FOR TEACHERS ONLY

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

P.S.–CH PHYSICAL SETTING/CHEMISTRY

Wednesday, January 28, 2015 — 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 . . . . . **1**	9 . . . . . **4**	17 . . . . . **1**	25 . . . . . **3** . . . . .
2 . . . . . **4**	10 . . . . . **2**	18 . . . . . **3**	26 . . . . . **2** . . . . .
3 . . . . . **3**	11 . . . . . **3**	19 . . . . . **3**	27 . . . . . **1** . . . . .
4 . . . . . **3**	12 . . . . . **1**	20 . . . . . **1**	28 . . . . . **1** . . . . .
5 . . . . . **1**	13 . . . . . **3**	21 . . . . . **3**	29 . . . . . **3** . . . . .
6 . . . . . **3**	14 . . . . . **2**	22 . . . . . **4**	30 . . . . . **1** . . . . .
7 . . . . . **4**	15 . . . . . **4**	23 . . . . . **3**	
8 . . . . . **1**	16 . . . . . **3**	24 . . . . . **3**	

Part B–1

31 . . . . . **1**	36 . . . . . **3**	41 . . . . . **1**	46 . . . . . **3** . . . . .
32 . . . . . **1**	37 . . . . . **1**	42 . . . . . **3**	47 . . . . . **1** . . . . .
33 . . . . . **3**	38 . . . . . **3**	43 . . . . . **1**	48 . . . . . **4** . . . . .
34 . . . . . **2**	39 . . . . . **3**	44 . . . . . **3**	49 . . . . . **2** . . . . .
35 . . . . . **1**	40 . . . . . **2**	45 . . . . . **3**	50 . . . . . **4** . . . . .

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, January 28, 2015. 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 13.2 g *or* for any value from 13.155 g to 13.2042 g, inclusive.

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

The entropy of the reactants is less than the entropy of the products.

The reactants are more ordered.

The products have greater entropy.

53 [1] Allow 1 credit for CH_2O. The order of the elements can vary.

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

2 atm

2.0 atm

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

When the piston is moved farther into the cylinder, the frequency of collisions between the molecules increases.

There will be more collisions per second.

increased frequency

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

H_2O

water

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

As liquid methane boils, the potential energy of the sample increases.

Potential energy increases.

higher PE

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

Methanol and water molecules are polar, but methane molecules are nonpolar.

The compounds methanol and water have similar polarities.

59 [1] Allow 1 credit. The positions of the dots can vary.

Examples of 1-credit responses:

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

The molecule in diagram *B* has only single carbon-carbon bonds.

There are no multiple bonds between the carbon atoms.

Cannot add more H atoms to the C atoms because all C−C bonds are single.

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

Both molecules have the same molecular formula, but have different structural formulas.

Both molecules are composed of 5 carbon atoms and 12 hydrogen atoms, but differ in the arrangement of their atoms.

62 [1] Allow 1 credit for $\underline{4}\ Fe(s) + \underline{3}\ O_2(g) \rightarrow \underline{2}\ Fe_2O_3(s)$.

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

From 0 to −2

From 0 to 2−

From zero to negative two

64 [1] Allow 1 credit.

Example of a 1-credit response:

Aqueous Solution	Color of Thymol Blue
NaCl(aq)	yellow
NaOH(aq)	blue

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

10

ten

tenfold

10 times

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:

Si

germanium

element 32

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

The atomic radius of these elements increases down the group because each successive element has one more electron shell.

The number of shells per atom increases.

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

4

four

$4e^-$

four valence electrons

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

The bracelet temperature increased because heat flowed from the body to the copper.

Energy is tranferred from the student to the bracelet.

Heat is absorbed by the bracelet.

70 [1] Allow 1 credit for 0.474 mol *or* for any value from 0.47 mol to 0.47402 mol, inclusive, *or* for 0.5 mol.

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

$q = (30.1\text{ g})(0.385\text{ J/g•K})(19°\text{C} - 33°\text{C})$

$(30.1\text{ g})(306\text{ K} - 292\text{ K})(0.385\text{ J/g•K})$

$(0.385)(30.1)(14)$

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

Copper is less chemically active than iron, so copper is less likely to react with substances in the air or on the skin.

Iron is more active.

Fe oxidizes more easily.

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

3.3%

3%

3.3333%

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

Water has a higher freezing point than seawater.

Seawater's is lower.

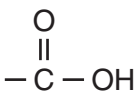
75 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

Energy is needed to overcome the intermolecular forces.

Energy is required to change liquid water to water vapor.

The heat of vaporization is positive.

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



alcohol group

acid

hydroxyl

carboxyl

Note: Do *not* allow credit for OH^- *or* hydroxide.

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

The rate of the forward reaction equals the rate of the reverse reaction.

The reaction rates are the same at equilibrium.

78 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

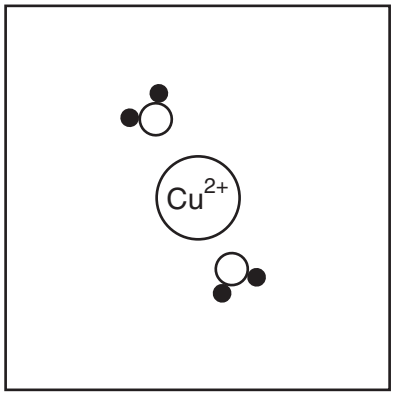
The stress of adding H^+ ions shifts the equilibrium to the left, producing more lactic acid.

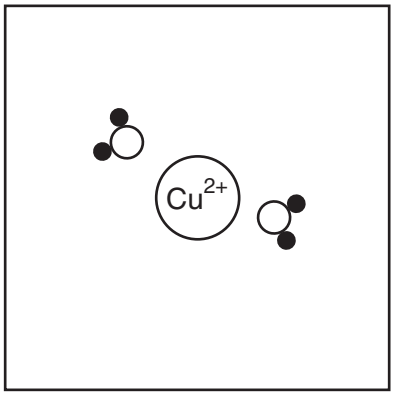
Increasing the concentration of $H^+(aq)$ favors the reverse reaction.

More H^+ ions collide with lactate ions, shifting the equilibrium left.

79 [1] Allow 1 credit. Acceptable responses must show *at least two* water molecules. The oxygen atom of each water molecule must face toward the copper ion.

Examples of 1-credit responses:





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

$$\frac{6.75 \times 10^{-4} g}{5.50 \times 10^{2} g} \times 10^{6}$$

$$\frac{0.000675}{550.} \times 1\,000\,000$$

$$\frac{6.75 \times 10^{-4}}{550} \times 1000000$$

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

$Cu \rightarrow Cu^{2+} + 2e^{-}$

$Cu - 2e^{-} \rightarrow Cu^{+2}$

82 [1] Allow 1 credit for 146.

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

alpha

α

$^{4}_{2}\alpha$

$^{4}_{2}He$

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

The fission of one mole of Pu-239 releases much more energy than the combustion of one mole of CH_4.

The energy released during the chemical reaction is less than the energy released during the nuclear reaction.

greater for $^{239}_{94}Pu$

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

$^{144}_{58}Ce$

^{144}Ce

cerium-144

Ce-144

Regents Examination in Physical Setting/Chemistry

January 2015

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

The *Chart for Determining the Final Examination Score for the January 2015 Regents Examination in Physical Setting/Chemistry* will be posted on the Department's web site at: http://www.p12.nysed.gov/assessment/ on Wednesday, January 28, 2015. 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

January 2015 Physical Setting/Chemistry			
Question Numbers			
Key Ideas/Performance Indicators	Part A	Part B	Part C
Standard 1			
Math Key Idea 1		36, 38, 43, 54	71, 73, 80
Math Key Idea 2		62	
Math Key Idea 3		48, 51, 54, 63	70, 73, 82, 85
Science Inquiry Key Idea 1		34, 42, 43, 55, 57, 58, 60, 61, 65	67, 68, 69, 74, 75, 76, 77, 79, 84
Science Inquiry Key Idea 2			
Science Inquiry Key Idea 3		33, 34, 35, 40, 41, 50, 60, 62, 63	68, 78, 85
Engineering Design Key Idea 1			
Standard 2			
Key Idea 1		64	
Key Idea 2			
Key Idea 3			
Standard 6			
Key Idea 1			69
Key Idea 2		44	79
Key Idea 3		65	
Key Idea 4		45	78
Key Idea 5			
Standard 7			
Key Idea 1			72
Key Idea 2			
Standard 4 Process Skills			
Key Idea 3		31, 32, 36, 37, 39, 40, 43, 44, 45, 46, 47, 51, 52, 53, 54, 55, 58, 59, 62, 64	66, 67, 70, 73, 74, 76, 77, 78, 80, 81, 82, 83
Key Idea 4		48, 49, 57	71, 85
Key Idea 5		56	
Standard 4			
Key Idea 3	1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 16, 17, 19, 20, 23, 24, 25, 26, 27, 28, 29	31, 32, 33, 34, 36, 37, 38, 39, 40, 41, 44, 45, 46, 47, 49, 50, 51, 52, 53, 54, 55, 58, 59, 60, 61, 62, 63, 64, 65	66, 67, 68, 70, 72, 73, 74, 76, 77, 78, 80, 81, 82
Key Idea 4	18, 21, 22, 30	43, 48, 57	69, 71, 75, 83, 85
Key Idea 5	7, 12, 13, 14, 15	35, 42, 56	79, 84
Reference Tables			
2011 Edition	6, 11, 13, 15, 16, 22, 29	31, 32, 34, 35, 37, 38, 40, 43, 47, 48, 50, 54, 59, 63, 64	66, 67, 68, 70, 71, 72, 73, 75, 76, 79, 80, 82, 83, 85