FOR TEACHERS ONLY

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

PS–CH PHYSICAL SETTING/CHEMISTRY

Wednesday, June 17, 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

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

Part B–1

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

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 Wednesday, June 17, 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 15 credits for this part. The student must answer all questions in this part.

51 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

$$\frac{(2.0\text{ atm})(500.\text{ mL})}{200.\text{ K}} = \frac{(7.0\text{ atm})(V_2)}{300.\text{ K}}$$

$$\frac{(2)(500)(300)}{200(7)}$$

52 [1] Allow 1 credit for 27°C.

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

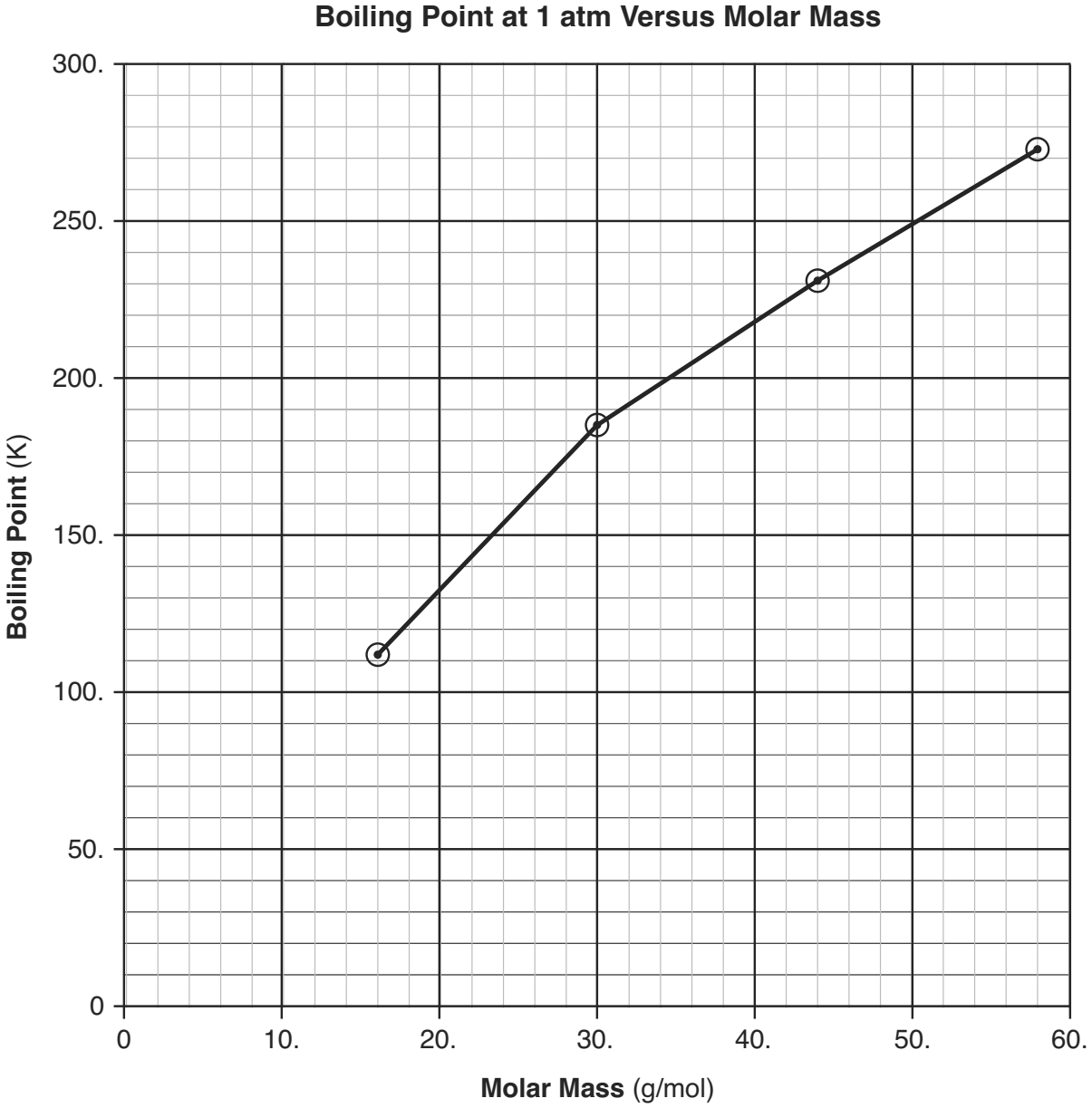
The total number of gas particles is the same under the initial and final conditions.

The total number of particles before and after is the same.

54 [1] Allow 1 credit for marking an appropriate scale. An appropriate scale is linear and allows a trend to be seen.

55 [1] Allow 1 credit for plotting all four points correctly ± 0.3 grid space. Plotted points do *not* need to be circled or connected.

Example of a 2-credit response for questions 54 and 55:



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

As molar mass increases, boiling point at 1 atm increases.

the smaller the molar mass, the lower the boiling point

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

The boiling point of propane at 1 atm is lower than the boiling point of butane at 1 atm because propane has weaker intermolecular forces than butane.

Butane has stronger intermolecular forces.

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

The arrangement of the H_2O molecules becomes more ordered as liquid water forms.

As a liquid, the movement of the particles is less random.

59 [1] Allow 1 credit for 11 300 J. Significant figures do *not* need to be shown.

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

The electrons flow from the Mg electrode to the Cu electrode.

from anode to cathode

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

The salt bridge allows ions to flow between the half-cells.

preventing polarization

62 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

Copper ions from the solution are reduced to copper atoms at the electrode, increasing the mass of the electrode.

Copper ions become copper atoms.

The number of copper ions decreases, and the number of copper atoms increases.

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

Similarity: All atoms of these isotopes have the same number of protons.

Difference: An S-32 atom has 16 neutrons, an S-33 atom has 17 neutrons, an S-34 atom has 18 neutrons, and an S-36 atom has 20 neutrons.

Similarity: Every sulfur atom has 16 protons.

Difference: The number of neutrons in an atom of one isotope is different than the number of neutrons in an atom of a different isotope.

64 [1] Allow 1 credit.

Example of a 1-credit response:

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

$(31.97)(0.9493) + (32.97)(0.0076) + (33.97)(0.0429) + (35.97)(0.0002)$

$$\frac{(31.97)(94.93) + (32.97)(0.76) + (33.97)(4.29) + (35.97)(0.02)}{100}$$

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:

An atom has a nucleus that is positively charged.

An atom is mostly empty space.

Negatively charged particles are located outside the positive nucleus.

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

An atom has equal amounts of negative and positive charge.

An atom has an equal number of protons and electrons.

All atoms contain electrons.

Electrons are negatively charged.

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

beta particle

γ

69 [1] Allow 1 credit for 15.78 y. Significant figures do *not* need to be shown.

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

$^{137}_{56}Ba$

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

The pressure above the solution decreases, so the $CO_2(g)$ is less soluble in the solution.

The pressure is less, so the CO_2 has lower solubility.

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

carbonic acid

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

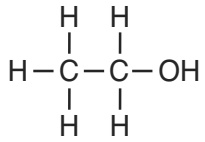
The solubility of $CO_2(g)$ decreases as the temperature of the solution increases.

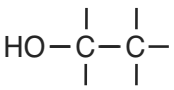
As temperature decreases, solubility of CO_2 increases.

74 [1] Allow 1 credit for: $\_\_\_\_\_C_6H_{12}O_6 \xrightarrow{\text{zymase}} \_\_2\_\_C_2H_5OH + \_\_2\_\_CO_2$ + energy.
Allow credit even if the coefficient "1" is written in front of $C_6H_{12}O_6$.

75 [1] Allow 1 credit.

Examples of 1-credit responses:





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

Zymase lowers the activation energy.

77 [1] Allow 1 credit for 3 *or* three.

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:

  $(M_A)(25.00\text{ mL}) = (0.150\ M)(20.20\text{ mL})$

  $\frac{(0.150)(20.20)}{25}$

- Allow 1 credit for 0.121 M *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 5×10^{-3} g *or* 0.005 g.

80 [1] Allow 1 credit for 57.5 kg.

81 [1] Allow 1 credit for As_2O_3.

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

In gray arsenic, the atoms are arranged closer together so there is more mass in a unit volume.

The atoms in yellow As are farther apart; therefore, there is less mass per volume than in gray As.

83 [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:

  $$\%\text{ As} = \frac{74.9\text{ g/mol}}{(55.8 + 32.1 + 74.9)\text{ g/mol}} \times 100$$

  $$\frac{75}{163} \times 100$$

- Allow 1 credit for 46.0% *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.

Regents Examination in Physical Setting/Chemistry

June 2009

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

The *Chart for Determining the Final Examination Score for the June 2009 Regents Examination in Physical Setting/Chemistry* will be posted on the Department's web site http://www.emsc.nysed.gov/osa/ on Wednesday, June 17, 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.
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

June 2009 Physical Setting/Chemistry			
Question Numbers			
Key Ideas/Performance Indicators	Part A	Part B	Part C
Standard 1			
Math Key Idea 1		51,52,54,55	77,78,79,83
Math Key Idea 2		56	
Math Key Idea 3		33,36,44,46,51, 59,65	71,78,80,81,83
Science Inquiry Key Idea 1		53,57,61,62	66,67,72,73,82
Science Inquiry Key Idea 2			
Science Inquiry Key Idea 3		35,37,38,40,43, 48,53	68,73,81
Engineering Design Key Idea 1			
Standard 2			
Key Idea 1			79
Key Idea 2			
Standard 6			
Key Idea 1		35	
Key Idea 2		39,63	
Key Idea 3		47	
Key Idea 4		42	
Key Idea 5			
Standard 7			
Key Idea 1			
Key Idea 2			
Standard 4 Process Skills			
Key Idea 3		31,32,33,34,37, 38,39,41,42,45, 46,49,51,52,58, 60,61,62,63,64, 65	66,68,73,74,75, 78,80
Key Idea 4		40,50,59	69,70,76
Key Idea 5			
Key Idea 3	1,2,3,4,5,6,7,15, 16,17,19,20,22, 23,24,25,26,27, 28,29,30	31,32,33,34,36, 37,39,41,42,43, 44,45,46,47,48, 49,51,53,58,60 61,62,63,65	66,67,68,71,72, 73,74,75,76,77, 78,79,80,81,83
Key Idea 4	14,21	35,40,50,52,59	68,69,70
Key Idea 5	8,9,10,11,12,13, 18	38,54,55,56,57, 64	82
2002 Edition	1,2,3,4,5,6,7,8,9, 11,12,13,14,15, 18,24,29	31,32,36,37,38, 43,44,45,46,48, 49,51,52,59,62, 63,64	68,69,70,72,73, 75,78,79,83