

## **Authorized Materials**

The following materials are permitted during the examination:

- Calculators with or without graphic displays\*
- Writing instruments
- Rulers

\* Calculators with or without graphic displays designed mainly to perform mathematical calculations are authorized during official exams. **Before the exam starts**, data and programs stored in the calculator's memory must be deleted. Calculators equipped with formal calculation software are not authorized for the exams. These models are allowed **under the sole condition** that the formal calculation functions are deactivated during the exam. Computers, tablet computers, electronic organizers and calculators with an alphanumeric keyboard (QWERTY or AZERTY) are not authorized. All calculator peripherals, such as instruction manuals and memory expansion devices, are forbidden. Using memory expansion cards or chips, data or program libraries are strictly forbidden. Communication between calculators is not allowed during the exam either. Using a calculator containing stored data or programs will be considered as cheating. Students cannot share their calculator with a peer.

[Adapted from *MELS Information Document, Science and Technology, Applied Science and Technology, June/August/January 2013*, and provided as a recommendation.]

Note: Students may refer to the Periodic Table of Elements and the lists of Formulas and Physical Constants included in the *Student Booklet*.

**Evaluation Tools<sup>1</sup>**

In order to determine what is expected of the students and ensure a uniform understanding of the evaluation tools, it is suggested that teachers in each school form a marking committee to analyze the work of a sample of students.

**Guidelines for correcting questions requiring an explanation, a justification, or a representation**

Analyze the student's work and determine if it is appropriate.

- An explanation, a justification or a representation is **appropriate** if most of the elements of the answer are correct and if appropriate terminology or symbolism is used.
- An explanation, a justification or a representation is **partially appropriate** if:
  - most of the elements of the answer are correctly indicated, **but** the terminology or symbolism used is not appropriate.
  - some elements of the answer are indicated, **and** some of the terminology or symbolism used is appropriate.
- An explanation, a justification or a representation is **inappropriate** if most of the elements of the answer are incorrect or missing or if the terminology or symbolism used is inappropriate.

<sup>1</sup> Adapted from: *MELS, 555-410, Science and Technology, Marking Guide, June 2012*, and provided as a recommendation.

## **Guidelines for correcting questions requiring the use of formal mathematical solutions**

### Step 1

Analyze the work to understand the procedure used by the student, and then decide if the procedure is appropriate or not.

A procedure is **appropriate** if most of the steps are relevant and could lead to the correct answer.

A procedure is **partially appropriate** if the steps presented do not lead to the correct answer, but include at least one step that is relevant and correct.

A procedure is **inappropriate** if none of the steps presented are relevant or if the student has not shown any work.

### Step 2

If the procedure is deemed **appropriate** or **partially appropriate**, then evaluate the answer. If the answer is incorrect, identify the type of error(s) made.

The **error** is considered **minor** if it is an error in calculation or transcription, or if the unit of measurement is incorrect or missing.

The **error** is considered **major** if a law, rule, or formula has been applied incorrectly.

No marks are allotted for a correct answer when the procedure used is **inappropriate** or no work is shown.

PERIODIC TABLE OF THE ELEMENTS

**Key**

1	Atomic number
H	Atomic mass
1.01	

Element symbol

	I A 1		II A 2		III B 3	IV B 4	V B 5	VI B 6	VII B 7	VIII B 8 9 10	I B 11	II B 12	III A 13	IV A 14	V A 15	VI A 16	VII A 17	VIII A 18	
1	H hydrogen 1.01																		He helium 4.00
2	Li lithium 6.94		Be beryllium 9.01										B boron 10.81	C carbon 12.01	N nitrogen 14.01	O oxygen 16.00	F fluorine 19.00	Ne neon 20.18	
3	Na sodium 22.99		Mg magnesium 24.31										Al aluminum 26.98	Si silicon 28.09	P phosphorus 30.97	S sulphur 32.07	Cl chlorine 35.45	Ar argon 39.95	
4	K potassium 39.10	Ca calcium 40.08	Sc scandium 44.96	Ti titanium 47.90	V vanadium 50.94	Cr chromium 52.00	Mn manganese 54.94	Fe iron 55.85	Co cobalt 58.93	Ni nickel 58.71	Cu copper 63.55	Zn zinc 65.39	Ga gallium 69.72	Ge germanium 72.59	As arsenic 74.92	Se selenium 78.96	Br bromine 79.90	Kr krypton 83.80	
5	Rb rubidium 85.47	Sr strontium 87.62	Y yttrium 88.91	Zr zirconium 91.22	Nb niobium 92.91	Mo molybdenum 95.94	Tc technetium 98.91	Ru ruthenium 101.07	Rh rhodium 102.91	Pd palladium 106.40	Ag silver 107.87	Cd cadmium 112.41	In indium 114.82	Sn tin 118.71	Sb antimony 121.75	Te tellurium 127.60	I iodine 126.90	Xe xenon 131.30	
6	Cs caesium 132.91	Ba barium 137.33	57-71 lanthanoids	Hf hafnium 178.49	Ta tantalum 180.95	W tungsten 183.85	Re rhenium 186.21	Os osmium 190.20	Ir iridium 192.22	Pt platinum 195.09	Au gold 196.97	Hg mercury 200.59	Tl thallium 204.37	Pb lead 207.20	Bi bismuth 208.98	Po polonium (209)	At astatine (210)	Rn radon (222)	
7	Fr francium (223)	Ra radium (226)	89-103 actinoids	Rf rutherfordium (267)	Db dubnium (268)	Sg seaborgium (271)	Bh bohrium (272)	Hs hassium (270)	Mt meitnerium (276)	Ds darmstadtium (281)	Rg roentgenium (280)	Cn copernicium (285)	Uut ununtrium (284)	Fl flerovium (289)	Uup ununpentium (288)	Lv livermorium (293)	Uus ununseptium (292)	Uuo ununoctium (294)	
				57 La lanthanum 138.91	58 Ce cerium 140.12	59 Pr praseodymium 140.91	60 Nd neodymium 144.24	61 Pm promethium (145)	62 Sm samarium 150.36	63 Eu europium 151.96	64 Gd gadolinium 157.25	65 Tb terbium 158.93	66 Dy dysprosium 162.50	67 Ho holmium 164.93	68 Er erbium 167.26	69 Tm thulium 168.93	70 Yb ytterbium 173.05	71 Lu lutetium 174.97	
				89 Ac actinium (227)	90 Th thorium 232.04	91 Pa protactinium 231.04	92 U uranium 238.03	93 Np neptunium (237)	94 Pu plutonium (244)	95 Am americium (243)	96 Cm curium (247)	97 Bk berkelium (247)	98 Cf californium (251)	99 Es einsteinium (252)	100 Fm fermium (257)	101 Md mendelevium (258)	102 No nobelium (259)	103 Lr lawrencium (262)	

**FORMULAS**

$$Q = mc\Delta T$$

$$PV = nRT$$

$$\frac{P_1V_1}{n_1T_1} = \frac{P_2V_2}{n_2T_2}$$

$$P_T = P_A + P_B + P_C + \dots$$

$$P_A = P_T \frac{n_A}{n_T}$$

**PHYSICAL CONSTANTS**

SYMBOL	NAME	VALUE
$C_{H_2O}$	Specific heat capacity of water	4190 J/(kg•°C) or 4.19 J/(g•°C)
$\rho_{H_2O}$	Density of water	1.00 g/mL
$R$	Molar gas constant	8.31 kPa • L/(mol•K)
SATP	Standard ambient temperature and pressure	Temperature: 25.0°C
		Pressure: 101.3 kPa