

# FOR TEACHERS ONLY

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

## **P.S.–CH** PHYSICAL SETTING/CHEMISTRY

Wednesday, August 17, 2016 — 8:30 to 11:30 a.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 . . . . . <b>1</b> . . . . .	9 . . . . . <b>4</b> . . . . .	17 . . . . . <b>2</b> . . . . .	25 . . . . . <b>4</b> . . . . .
2 . . . . . <b>3</b> . . . . .	10 . . . . . <b>4</b> . . . . .	18 . . . . . <b>4</b> . . . . .	26 . . . . . <b>3</b> . . . . .
3 . . . . . <b>1</b> . . . . .	11 . . . . . <b>2</b> . . . . .	19 . . . . . <b>1</b> . . . . .	27 . . . . . <b>1</b> . . . . .
4 . . . . . <b>4</b> . . . . .	12 . . . . . <b>3</b> . . . . .	20 . . . . . <b>4</b> . . . . .	28 . . . . . <b>3</b> . . . . .
5 . . . . . <b>1</b> . . . . .	13 . . . . . <b>3</b> . . . . .	21 . . . . . <b>3</b> . . . . .	29 . . . . . <b>2</b> . . . . .
6 . . . . . <b>2</b> . . . . .	14 . . . . . <b>2</b> . . . . .	22 . . . . . <b>1</b> . . . . .	30 . . . . . <b>2</b> . . . . .
7 . . . . . <b>2</b> . . . . .	15 . . . . . <b>3</b> . . . . .	23 . . . . . <b>2</b> . . . . .	
8 . . . . . <b>3</b> . . . . .	16 . . . . . <b>3</b> . . . . .	24 . . . . . <b>4</b> . . . . .	
Part B–1			
31 . . . . . <b>3</b> . . . . .	36 . . . . . <b>3</b> . . . . .	41 . . . . . <b>3</b> . . . . .	46 . . . . . <b>1</b> . . . . .
32 . . . . . <b>1</b> . . . . .	37 . . . . . <b>2</b> . . . . .	42 . . . . . <b>1</b> . . . . .	47 . . . . . <b>4</b> . . . . .
33 . . . . . <b>3</b> . . . . .	38 . . . . . <b>2</b> . . . . .	43 . . . . . <b>3</b> . . . . .	48 . . . . . <b>4</b> . . . . .
34 . . . . . <b>2</b> . . . . .	39 . . . . . <b>1</b> . . . . .	44 . . . . . <b>3</b> . . . . .	49 . . . . . <b>3</b> . . . . .
35 . . . . . <b>4</b> . . . . .	40 . . . . . <b>4</b> . . . . .	45 . . . . . <b>1</b> . . . . .	50 . . . . . <b>1</b> . . . . .

## 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. Teachers may not score their own students' answer papers.

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 Wednesday, August 17, 2016. 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 for CH<sub>2</sub>. The order of the elements can vary.

**52** [1] Allow 1 credit for any value from 78 g to 82 g inclusive.

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

boiling point

boiling temperature

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

The average kinetic energy decreases.

The average KE goes down.

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

freezing

solidification

liquid to solid

**56** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

Two substances react to produce one substance.

This product is formed by chemically combining two substances.

Two molecules produce a more complex molecule.

One compound is formed from two compounds.

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

halide

halocarbon

alkyl halide

halogenalkane

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

The molecular formulas for the two compounds are the same, but the structural formulas are different.

Both molecules have the same number of *C* atoms and the same number of *H* atoms, but have a different arrangement of atoms.

Both compounds are  $C_3H_6$ , but have different structures.

Both compounds are  $C_3H_6$ , but one has a ring and one has a double bond.

59 [1] Allow 1 credit for 240. K. Significant figures need *not* be shown.

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

The radius of a fluoride ion is larger than the radius of a fluorine atom.

The radius of  $F^-$  is 73 pm greater than the radius of an F atom.

The F atom is 60 pm, the  $F^-$  is 133 pm.

The F atom is smaller.

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

A lithium atom loses its second-shell electron, so the lithium ion has only one shell of electrons.

A lithium ion has one fewer electron.

The Li atom has 3 electrons and the  $Li^+$  ion has 2 electrons.

A  $Li^+$  ion has one less electron.

62 [1] Allow 1 credit. The positions of the dots may vary.

**Examples of 1-credit responses:**



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

As the elements in Period 2 are considered from left to right, the atomic radius generally decreases.

The atomic radius goes down except for Neon.

The atomic radius gets smaller.

**64** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

In this reaction, uranium is changing to other elements.

Different elements are formed.

One element becomes two new elements.

Two atoms are formed with different atomic numbers from the U-235.

**65** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

${}_{41}^{97}\text{Nb}$

${}^{97}\text{Nb}$

Nb-97

niobium-97

### 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:

Fe oxidizes in the presence of  $\text{Cu}^{2+}$  ions.

Iron is a more active metal than copper.

$\text{Cu}^{2+}$  ions act as an oxidizing agent.

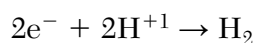
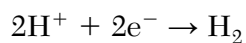
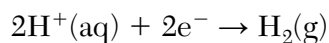
Fe is above Cu on Table *J*.

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

$5 \times 10^{-4}$  mol

0.0005 mol

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



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

Increase the concentration of the  $\text{HCl}(\text{aq})$ .

Increase the temperature.

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

Solute: NaCl

Solvent:  $\text{H}_2\text{O}$

Solute: sodium chloride

Solvent: water

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

$$\frac{35.04 \text{ g}}{100.00 \text{ g} + 35.04 \text{ g}} \times 100$$

$$\frac{35}{135} \times 100$$

$$\frac{35 \text{ g} (100)}{35 \text{ g} + 100 \text{ g}}$$

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

The solution in beaker 4 has a greater ability to conduct an electric current because it has a greater concentration of aqueous ions than the solution in beaker 1.

There are fewer charged particles free to move in beaker 1.

There are more ions in beaker 4.

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

The greater the concentration of ions, the higher the boiling point of the solution.

The boiling point is lower with fewer dissolved particles.

The boiling point goes up with more aqueous ions.

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

From 0 to +2

From 0 to 2+

From zero to two

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

The number of moles of electrons lost is equal to the number of moles of electrons gained.

The number of moles is the same.

$e^-$  lost =  $e^-$  gained.

**76** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

Risk: Mercury is toxic.

Benefit: Mercury batteries are miniature.

Risk: harmful to humans

Benefit: producing electricity

77 [1] Allow 1 credit for yellow.

78 [1] Allow 1 credit for  $\text{OH}^-$  or hydroxide.

79 [1] Allow 1 credit for 2 or two.

80 [1] Allow 1 credit for 0.86 M or 0.862 M.

81 [1] Allow 1 credit for carbon or C.

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

fermentation

fermenting

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

There is a double carbon-carbon bond in an ethene molecule.

Molecules of the compound contain a multiple C to C bond.

More H atoms can be added to the molecule.

Each molecule has  $\text{C} = \text{C}$ .

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

The alcohol functional group,  $-\text{OH}$ , allows for hydrogen bonding between ethanol molecules, so ethanol has a higher boiling point than ethene.

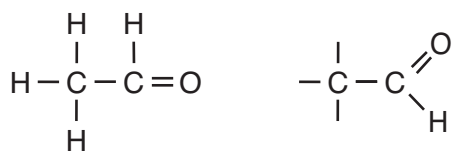
The boiling point of ethene is lower because its intermolecular forces are weaker than the intermolecular forces in the alcohol.

IMF for ethanol is stronger.



85 [1] Allow 1 credit.

**Examples of 1-credit responses:**



## Regents Examination in Physical Setting/Chemistry

August 2016

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

**The *Chart for Determining the Final Examination Score for the August 2016 Regents Examination in Physical Setting/Chemistry* will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> on Wednesday, August 17, 2016. 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

August 2016 Physical Setting/Chemistry			
Question Numbers			
Key Ideas/Performance Indicators	Part A	Part B	Part C
<b>Standard 1</b>			
Math Key Idea 1		41, 59	71, 79
Math Key Idea 2		40, 50, 51, 55, 65	73
Math Key Idea 3		32, 38, 41, 52, 59	67, 74, 80
Science Inquiry Key Idea 1		34, 36, 47, 51, 53, 54, 56, 57, 58, 60, 61, 63, 64	66, 69, 70, 72, 73, 75, 78, 77, 81, 82, 83, 84
Science Inquiry Key Idea 2			
Science Inquiry Key Idea 3		33, 34, 35, 37, 42, 43, 46, 47, 48, 49, 54, 58, 60, 64, 65	66, 74, 77
Engineering Design Key Idea 1			
<b>Standard 2</b>			
Key Idea 1		31	
Key Idea 2			
Key Idea 3			
<b>Standard 6</b>			
Key Idea 1			
Key Idea 2		46	68
Key Idea 3		32	
Key Idea 4			
Key Idea 5		51, 52, 55	
<b>Standard 7</b>			
Key Idea 1			76
Key Idea 2			
<b>Standard 4 Process Skills</b>			
Key Idea 3		39, 42, 44, 45, 51, 56, 63	67, 68, 71, 77, 80, 82, 85
Key Idea 4		33, 35, 37, 41, 54, 65	
Key idea 5		34, 36, 62	84
<b>Standard 4</b>			
Key Idea 3	1, 2, 3, 4, 5, 6, 10, 12, 13, 14, 15, 16, 17, 19, 20, 21, 23, 24, 25, 26, 27, 28, 30	31, 32, 33, 35, 39, 40, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 55, 56, 57, 58, 63	66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 85
Key Idea 4	18, 22, 29	41, 54, 59, 65	
Key Idea 5	7, 8, 9, 11	34, 36, 37, 38, 60, 61, 62, 64	84
<b>Reference Tables</b>			
2011 Edition	2, 3, 6, 7, 9, 10, 12, 15, 17, 26, 29	31, 33, 36, 38, 40, 41, 43, 45, 47, 50, 52, 57, 59, 61, 62, 63, 65	66, 68, 71, 74, 77, 78, 80, 81, 83, 85