FOR TEACHERS ONLY

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

PS–CH PHYSICAL SETTING/CHEMISTRY

Wednesday, August 13, 2003 — 12:30 to 3:30 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

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

Part A and Part B–1
Allow 1 credit for each correct response.

Part A

1	1	13	2	25	4			
2	4	14	1	26	3			
3	1	15	1	27	1			
4	3	16	4	28	4			
5	1	17	2	29	3			
6	3	18	1	30	4			
7	2	19	1	31	4			
8	1	20	3	32	3			
9	1	21	2	33	4			
10	3	22	3	34	2			
11	2	23	2	35	2			
12	4	24	4					

Part B–1

36	2	44	3
37	1	45	2
38	1	46	3
39	4	47	2
40	4	48	1
41	3	49	4
42	2	50	3
43	2		

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 Administering and 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 printed at the end of this Scoring Key and Rating Guide. 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 in the scoring key for that administration be used to determine the student's final score. The chart in this scoring key is usable only for this administration of the examination.

Part B–2

Allow a total of 14 credits for this part. The student must answer all questions in this part.

51 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

lowers activation energy

provides an alternate reaction pathway

brings particles together

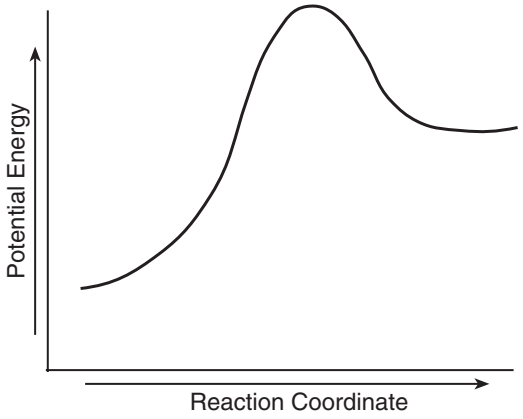
forms a different activated complex at lower activation energy

52 [2] Allow 1 credit for showing a peak that is higher than the beginning and the end of the curve.

and

Allow 1 credit for showing that the end of the curve is higher than the beginning of the curve.

Acceptable responses include, but are not limited to, this example:



Note: The labeling of the activation energy and/or the potential energy of the reactants and products does *not* need to be shown. However, if labels are shown, they must be consistent with a correct answer.

53 [1] Allow 1 credit for a correctly balanced equation showing atoms, ions, electrons, and appropriate coefficients. Acceptable responses include, but are not limited to, these examples:

$Cl_2 + 2e^- \rightarrow 2\,Cl^-$

$Cl_2 \rightarrow 2\,Cl^- - 2e^-$

$Cl + e^- \rightarrow Cl^-$

54 [1] Allow 1 credit for $\_\_\_\_\_\ C_6H_{12}O_6 \xrightarrow{\text{enzyme}} \underline{\mathbf{2}}\ C_2H_5OH + \underline{\mathbf{2}}\ CO_2$.

Note: Allow credit even if the coefficient 1 is written in front of $C_6H_{12}O_6$.

55 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

fermentation

decomposition

redox

56 [1] Allow 1 credit only if all values are correct.

Atomic Number	**Element**	**First Ionization Energy** (kJ/mol)
2	He	**2372**
10	Ne	**2081**
18	Ar	**1521**
36	Kr	**1351**
54	Xe	**1170**

57 [2] Allow 1 credit for marking an appropriate scale on the axis labeled "First Ionization Energy."

Note: An appropriate scale is one that allows a trend to be seen.

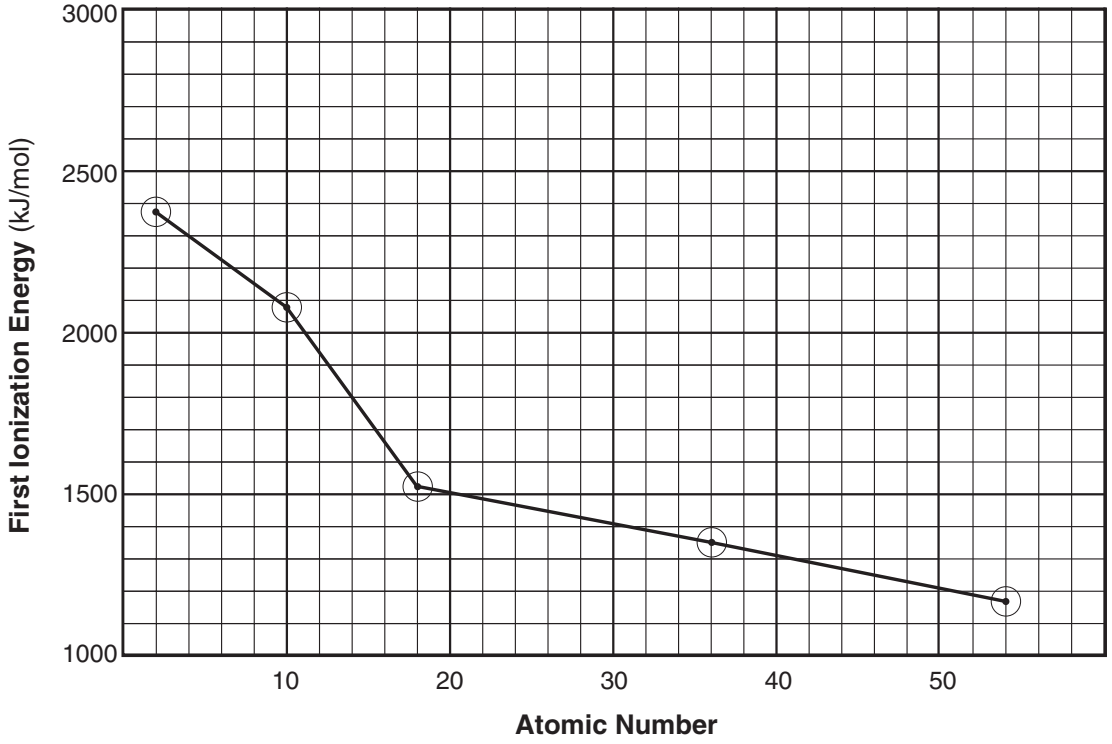
and

Allow 1 credit for correctly plotted (±0.3 grid space) and connected points. Allow credit even if the points are not circled on the graph.

or

Allow 1 credit for plotted (±0.3 grid space) and connected points that are consistent with the student's response to question 56. Allow credit even if the points are not circled on the graph.

Acceptable responses include, but are not limited to, this example:



[5]

58 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

As atomic number increases within Group 18, the first ionization energy decreases.

decreases

or

Allow 1 credit for a description that is consistent with the student's graph in question 57.

59 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

boiling

vaporization

liquid – vapor equilibrium

60 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

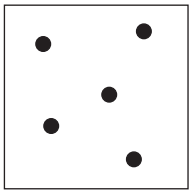
$\overline{AB}$

$\overline{CD}$

$\overline{EF}$

Note: The lines over the letters do *not* need to be shown.

61 [1] Allow 1 credit for a drawing with particles appearing in the gas phase. Acceptable responses include, but are not limited to, this example:



62 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

The potential energy of the particles increases.

PE increases.

KE remains the same.

particles more disordered

Particles are spreading farther apart.

Intermolecular forces of attraction decrease.

Part C

Allow a total of 21 credits for this part. The student must answer all questions in this part.

63 [2] Allow 2 credits, 1 credit *each* for **H** and **He** *or* **hydrogen** and **helium**.

64 [2] Allow 1 credit for a correct response involving the change from the excited state to the ground state.

and

Allow 1 credit for a correct response involving the release of energy.

Acceptable responses include, but are not limited to, these examples:

Excited state to ground state releases energy.

energy released — excited to ground

An electron absorbs energy and moves to a higher shell (energy level). As the electron returns to a lower shell (energy level), it releases energy in the form of a bright-line spectrum.

Note: An accurate drawing or sketch may be used in the student's explanation.

65 [3] Allow 1 credit for a correct numerical setup. Acceptable responses include, but are not limited to, these examples:

$$\frac{(19.91)(10.01) + 80.09(11.01)}{100}$$

$(.1991)(10.01) + (.8009)(11.01)$

and

Allow 1 credit for **10.81** *or* for a response that is consistent with the student's setup.

and

Allow 1 credit for a response that is consistent with the student's setup.

66 [2] Allow 1 credit for a correct numerical setup. Acceptable responses include, but are not limited to, this example:

$$\frac{7.56 - 7.14}{7.14} \times 100$$

and

Allow 1 credit for a correct response. Significant figures are *not* needed. Acceptable responses include, but are not limited to, these examples:

5.88

5.9

6

or

Allow 1 credit for a response that is consistent with the student's setup.

67 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

Entropy increases.

more entropy

Entropy changes.

68 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

NaCl(s) ions cannot move (are not mobile).

no charged particles free to move

69 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

An endothermic process absorbs heat energy.

Heat flows from the surroundings to the mixture.

heat absorbed by system

70 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

$^{4}_{2}\text{He}$

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

Note: Do *not* allow credit for α.

71 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

Emitted particles alter genetic information.

change DNA

72 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

both Group 2 metals

Radium is a more active metal.

similar chemical properties

They are both alkaline earth metals.

It also has two valence electrons.

73 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

acts as the scintillator

It emits visible light in response to ionizing radiation.

74 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

Zinc sulfide is not soluble in water.

insoluble

75 [1] Allow 1 credit for **H_3O^+** or **H^+** or **hydronium** or **hydrogen**.

76 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

to increase CO_2 solubility in H_2O

to force CO_2 into the solution

77 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

Very little carbon dioxide will dissolve in water.

low solubility

78 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

CO_2: nonpolar
H_2O: polar

CO_2: symmetrical in shape and charge
H_2O: asymmetrical in shape and charge

or

Allow 1 credit for a response that is consistent with the student's response to question 77.

Regents Examination in Physical Setting/Chemistry
August 2003
Chart for Converting Total Test Raw Scores to Final Examination Scores (Scaled Scores)

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
85	100	63	71	41	58	19	38
84	98	62	71	40	57	18	37
83	96	61	70	39	57	17	35
82	94	60	69	38	56	16	34
81	93	59	68	37	55	15	32
80	91	58	68	36	55	14	31
79	90	57	67	35	54	13	29
78	88	56	67	34	53	12	27
77	87	55	66	33	53	11	25
76	85	54	66	32	52	10	23
75	84	53	65	31	51	9	21
74	83	52	64	30	50	8	19
73	81	51	64	29	49	7	17
72	80	50	63	28	48	6	15
71	79	49	62	27	47	5	13
70	78	48	62	26	46	4	10
69	77	47	61	25	45	3	8
68	76	46	61	24	44	2	5
67	75	45	60	23	43	1	3
66	74	44	60	22	42	0	0
65	73	43	59	21	41		
64	72	42	58	20	40		

To determine the student's final examination score, find the student's total test raw score in the column labeled "Raw Score" and then locate the scaled score that corresponds to that raw score. The scaled score is the student's final examination score. Enter this score in the space labeled "Final Score" on the student's answer sheet.

Map to Core Curriculum

August 2003 Physical Setting/ Chemistry			
Question Numbers			
Key Ideas	Part A	Part B	Part C
Standard 1			
Math Key Idea 1		56,57	65,66
Math Key Idea 2			
Math Key Idea 3			
Sci. Inq. Key Idea 1		38	64,68,76,78
Sci. Inq. Key Idea 2			73
Sci. Inq. Key Idea 3		52,62	70
Eng. Des. Key Idea 1			
Standard 2			
Key Idea 1			74,77
Key Idea 2			
Standard 6			
Key Idea 1			69
Key Idea 2			66
Key Idea 3			
Key Idea 4		46	
Key Idea 5			
Standard 7			
Key Idea 1			71
Key Idea 2			
Standard 4 Process Skills			
Key Idea 3		36,37,39,41,42, 43,44,45,46,47, 48,49,51,53,54, 55,58,61	63,65,67,72
Key Idea 4		50,59,60,62	
Key Idea 5		40	
Standard 4			
Key Idea 3	1,2,3,4,5,6,7,8, 9,10,14,16,18, 19,20,21,22,23, 24,25,27,28,29, 30,31,32,35	36,37,38,39,41, 42,43,44,45,46, 47,48,49,51,53, 54,55,56,57,58, 61	63,64,65,66,67, 68,72,74,75,76,77
Key Idea 4	17,33	50,52,59,60,62	69,70,71,73
Key Idea 5	11,12,13,15,26, 34	40	78
Reference Tables			
2002 Edition	3,4,5,6,7,8,9, 12,13,15,19,23, 24,26,27,32	37,38,40,42,44, 47,50,53,56	70,72,74