

FOR TEACHERS ONLY

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

PS-CH

PHYSICAL SETTING/CHEMISTRY

Tuesday, June 24, 2003 — 9:15 a.m. to 12:15 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			Part B-1	
1 1	13 3	25 3	36 1	44 3
2 3	14 4	26 3	37 1	45 4
3 4	15 2	27 1	38 4	46 1
4 3	16 4	28 2	39 1	47 1
5 2	17 1	29 2	40 3	48 3
6 3	18 1	30 4	41 4	49 4
7 4	19 2	31 3	42 3	50 2
8 1	20 4	32 1	43 2	
9 2	21 4	33 1		
10 2	22 2	34 2		
11 3	23 3	35 1		
12 4	24 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 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.

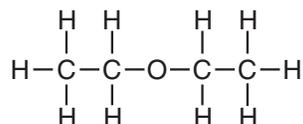
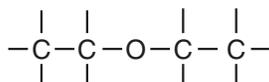
Because scaled scores corresponding to raw scores in the conversion chart may change from one examination to another, it is crucial that for each administration, the conversion chart provided in the scoring key for that administration be used to determine the student's final score. The chart in this scoring key is usable only for this administration of the examination.

Part B-2

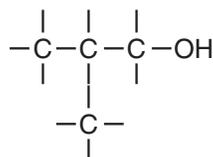
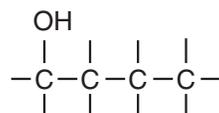
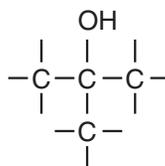
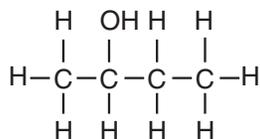
Allow a total of 15 credits for this part. The student must answer all questions in this part.

- 51 [1] Allow 1 credit for **2**.
- 52 [1] Allow 1 credit for **Y** or **2-8-7-3**.
- 53 [1] Allow 1 credit for **Na** and **Rb**.
- 54 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
 same number of valence electrons
 Group 1
 Elements in the same group (family) have similar chemical properties.
 Both lose one electron when they react.

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



- 56 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:



or

Allow 1 credit for a response consistent with the student's answer to question 55.

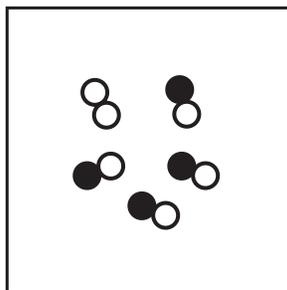
- 57 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
- Cu is less active than hydrogen gas.
 - Zn more reactive
 - Cu is below H₂ on the activity series and Zn is above H₂.

- 58 [1] Allow 1 credit for any metal other than Zn, that is above H₂ on Table J. Acceptable responses include, but are not limited to, these examples:
- magnesium or Mg
 - aluminum or Al

- 59 [2] Allow 1 credit for correctly drawing four  particles and one  particle.
- and*

Allow 1 credit for showing any particles in a gaseous state.

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



Box B
System After Reaction Has
Gone to Completion

- 60 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
- gets bigger
 - increases
 - The ion is larger than the atom.
- 61 [1] Allow 1 credit for **-2** or **negative**.

- 62** [2] **a** Allow 1 credit for a correct setup. Writing the formula in the setup is *not* required. Acceptable responses include, but are not limited to, these examples:

$$q = mH_f = (25.0 \text{ g})(334 \text{ J/g})$$
$$25.0(334)$$

- b** Allow 1 credit for **8350 J** or **8350 joules**.

or

Allow 1 credit for a response consistent with the student's setup and that has an appropriate unit.

Note: Significant figures do *not* need to be shown.

- 63** [1] Allow 1 credit for a correct response. Students must discuss both voltaic and electrolytic cells. Acceptable responses include, but are not limited to, these examples:

Voltaic cells produce energy; electrolytic cells consume energy.

voltaic changes chemical to electrical, electrolytic opposite

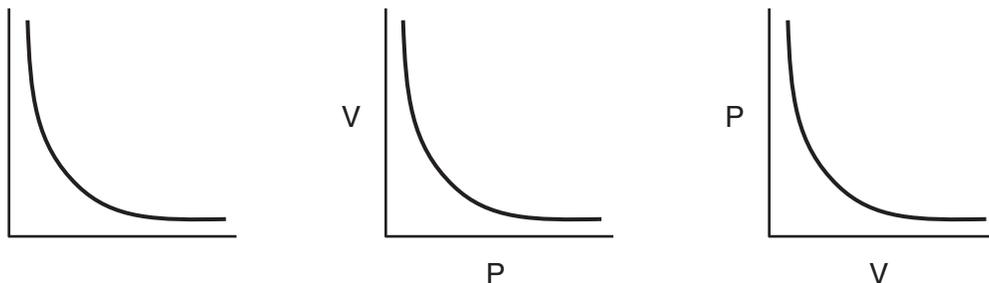
Voltaic cells involve spontaneous redox reactions; electrolytic cells involve nonspontaneous redox reactions.

voltaic spontaneous/electrolytic not

Part C

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

- 64** [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:



- 65** [2] **a** Allow 1 credit for a correct setup. Writing the formula in the setup is *not* required. Units and significant figures do *not* need to be shown. Acceptable responses include, but are not limited to, these examples:

$$(6.2 \text{ mL})(1.4 \text{ atm}) = (3.1 \text{ mL})(P_2)$$

$$P_2 = \frac{6.2 \text{ mL}(1.4 \text{ atm})}{3.1 \text{ mL}}$$

The volume is halved so pressure must double.

- b** Allow 1 credit for **2.8**.

or

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

Note: Significant figures do *not* need to be shown.

- 66** [2] **a** Allow 1 credit for a correct setup. Writing the formula and/or the unit in the setup is *not* required. Acceptable responses include, but are not limited to, these examples:

$$M_{\text{KOH}} = \frac{(0.100 \text{ M})(10.01 \text{ mL})}{5.01 \text{ mL}}$$

$$M_A V_A = M_B V_B$$

$$(0.100 \text{ M})(10.01 \text{ mL}) = (M_B)(5.01 \text{ mL})$$

- b** Allow 1 credit for **0.200**. The response must contain three significant figures.

or

Allow 1 credit for a response containing two or three significant figures consistent with the student's setup.

- 67** [3] **a** Allow 1 credit for identifying one experiment. Acceptable responses include, but are not limited to, these examples:
- gold foil (Rutherford)
 - cathode rays (Thomson)
 - electron bombardment (Moseley)
- b** Allow 1 credit for a description consistent with the experiment chosen by the student. Acceptable responses include, but are not limited to, this example:
- In the gold-foil experiment, gold foil was bombarded with alpha particles. Some alpha particles were deflected.
- c** Allow 1 credit for stating a conclusion drawn from the experiment chosen by the student. Acceptable responses include, but are not limited to, these examples:
- The gold-foil experiment shows that an atom is mostly empty space.
 - An atom has a small dense core.
 - An atom has a positively charged center.
- 68** [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
- corrosion rates of the waste containers
 - the area's vulnerability to earthquakes
 - climate changes that increase rainfall
- 69** [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
- pollution of fresh water in the area
 - adverse effects on humans, fish, and wildlife
 - Radioactivity would get into the food chain.
 - Groundwater would become contaminated.
- 70** [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
- The other sites may be in more populated areas so more people would be at risk.
 - Leaving radioactive waste in sites spread around the country would expose more regions to contamination.
 - terrorism
- 71** [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
- any response from 150 to 152
 - 5 half-lives

- 72** [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
- The half-life of cesium-137 is short, and the sample would almost be entirely decayed after 10,000 years.
- The half-life of strontium-90 is short, and the sample would almost be entirely decayed after 10,000 years.
- 73** [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
- because water may transport the radioactive materials
- cause containers to corrode
- 74** [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
- concentration of HCl
- HCl(aq)
- HCl
- [HCl]
- 75** [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
- temperature
- surface area of Zn
- amount of Zn
- Zn
- concentration of Zn
- [Zn]
- 76** [1] Allow 1 credit for a response with a correct justification. Acceptable responses include, but are not limited to, these examples:
- rate ↑, more collisions
- The rate will increase because the higher concentration of HCl will lead to a greater number of collisions.

77 [1] Allow 1 credit for **H⁺** or **hydrogen** or **H₃O⁺** or **hydronium** or **NO₃⁻** or **nitrate**.

78 [1] Allow 1 credit for **5**. Significant figures do *not* need to be shown.

79 [1] Allow 1 credit for **yellow**.

or

Allow 1 credit for a response consistent with the student's answer to question 78.

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

Raw Score	Scaled Score						
85	100	63	74	41	57	19	35
84	98	62	73	40	56	18	33
83	97	61	72	39	55	17	32
82	95	60	72	38	55	16	30
81	94	59	71	37	54	15	29
80	93	58	70	36	53	14	27
79	91	57	69	35	52	13	26
78	90	56	68	34	51	12	24
77	89	55	68	33	50	11	22
76	87	54	67	32	49	10	21
75	86	53	66	31	48	9	19
74	85	52	66	30	47	8	17
73	84	51	65	29	46	7	15
72	83	50	64	28	45	6	13
71	82	49	63	27	44	5	11
70	81	48	62	26	43	4	9
69	80	47	62	25	42	3	7
68	79	46	61	24	41	2	5
67	78	45	60	23	40	1	2
66	77	44	59	22	38	0	0
65	76	43	59	21	37		
64	75	42	58	20	36		

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

June 2003 Physical Setting/ Chemistry			
Question Numbers			
Key Ideas	Part A	Part B	Part C
Standard 1			
Math Key Idea 1			66b,74,75
Math Key Idea 2			
Math Key Idea 3			
Sci. Inq. Key Idea 1		54,60,61	67
Sci. Inq. Key Idea 2			
Sci. Inq. Key Idea 3		56	71,72
Eng. Des. Key Idea 1			
Standard 2			
Key Idea 1		40,41	
Key Idea 2			68
Standard 6			
Key Idea 1			
Key Idea 2			
Key Idea 3			77
Key Idea 4			
Key Idea 5			
Standard 7			
Key Idea 1			69,70,73
Key Idea 2			
Standard 4 Process Skills			
Key Idea 3		36,37,38,41,42, 44,45,46,48,50, 51,52,53,55,57, 58,59,63	64,65,66a,76,78, 79
Key Idea 4		39,43,49,62	71,72
Key Idea 5		47	
Standard 4			
Key Idea 3	1,2,3,4,5,6,8,9, 10,14,15,16,18, 19,20,21,23,24, 25,26,27,28,29, 30,31,32,35	36,37,38,42,44, 45,46,48,50,51, 52,53,54,55,56, 57,58,59,63	64,65,66,67,74, 75,76,77,78,79
Key Idea 4	7,17,22	39,43,49,62	69,70,71,72,73
Key Idea 5	11,12,13,33,34	40,41,47,60,61	
Reference Tables			
2002 Edition	2,7,10,13,14, 19,24,26,32	36,37,40,41,44, 47,48,49,52,53, 54,55,56,57,58, 62	64,65,66,71,72,79