

# FOR TEACHERS ONLY

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

# PS-CH

## PHYSICAL SETTING/CHEMISTRY

Thursday, January 29, 2009 — 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>2</b> . . . . .	11 . . . . . <b>2</b> . . . . .	21 . . . . . <b>1</b> . . . . .	31 . . . . . <b>2</b> . . . . .	41 . . . . . <b>4</b> . . . . .
2 . . . . . <b>3</b> . . . . .	12 . . . . . <b>3</b> . . . . .	22 . . . . . <b>4</b> . . . . .	32 . . . . . <b>2</b> . . . . .	42 . . . . . <b>1</b> . . . . .
3 . . . . . <b>2</b> . . . . .	13 . . . . . <b>4</b> . . . . .	23 . . . . . <b>3</b> . . . . .	33 . . . . . <b>4</b> . . . . .	43 . . . . . <b>1</b> . . . . .
4 . . . . . <b>3</b> . . . . .	14 . . . . . <b>1</b> . . . . .	24 . . . . . <b>2</b> . . . . .	34 . . . . . <b>3</b> . . . . .	44 . . . . . <b>2</b> . . . . .
5 . . . . . <b>4</b> . . . . .	15 . . . . . <b>3</b> . . . . .	25 . . . . . <b>3</b> . . . . .	35 . . . . . <b>3</b> . . . . .	45 . . . . . <b>1</b> . . . . .
6 . . . . . <b>4</b> . . . . .	16 . . . . . <b>1</b> . . . . .	26 . . . . . <b>4</b> . . . . .	36 . . . . . <b>4</b> . . . . .	46 . . . . . <b>1</b> . . . . .
7 . . . . . <b>2</b> . . . . .	17 . . . . . <b>4</b> . . . . .	27 . . . . . <b>3</b> . . . . .	37 . . . . . <b>4</b> . . . . .	47 . . . . . <b>3</b> . . . . .
8 . . . . . <b>2</b> . . . . .	18 . . . . . <b>3</b> . . . . .	28 . . . . . <b>2</b> . . . . .	38 . . . . . <b>2</b> . . . . .	48 . . . . . <b>2</b> . . . . .
9 . . . . . <b>2</b> . . . . .	19 . . . . . <b>3</b> . . . . .	29 . . . . . <b>3</b> . . . . .	39 . . . . . <b>3</b> . . . . .	49 . . . . . <b>3</b> . . . . .
10 . . . . . <b>1</b> . . . . .	20 . . . . . <b>1</b> . . . . .	30 . . . . . <b>1</b> . . . . .	40 . . . . . <b>4</b> . . . . .	50 . . . . . <b>3</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 check mark 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 Thursday, January 29, 2009. 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. The specific positioning of the dots may vary.

**Examples of 1-credit responses:**



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

Neon has atoms with a complete outer shell of electrons.

Neon has a complete octet.

Neon has eight valence electrons.

**53** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

The rate of the forward reaction decreases because there are fewer  $\text{N}_2$  molecules to collide with  $\text{H}_2$  molecules.

The rate slows down because collisions are less frequent.

fewer effective collisions

54 [1] Allow 1 credit for 1.94 g.

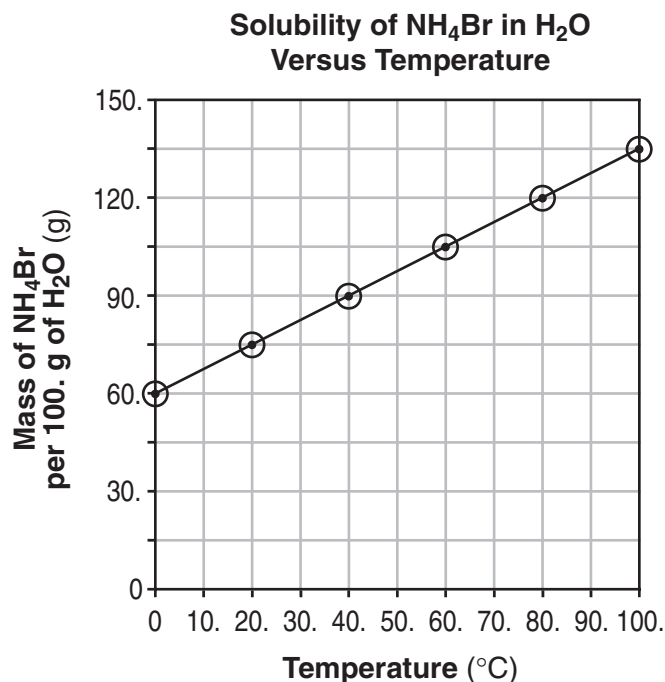
55 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

A  $\text{Ca}^{2+}$  ion has two fewer electrons than a Ca atom, so the ion is smaller.

Ca has an electron configuration of 2-8-8-2, and  $\text{Ca}^{2+}$  has an electron configuration of 2-8-8, so the ion is smaller.

56 [1] Allow 1 credit for correctly plotting all six points  $\pm 0.1$  grid space. Plotted points do *not* need to be circled or connected.

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



57 [1] Allow 1 credit for 210. g *or* for a response consistent with the student's graph in question 56. Significant figures do *not* need to be shown.

58 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

As temperature increases, the solubility of  $\text{NH}_4\text{Br}(s)$  in  $\text{H}_2\text{O}$  increases and the solubility of  $\text{NH}_3(g)$  in  $\text{H}_2\text{O}$  decreases.

$\text{NH}_4\text{Br}$  becomes more soluble and  $\text{NH}_3$  becomes less soluble.

- 59** [1] Allow 1 credit for identifying *one* physical property and *one* chemical property of CS<sub>2</sub>. Acceptable responses include, but are not limited to:

Physical property:

liquid at room temperature  
 colorless  
 odor  
 boiling point above room temperature

Chemical property:

CS<sub>2</sub> can be decomposed into C and S.  
 flammable

- 60** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

The potential energy of the CO<sub>2</sub> molecules increases.

PE increases.

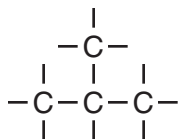
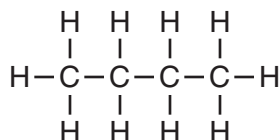
- 61** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

Carbon disulfide has stronger intermolecular forces than carbon dioxide.

CO<sub>2</sub> has weaker intermolecular forces.

- 62** [1] Allow 1 credit.

**Examples of 1-credit responses:**



**63** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

pentane



**64** [1] Allow 1 credit for 231 K.

**65** [1] Allow 1 credit for 3 *or* three.

**66** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

$$\frac{112 \text{ mL}}{298 \text{ K}} = \frac{V_2}{273 \text{ K}}$$

$$\frac{(112)(273)(1)}{(298)(1)}$$

**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:

Electrons flow from the magnesium block to the iron pipe.

Electrons flow from the Mg to the Fe through the wire.

Electrons flow from the anode to the cathode in a voltaic cell.

from the block to the pipe

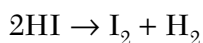
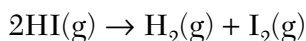
**68** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

Magnesium atoms lose electrons more easily than zinc atoms.

Mg oxidizes more readily than Zn.

Mg is more active than Zn.

**69** [1] Allow 1 credit. Acceptable responses include, but are not limited to:



**70** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

The concentration of each product and the concentration of the reactant remain the same.

The concentrations have reached constant levels.

The horizontal lines on the graph show that the concentrations are constant.

**Note:** Do *not* allow credit for a response stating the color of the gas is not changing, without including a reference to concentration.



71 [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:

$$126.905 \times 2 = 253.810 \text{ g/mol}$$

$$(0.013 \text{ M})(1.00 \text{ L})(253.810 \text{ g/mol})$$

$$\text{mass} = 0.013 \times 254$$

- Allow 1 credit for 3.3 g *or* for a response consistent with the student's numerical setup. Significant figures do *not* need to be shown.

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

72 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

The hydroxide ion concentration is greater than the hydrogen ion concentration.

The  $\text{H}_3\text{O}^+$  concentration is less than the  $\text{OH}^-$  concentration.

$$[\text{OH}^-] > [\text{H}_3\text{O}^+]$$

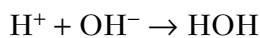
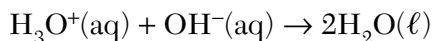
73 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

The pH is between 4.4 and 6.0, which indicates an acidic soil.

The pH of the soil surrounding the plant is below 6.0.

For chlorosis, the soil pH must be above 7.

74 [1] Allow 1 credit. Acceptable responses include, but are not limited to:



hydrogen ions + hydroxide ions  $\rightarrow$  water

hydroxide ions + hydronium ions  $\rightarrow$  water

75 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

yttrium oxide

76 [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:

$$\frac{(11)(26.981\ 54\ \text{g/mol})}{(140.12\ \text{g/mol}) + (24.305\ \text{g/mol}) + 11(26.981\ 54\ \text{g/mol}) + 19(15.9994\ \text{g/mol})} \times 100$$

$$\frac{297}{765} \times 100$$

- Allow 1 credit for 38.8% *or* for a response consistent with the student's numerical setup. Significant figures do *not* need to be shown.

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

77 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

Electrons move from the ground state to an excited state as the compounds gain energy. Light energy is released when the electrons return to lower states.

Electrons lose energy as they move to lower shells.

Light is emitted as electrons return from higher to lower energy states.

78 [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:

$$(0.000\ 156)(3.78\ \text{kg})$$

$$\frac{0.0156}{100} \times 3.78$$

- Allow 1 credit for  $5.90 \times 10^{-4}$  kg *or* 0.000 590 kg *or* for a response consistent with the student's numerical setup. Significant figures do *not* need to be shown.

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

**79** [1] Allow 1 credit for  $\frac{1}{0}n$ .

**80** [2] Allow a maximum of 2 credits, 1 credit for *each* acceptable response. Acceptable responses include, but are not limited to:

A butanoic acid molecule has four carbon atoms and an ethanol molecule has two carbon atoms.

Butanoic acid has a different functional group than ethanol.

A butanoic acid molecule has more hydrogen atoms than an ethanol molecule.

In a butanoic acid molecule, one oxygen atom has a double bond and in an ethanol molecule, the oxygen atom has two single bonds.

**81** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

esterification

dehydration synthesis

## Regents Examination in Physical Setting/Chemistry

January 2009

### Chart for Converting Total Test Raw Scores to Final Examination Scores (Scaled Scores)

**The *Chart for Determining the Final Examination Score for the January 2009 Regents Examination in Physical Setting/Chemistry* will be posted on the Department's web site <http://www.emsc.nysed.gov/osa/> on Thursday, January 29, 2009. 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.**

#### **Online Submission of Teacher Evaluations of the Test to the Department**

Suggestions and feedback from teachers provide an important contribution to the test development process. The Department provides an online evaluation form for State assessments. It contains spaces for teachers to respond to several specific questions and to make suggestions. Instructions for completing the evaluation form are as follows:

1. Go to [www.emsc.nysed.gov/osa/exameval](http://www.emsc.nysed.gov/osa/exameval).
2. Select the test title.
3. Complete the required demographic fields.
4. Complete each evaluation question and provide comments in the space provided.
5. Click the SUBMIT button at the bottom of the page to submit the completed form.

## Map to Core Curriculum

<b>January 2009 Physical Setting/Chemistry</b>			
<b>Question Numbers</b>			
Key Ideas/Performance Indicators	Part A	Part B	Part C
<b>Standard 1</b>			
Math Key Idea 1		37,38,49,56,64,65	76
Math Key Idea 2		35,58	70
Math Key Idea 3		37,44,54,57,64,66	71,76,78
Science Inquiry Key Idea 1		41,53,55	68,77,80
Science Inquiry Key Idea 2			
Science Inquiry Key Idea 3		32,36,37,46,48,49, 57,63	68,69,72,73,75
Engineering Design Key Idea 1			
<b>Standard 2</b>			
Key Idea 1		59	
Key Idea 2			
<b>Standard 6</b>			
Key Idea 1			
Key Idea 2			
Key Idea 3			
Key Idea 4			
Key Idea 5		42	
<b>Standard 7</b>			
Key Idea 1			
Key Idea 2			
<b>Standard 4 Process Skills</b>			
Key Idea 3		31,32,33,34,39,40, 41,43,45,47,52,53, 54,57,58,62,66	67,69,70,71,73,74, 80,81
Key Idea 4		38,39,42,50,60	79
Key Idea 5		45,51,61	
<b>Standard 4</b>			
Key Idea 3	1,2,3,4,5,6,7,8,9, 10,11,15,16,17,18, 20,21,22,23,24,25, 26,27,28,30	31,32,33,34,36,40, 41,43,44,46,47,49, 53,54,56,57,58,59, 62,65,66	67,68,69,70,71,72, 73,74,75,76,77,78, 80,81
Key Idea 4	14,19,29	35,38,39,42,48,50, 60,63,64	79
Key Idea 5	12,13	37,45,51,52,55,61	
<b>Reference Tables</b>			
2002 Edition	2,6,7,8,9,12,13,15, 25,27,28,30	33,34,37,38,43,44, 45,46,47,48,49,51, 55,62,64,66	67,68,71,73,74,75, 76,78,79,80,81





