

# FOR TEACHERS ONLY

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

## P.S.–CH PHYSICAL SETTING/CHEMISTRY

Thursday, January 24, 2013 — 1:15 to 4:15 p.m., only

### SCORING KEY AND RATING GUIDE

**Directions to the Teacher:**

Refer to the directions on page 2 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 at: <http://www.p12.nysed.gov/assessment/> and select the link "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			
1 . . . . . 4 . . . . .	9 . . . . . 2 . . . . .	17 . . . . . 3 . . . . .	25 . . . . . 1 . . . . .
2 . . . . . 4 . . . . .	10 . . . . . 3 . . . . .	18 . . . . . 3 . . . . .	26 . . . . . 3 . . . . .
3 . . . . . 1 . . . . .	11 . . . . . 3 . . . . .	19 . . . . . 3 . . . . .	27 . . . . . 1 . . . . .
4 . . . . . 4 . . . . .	12 . . . . . 1 . . . . .	20 . . . . . 2 . . . . .	28 . . . . . 4 . . . . .
5 . . . . . 2 . . . . .	13 . . . . . 1 . . . . .	21 . . . . . 3 . . . . .	29 . . . . . 3 . . . . .
6 . . . . . 1 . . . . .	14 . . . . . 1 . . . . .	22 . . . . . 2 . . . . .	30 . . . . . 4 . . . . .
7 . . . . . 3 . . . . .	15 . . . . . 2 . . . . .	23 . . . . . 4 . . . . .	
8 . . . . . 2 . . . . .	16 . . . . . 4 . . . . .	24 . . . . . 2 . . . . .	
Part B–1			
31 . . . . . 2 . . . . .	36 . . . . . 3 . . . . .	41 . . . . . 4 . . . . .	46 . . . . . 2 . . . . .
32 . . . . . 1 . . . . .	37 . . . . . 1 . . . . .	42 . . . . . 4 . . . . .	47 . . . . . 3 . . . . .
33 . . . . . 2 . . . . .	38 . . . . . 3 . . . . .	43 . . . . . 3 . . . . .	48 . . . . . 3 . . . . .
34 . . . . . 2 . . . . .	39 . . . . . 1 . . . . .	44 . . . . . 1 . . . . .	49 . . . . . 1 . . . . .
35 . . . . . 3 . . . . .	40 . . . . . 4 . . . . .	45 . . . . . 2 . . . . .	50 . . . . . 1 . . . . .

## Directions to the Teacher

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

**Do not attempt to correct the student's work by making insertions or changes of any kind. If the student's responses for the multiple-choice questions are being hand scored prior to being scanned, the scorer must be careful not to make any marks on the answer sheet except to record the scores in the designated score boxes. Marks elsewhere on the answer sheet will interfere with the accuracy of the scanning.**

Allow 1 credit for each correct response.

At least two science teachers must participate in the scoring of the Part B–2 and Part C open-ended questions on a student's paper. 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 more than approximately one-half of 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. On the student's separate answer sheet, for each question, record the number of credits earned and the teacher's assigned rater/scorer letter.

Fractional credit is *not* allowed. Only whole-number credit may be given for a response. If the student gives more than one answer to a question, only the first answer should be rated. Units need not be given when the wording of the questions allows such omissions.

For hand scoring, raters should enter the scores earned in the appropriate boxes printed on the separate answer sheet. Next, the rater should add these scores and enter the total in the box labeled "Total Raw Score." Then the student's raw score should be converted to a scale score by using the conversion chart that will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> on Thursday, January 24, 2013. The student's scale score should be entered in the box labeled "Scale Score" on the student's answer sheet. The scale score is the student's final examination score.

**Schools are not permitted to rescore any of the open-ended questions on this exam after each question has been rated once, regardless of the final exam score. Schools are required to ensure that the raw scores have been added correctly and that the resulting scale score has been determined accurately.**

Because scale scores corresponding to raw scores in the conversion chart may change from one administration 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 15 credits for this part. The student must answer all questions in this part.**

**51** [1] Allow 1 credit.

**Examples of 1-credit responses:**



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

Interval 3 represents the difference in potential energy between the products and the reactants.

Interval 3 represents the heat of reaction, +52.4 kJ.

$\Delta H$

**53** [1] Allow 1 credit for 104.8 kJ. Significant figures do *not* need to be shown.

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

Increase the temperature.

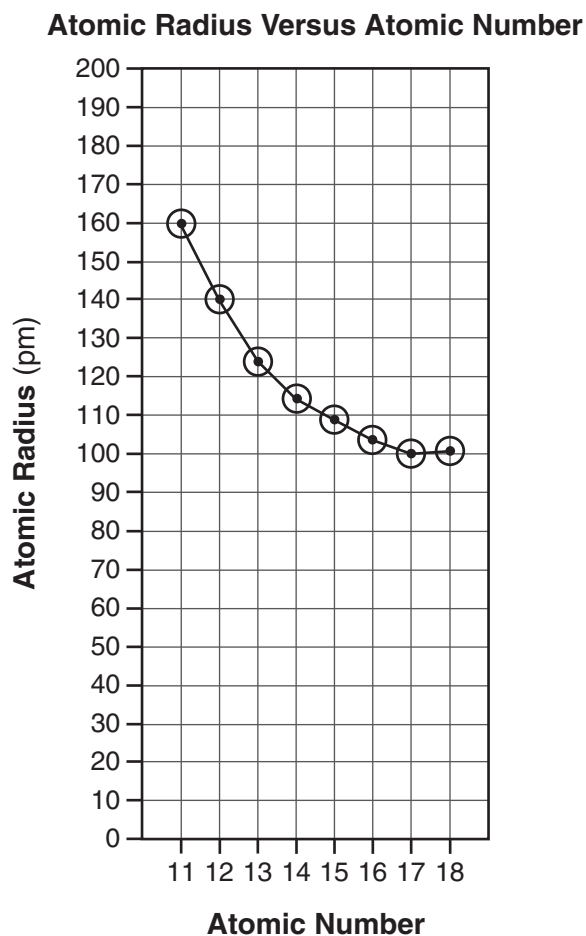
Increase the pressure.

Increase the concentration of  $\text{H}_2(\text{g})$ .

Increase the surface area of the carbon.

- 55 [1] Allow 1 credit for marking an appropriate scale. An appropriate scale is linear and allows a trend to be seen.
- 56 [1] Allow 1 credit for plotting all eight points correctly  $\pm 0.3$  grid space. Plotted points do *not* need to be circled or connected.

**Example of a 2-credit response for questions 55 and 56:**



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

As atomic number increases, there is a decrease in atomic radius.

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

The radius of a sodium ion is smaller because the sodium atom lost one electron.

An  $\text{Na}^+$  ion is smaller because it has one fewer electron shell.

- 59** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Each reactant hydrocarbon molecule has a double carbon-carbon bond.
  - There is a multiple carbon-carbon bond in each molecule.
  - More hydrogen atoms can be bonded with this hydrocarbon.
- 60** [1] Allow 1 credit for 56 g/mol. Significant figures do *not* need to be shown.
- 61** [1] Allow 1 credit for C<sub>2</sub>H<sub>4</sub>Br. The order of the elements can vary.
- 62** [1] Allow 1 credit for 0.20 mol. Significant figures do *not* need to be shown.
- 63** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The process requires heat to dissolve NH<sub>4</sub>Cl.
  - Energy is absorbed as NH<sub>4</sub>Cl dissolves.
  - The energy term is positive on the left side of the equation arrow.
  - The heat of reaction is positive.
- 64** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The 0.30 M NH<sub>4</sub>Cl(aq) sample has more mobile ions in solution.
  - The 0.10 M NH<sub>4</sub>Cl solution has a lower concentration of ions.
- 65** [1] Allow 1 credit for 47 g ± 1 g.

### Part C

**Allow a total of 20 credits for this part. The student must answer all questions in this part.**

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

H<sub>2</sub>

oxygen

nitrogen

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

Methane is a compound consisting of two elements, so it can be broken down by chemical means, but argon is an element, which cannot be broken down.

Methane is a compound and argon is an element.

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

$$338.7 \text{ ppm} = \frac{x}{100.0 \text{ g}} \times 10^6$$

$$\frac{(338.7)(100)}{1\,000\,000}$$

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

The gases in a mixture can be separated by physical means.

The gases in the atmosphere are separate elements or compounds that are not chemically combined with each other.

The proportions of the gases in the atmosphere can vary.

more than one substance

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

source of electrical energy

battery

- 71 [1] Allow 1 credit for identifying *one* metal from the passage that is more active than carbon and *one* metal from the passage that is less active than carbon.

More active than carbon:

aluminum

Mg

Na

Less active than carbon:

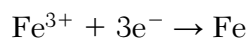
zinc

Pb

Fe

copper

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



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

Boron-11 is about four times more abundant than boron-10.

The B-10 is less abundant.

- 74 [1] Allow 1 credit for  ${}_{5}^{11}\text{B}$ .

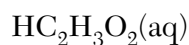
- 75 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

The carbon-11 nucleus has one more proton than the nucleus of boron-11.

A B-11 atom has a different number of neutrons than a C-11 atom.

- 76 [1] Allow 1 credit for 0.000 32 mol *or*  $3.2 \times 10^{-4}$  mol. Significant figures do *not* need to be shown.

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



78 [1] Allow 1 credit for red.

79 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

$$\frac{320. \text{ mg} - 325 \text{ mg}}{325 \text{ mg}} \times 100$$

$$\frac{(-5)(100)}{325}$$

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

The average kinetic energy of the water molecules at 7 a.m. is less than the average kinetic energy of the water molecules at 3 p.m.

The average kinetic energy of the molecules is greater at 3 p.m.

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

Heat was transferred from the surroundings to the water in the bottle.

The water absorbed energy from the surroundings.

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

$$q = (800. \text{ g})(4.18 \text{ J/g}\cdot\text{°C})(20.5\text{°C} - 12.5\text{°C})$$

$$(800)(4.18)(8)$$

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

fermentation

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

–OH

alcohol group

**Note:** Do *not* allow credit for hydroxide or OH<sup>–</sup>.

85 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

Zymase provides an alternate reaction pathway.

A reaction that involves zymase has a lower activation energy.



## Regents Examination in Physical Setting/Chemistry

January 2013

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

**The *Chart for Determining the Final Examination Score for the January 2013 Regents Examination in Physical Setting/Chemistry* will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> on Thursday, January 24, 2013. 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 <http://www.forms2.nysed.gov/emsc/osa/exameval/reexameval.cfm>.
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 2013 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		38, 42, 55, 56, 65	67, 79, 82
Math Key Idea 2		57	73, 78
Math Key Idea 3		34, 36, 37, 42, 53, 60, 62, 63	68, 72, 76, 77
Science Inquiry Key Idea 1		48, 49, 52, 54, 58, 59	66, 69, 70, 71, 80, 84, 85
Science Inquiry Key Idea 2			
Science Inquiry Key Idea 3		37, 40, 41, 46, 48	67, 70, 71, 72, 77, 81
Engineering Design Key Idea 1			
<b>Standard 2</b>			
Key Idea 1			
Key Idea 2			
<b>Standard 6</b>			
Key Idea 1			81
Key Idea 2		45, 50	79
Key Idea 3		32	
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, 33, 35, 42, 44, 45, 47, 51, 57, 60, 61, 64, 65	68, 72, 74, 75, 76, 83
Key Idea 4		43, 52, 53, 63	82
Key Idea 5		39	
<b>Standard 4</b>			
Key Idea 3	1, 2, 3, 4, 5, 6, 8, 11, 12, 13, 14, 17, 18, 19, 21, 23, 24, 25, 26, 27, 28, 29	31, 32, 33, 34, 35, 36, 37, 42, 44, 45, 46, 47, 49, 50, 54, 55, 56, 57, 59, 60, 61, 62, 64, 65	67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 83, 84, 85
Key Idea 4	15, 16, 20, 30	43, 52, 53, 63	80, 81, 82
Key Idea 5	7, 9, 10, 22	38, 39, 40, 41, 48, 51, 58	66
<b>Reference Tables</b>			
2011 Edition	1, 2, 7, 8, 10, 11, 12, 14, 16, 18, 24, 26, 28, 29, 30	31, 33, 34, 36, 37, 39, 40, 41, 42, 44, 45, 47, 51, 57, 58, 59, 60, 62, 63, 65	68, 72, 73, 74, 75, 76, 77, 78, 79, 82, 84