

# FOR TEACHERS ONLY

The University of the State of New York  
REGENTS HIGH SCHOOL EXAMINATION

## PS-CH

### PHYSICAL SETTING/CHEMISTRY

Wednesday, June 21, 2006 — 1:15 to 4:15 p.m., only

## SCORING KEY AND RATING GUIDE

### Directions to the Teacher:

Refer to the directions on page 3 before rating student papers.

Updated information regarding the rating of this examination may be posted on the New York State Education Department's web site during the rating period. Check this web site <http://www.emsc.nysed.gov/osa/> and select the link "Examination Scoring Information" for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and several times throughout the Regents examination period.

### Part A and Part B-1

Allow 1 credit for each correct response.

| Part A                          |                                 |                                 | Part B-1                        |                                 |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| 1 . . . . . <b>1</b> . . . . .  | 11 . . . . . <b>1</b> . . . . . | 21 . . . . . <b>2</b> . . . . . | 31 . . . . . <b>4</b> . . . . . | 41 . . . . . <b>2</b> . . . . . |
| 2 . . . . . <b>4</b> . . . . .  | 12 . . . . . <b>3</b> . . . . . | 22 . . . . . <b>4</b> . . . . . | 32 . . . . . <b>4</b> . . . . . | 42 . . . . . <b>2</b> . . . . . |
| 3 . . . . . <b>4</b> . . . . .  | 13 . . . . . <b>2</b> . . . . . | 23 . . . . . <b>3</b> . . . . . | 33 . . . . . <b>3</b> . . . . . | 43 . . . . . <b>1</b> . . . . . |
| 4 . . . . . <b>2</b> . . . . .  | 14 . . . . . <b>3</b> . . . . . | 24 . . . . . <b>2</b> . . . . . | 34 . . . . . <b>4</b> . . . . . | 44 . . . . . <b>2</b> . . . . . |
| 5 . . . . . <b>4</b> . . . . .  | 15 . . . . . <b>3</b> . . . . . | 25 . . . . . <b>4</b> . . . . . | 35 . . . . . <b>3</b> . . . . . | 45 . . . . . <b>2</b> . . . . . |
| 6 . . . . . <b>3</b> . . . . .  | 16 . . . . . <b>2</b> . . . . . | 26 . . . . . <b>4</b> . . . . . | 36 . . . . . <b>1</b> . . . . . | 46 . . . . . <b>3</b> . . . . . |
| 7 . . . . . <b>2</b> . . . . .  | 17 . . . . . <b>2</b> . . . . . | 27 . . . . . <b>4</b> . . . . . | 37 . . . . . <b>4</b> . . . . . | 47 . . . . . <b>3</b> . . . . . |
| 8 . . . . . <b>3</b> . . . . .  | 18 . . . . . <b>2</b> . . . . . | 28 . . . . . <b>1</b> . . . . . | 38 . . . . . <b>3</b> . . . . . | 48 . . . . . <b>3</b> . . . . . |
| 9 . . . . . <b>2</b> . . . . .  | 19 . . . . . <b>4</b> . . . . . | 29 . . . . . <b>4</b> . . . . . | 39 . . . . . <b>1</b> . . . . . | 49 . . . . . <b>2</b> . . . . . |
| 10 . . . . . <b>1</b> . . . . . | 20 . . . . . <b>1</b> . . . . . | 30 . . . . . <b>1</b> . . . . . | 40 . . . . . <b>1</b> . . . . . | 50 . . . . . <b>2</b> . . . . . |



**Directions to the Teacher**

Follow the procedures below for scoring student answer papers for the Physical Setting/Chemistry examination. Additional information about scoring is provided in the publication *Information Booklet for Scoring Regents Examinations in the Sciences*.

Use only *red* ink or *red* pencil in rating Regents papers. Do *not* correct the student's work by making insertions or changes of any kind.

On the detachable answer sheet for Part A and Part B–1, indicate by means of a checkmark each incorrect or omitted answer. In the box provided at the end of each part, record the number of questions the student answered correctly for that part.

At least two science teachers must participate in the scoring of each student's responses to the Part B–2 and Part C open-ended questions. Each of these teachers should be responsible for scoring a selected number of the open-ended questions on each answer paper. No one teacher is to score all the open-ended questions on a student's answer paper.

Students' responses must be scored strictly according to the Scoring Key and Rating Guide. For open-ended questions, credit may be allowed for responses other than those given in the rating guide if the response is a scientifically accurate answer to the question and demonstrates adequate knowledge as indicated by the examples in the rating guide. Complete sentences are *not* required. Phrases, diagrams, and symbols may be used. In the student's answer booklet, record the number of credits earned for each answer in the box printed to the right of the answer lines or spaces for that question.

Fractional credit is *not* allowed. Only whole-number credit may be given to a response. Units need not be given when the wording of the questions allows such omissions.

Raters should enter the scores earned for Part A, Part B–1, Part B–2, and Part C on the appropriate lines in the box printed on the answer booklet and then should add these four scores and enter the total in the box labeled "Total Written Test Score." Then, the student's raw score should be converted to a scaled score by using the conversion chart that will be posted on the Department's web site <http://www.emsc.nysed.gov/osa/> on Wednesday, June 21, 2006. The student's scaled score should be entered in the labeled box on the student's answer booklet. The scaled score is the student's final examination score.

All student answer papers that receive a scaled score of 60 through 64 **must** be scored a second time. For the second scoring, a different committee of teachers may score the student's paper or the original committee may score the paper, except that no teacher may score the same open-ended questions that he/she scored in the first rating of the paper. The school principal is responsible for assuring that the student's final examination score is based on a fair, accurate, and reliable scoring of the student's answer paper.

Because scaled scores corresponding to raw scores in the conversion chart may change from one examination to another, it is crucial that for each administration, the conversion chart provided for that administration be used to determine the student's final score.

**Part B–2**

**Allow a total of 16 credits for this part. The student must answer all questions in this part.**

**51** [1] Allow 1 credit for 6 or six.

**52** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

Iron is more active than hydrogen.

Fe is higher on Table *J* than H<sub>2</sub>.

**53** [1] Allow 1 credit for 10 or ten.

**54** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

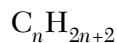
The third shell has one electron before the second shell is completely filled.

The electron configuration is not 2-7, which is the ground state for an atom with atomic number 9.

**Note:** Do *not* allow credit for a response that simply restates that the electron configuration is 2-6-1.

**55** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

alkanes



**56** [1] Allow 1 credit for 781 g. Significant figures do *not* need to be shown.

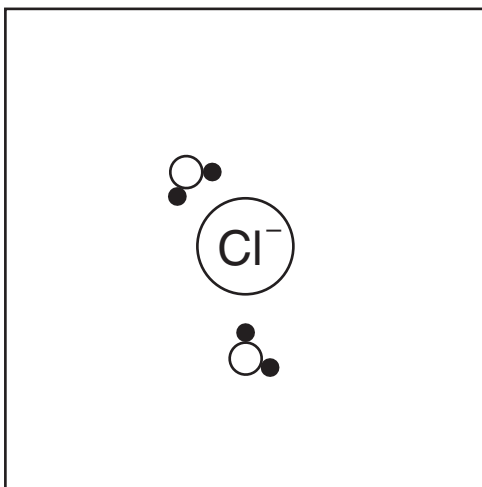
**57** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

Heat flows from the student's hand to the test tube.

The test tube absorbs heat from the hand.

- 58 [1] Allow 1 credit. Acceptable responses must show *at least two* water molecules with at least one hydrogen atom of each water molecule facing toward the  $\text{Cl}^-$  ion.

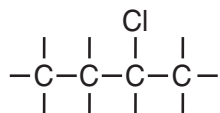
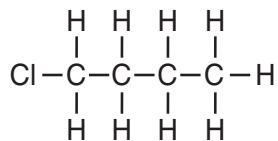
**Example of a 1-credit response:**



- 59 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Potential energy of the product is less than potential energy of the reactant.
  - More energy is released than absorbed.
  - Energy appears on the right.
- 60 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Equilibrium shifts toward the fewer number of moles of gas.
  - The reaction shifts to the side that would result in a reduction of pressure.
  - fewer moles of gas, less pressure
- 61 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- substitution
  - chlorination
  - halogenation

- 62 [1] Allow 1 credit.

**Examples of a 1-credit response:**



- 63 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Particles move slower and collide less frequently.
  - fewer effective collisions between molecules
- 64 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Ethanol's boiling point is lower than the boiling point of the solution.
  - The solution's boiling point is higher than 78.2°C.
- 65 [1] Allow 1 credit for 2730 kJ. Significant figures do *not* need to be shown.
- 66 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- soluble in water
  - boiling point
  - volatility

**Part C**

**Allow a total of 19 credits for this part. The student must answer all questions in this part.**

- 67** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

The greater the total number of carbon atoms in a molecule of a primary alcohol, the less soluble the alcohol is in water.

number of carbons ↓, solubility ↑

- 68** [1] Allow 1 credit for  $2.5 \text{ g} \pm 0.1 \text{ g}$ .

- 69** [1] Allow 1 credit for  $\underline{2} \text{ NaN}_3(\text{s}) \rightarrow \underline{2} \text{ Na}(\text{s}) + \underline{3} \text{ N}_2(\text{g})$ .

- 70** [2] Allow a maximum of 2 credits, allocated as follows:

- Allow 1 credit for a correct numerical setup. Acceptable responses include, but are not limited to:

$$V_2 = \frac{(273 \text{ K})(1.30 \text{ atm})(40.0 \text{ L})}{(301 \text{ K})(1.00 \text{ atm})}$$

$$\frac{(273)(1.30)(40.0)}{(301)(1.00)}$$

- Allow 1 credit for 47.2 L. Significant figures do *not* need to be shown.

**or**

Allow credit for a response consistent with the student's numerical setup.

**Note:** Do *not* allow credit for a numerical setup and calculated result that are not related to the concept assessed by the question.

- 71** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

This compound contains an —SH functional group.

There is a sulfur atom instead of an oxygen atom in the functional group.

- 72** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Oxygen and sulfur atoms have the same number (six) of valence electrons.
- Atoms of both elements need two more valence electrons to complete their outer shells.
- 73** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- $10^{-4}$  M
- 0.0001 M
- 74** [1] Allow 1 credit for blue.
- 75** [1] Allow 1 credit for seawater.
- 76** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- density
- mass
- volume
- 77** [1] Allow 1 credit. Significant figures do *not* need to be shown. Acceptable responses include, but are not limited to:
- $3.9 \text{ cm}^3$
- $3.88 \text{ cm}^3$
- 78** [1] Allow 1 credit. All three oxidation states must be correct to receive credit. Acceptable responses include, but are not limited to:
- Na: +1
- Al: +3
- F: -1
- 79** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- $\text{Al}^{3+} + 3\text{e}^- \rightarrow \text{Al}$



- 80** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

There are freely moving ions in the molten cryolite.

Ions are no longer held together in a crystal lattice.

- 81** [1] Allow 1 credit for a correct response that includes both processes. Acceptable responses include, but are not limited to:

A voltaic cell produces electrical energy and an electrolytic cell used in the Hall process requires electrical energy.

Electrolysis uses electrical energy. Voltaic cells produce electrical energy.

- 82** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

The electron of hydrogen absorbs energy and jumps to a higher energy state. The excited electron returns to a lower energy state, releasing light energy.

The  $e^-$  absorbs energy and jumps to a higher level. The  $e^-$  falls back to a lower level and releases energy related to a particular color.

- 83** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

The spectrum from a star is compared to spectra of known elements.

- 84** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

$$\% \text{ error} = \frac{647 \text{ nm} - 656 \text{ nm}}{656 \text{ nm}} \times 100$$

$$\frac{647 - 656}{656} \times 100$$

**The *Chart for Determining the Final Examination Score for the June 2006 Regents Examination in Physical Setting/Chemistry* will be posted on the Department's web site <http://www.emsc.nysed.gov/osa/> on Wednesday, June 21, 2006. Conversion charts provided for previous administrations of the Regents Examination in Physical Setting/Chemistry must NOT be used to determine students' final scores for this administration.**

**The *Teacher Evaluation of State Examinations* forms will also be posted on the same web site. Please select the link "Teacher Evaluation Forms" and then the examination title to complete the evaluation form for the *June 2006 Regents Examination in Physical Setting/Chemistry*.**

## Map to Core Curriculum

| <b>June 2006 Physical Setting/ Chemistry</b> |   |   |   |
|--|---|---|---|
| <b>Question Numbers</b>                      |   |   |   |
| Key Ideas                                    | Part A  | Part B  | Part C  |
| <b>Standard 1</b>                            |   |   |   |
| Math Key Idea 1                              |   | 44, 65  | 78, 84  |
| Math Key Idea 2                              |   |   |   |
| Math Key Idea 3                              |   | 35  | 70, 77  |
| Sci. Inq. Key Idea 1                         |   | 42, 59, 64  | 76, 82  |
| Sci. Inq. Key Idea 2                         |   |   |   |
| Sci. Inq. Key Idea 3                         |   | 43, 50, 51, 55  | 67, 68, 73  |
| Eng. Des. Key Idea 1                         |   |   |   |
| <b>Standard 2</b>                            |   |   |   |
| Key Idea 1                                   |   | 40  |   |
| Key Idea 2                                   |   |   |   |
| <b>Standard 6</b>                            |   |   |   |
| Key Idea 1                                   |   | 57  |   |
| Key Idea 2                                   |   |   |   |
| Key Idea 3                                   |   |   | 75  |
| Key Idea 4                                   |   |   |   |
| Key Idea 5                                   |   |   |   |
| <b>Standard 7</b>                            |   |   |   |
| Key Idea 1                                   |   |   |   |
| Key Idea 2                                   |   |   |   |
| <b>Standard 4 Process Skills</b>             |   |   |   |
| Key Idea 3                                   |   | 31, 32, 33, 34,<br>36, 37, 38, 40,<br>41, 44, 45, 46,<br>47, 48, 52, 53,<br>54, 56, 58, 60,<br>61, 62, 63, 64,<br>65                        | 69, 70, 71, 72, 74,<br>79, 81, 83                                       |
| Key Idea 4                                   |   | 49, 59  |   |
| Key Idea 5                                   |   | 39, 42, 66  | 80  |
| <b>Standard 4</b>                            |   |   |   |
| Key Idea 3                                   | 1, 2, 3, 4, 6, 7, 8,<br>14, 15, 16, 17,<br>20, 21, 22, 23,<br>24, 25, 26, 27,<br>30 | 31, 32, 33, 34,<br>35, 36, 37, 38,<br>40, 43, 44, 45,<br>46, 47, 48, 50,<br>51, 52, 53, 54,<br>55, 56, 58, 59,<br>60, 61, 62, 63,<br>64, 65 | 68, 69, 70, 71, 72,<br>73, 74, 75, 76, 77,<br>78, 79, 81, 82, 83,<br>84 |
| Key Idea 4                                   | 18, 19, 28  | 41, 49, 57  |   |
| Key Idea 5                                   | 5, 9, 10, 11, 12,<br>13, 29   | 39, 42, 66  | 67, 80  |
| <b>Reference Tables</b>                      |   |   |   |
| 2002 Edition                                 | 10, 15, 16, 19,<br>20, 25, 27, 28,<br>30  | 31, 32, 33, 34,<br>38, 40, 44, 45,<br>52, 56, 62  | 72, 74, 78, 84  |

