FOR TEACHERS ONLY

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

PHYSICAL SETTING/CHEMISTRY

Friday, January 26, 2024 — 9:15 a.m. to 12:15 p.m., only

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: https://www.nysed.gov/state-assessment/high-school-regents-examinations 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.

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*.

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 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. Do not attempt to correct the student's work by making insertions or changes of any kind. 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: https://www.nysed.gov/state-assessment/high-school-regents-examinations on Friday, January 26, 2024. 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 $C_6H_{12}O_6$. The order of the elements may vary.

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

As atomic number increases, atomic radius increases.

Radius increases.

increases

53 [1] Allow 1 credit for 12 g or any value from 12 g to 12.333 g, inclusive.

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

Atoms of these elements have the same number of valence electrons.

These elements each have seven electrons in the outermost shell of their atoms.

same number of valence e^-

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

nonpolar molecule

nonpolar

56 [1] Allow 1 credit for 2.4.

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

unsaturated

not saturated

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

The $\triangle H$ for this dissolving is +14.78 kJ/mol.

The heat of solution is positive.

59 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

The particles are distributed uniformly throughout the mixture.

There is an even distribution of particles in the solution.

All particles are evenly dispersed.

Concentration of the particles is the same throughout the solution.

mixed uniformly

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

EF

FE

from E to F

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

The potential energy of the particles increases during melting.

The particles of the substance gain potential energy.

The PE increases.

increases

62 [1] Allow 1 credit for blue.

63 [1] Allow 1 credit for 2 *or* two.

64 [1] Allow 1 credit for 0.060 M *or* .06 M.

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

The hydroxide ion concentration of the 0.10 M KOH(aq) is greater than the hydroxide ion concentration of the resulting neutral solution.

The resulting solution has a lower concentration of OH^-.

greater in KOH solution

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:

The number of protons in an atom of O-18 is equal to the number of electrons in the atom.

The number of protons and the number of electrons are the same.

There are 8 protons and 8 electrons in an atom of O-18.

equal

same

67 [1] Allow 1 credit. The position of electrons may vary.

Examples of 1-credit responses:

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

An O-18 atom in a water molecule has two more neutrons than an O-16 atom.

The O-18 atom has 10 neutrons and the O-16 atom has 8 neutrons.

There are more neutrons in an oxygen-18 atom.

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

$$\frac{3(15.9994)}{84.00484} = \frac{x}{100}$$

$$\frac{3(16\text{ g/mol})}{84\text{ g/mol}} \times 100$$

$$\frac{48(100)}{84}$$

$$\frac{4800}{84}$$

Note: Do *not* allow credit if the fraction is not multiplied by 100.

70 [1] Allow 1 credit for 1.75 mol.

71 [1] Allow 1 credit for $\_2\_$ $NaHCO_3(s)$ + heat → $\_\_\_$ $Na_2CO_3(s)$ + $\_\_\_$ $H_2O(g)$ + $___$$CO_2(g)$.

Allow credit even if the coefficient "1" is written in front of $Na_2CO_3(s)$, $H_2O(g)$, and/or $CO_2(g)$.

72 [1] Allow 1 credit for any value from 5.6 L to 5.9 L, inclusive.

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

The helium atoms have less average kinetic energy at 200. K than at 300. K.

Energy is higher at 300 K.

lower at 200 K

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

At high temperature, molecules of H_2 and N_2 collide more frequently with greater energy.

greater frequency of collisions

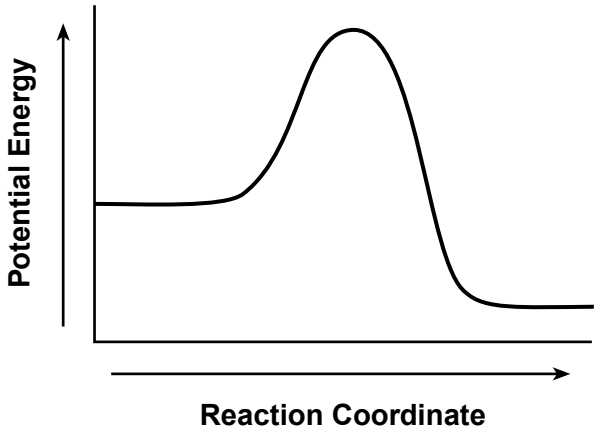
There is an increase in the percentage of effective collisions of reactant particles.

more collisions

75 [1] Allow 1 credit for 45.9 kJ *or* 46 kJ.

76 [1] Allow 1 credit for showing that the PE of the products is lower than the PE of the reactants.

Example of a 1-credit response:



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

The catalyst provides a different reaction pathway, which has a lower activation energy.

The activation energy is lower for the alternate reaction pathway.

lower energy, different mechanism

78 [1] Allow 1 credit for C *or* carbon.

79 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

ethanoic acid

acetic acid

80 [1] Allow 1 credit for H_2O *or* HOH.

81 [1] Allow 1 credit for ester *or* esters.

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

The beta emission from I-131 has a greater penetrating power than the alpha particle from U-238.

Beta particles have greater penetrating power than alpha particles.

U-238's alpha particle has a weaker penetrating power.

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

$^{59}_{27}Co$

Co-59

cobalt-59

^{59}Co

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

$\frac{1}{8}$

0.125

12.5%

85 [1] Allow 1 credit for 146.

Regents Examination in Physical Setting/Chemistry

January 2024

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

The *Chart for Determining the Final Examination Score for the January 2024 Regents Examination in Physical Setting/Chemistry* will be posted on the Department's web site at: https://www.nysed.gov/state-assessment/high-school-regents-examinations on Friday, January 26, 2024. 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 https://www.surveymonkey.com/r/8LNLLDW.
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 2024 Physical Setting/Chemistry			
Question Numbers			
Key Ideas/Performance Indicators	Part A	Part B	Part C
Standard 1			
Math Key Idea 1		33, 42, 63	69
Math Key Idea 2		43, 52, 57	71, 72
Math Key Idea 3		34, 40, 42, 48, 51, 53, 56, 64	70, 75, 84, 85
Science Inquiry Key Idea 1		41, 55, 58, 59, 60, 61, 65	66, 68, 73, 77, 78, 81, 82
Science Inquiry Key Idea 2		45	
Science Inquiry Key Idea 3		31, 35, 36, 37, 39, 41, 44, 46, 47, 49, 50, 54, 58, 61, 62	67, 71, 72, 75, 76, 79
Engineering Design Key Idea 1			
Standard 2			
Key Idea 1			
Key Idea 2			
Key Idea 3			
Standard 6			
Key Idea 1			
Key Idea 2		32	67
Key Idea 3		48	
Key Idea 4			
Key Idea 5		60	76
Standard 7			
Key Idea 1			
Key Idea 2			
Standard 4 Process Skills			
Key Idea 3		31, 32, 34, 38, 40, 41, 42, 44, 45, 51, 52, 54, 57, 62, 64	67, 68, 70, 71, 74, 75, 80, 81, 85
Key Idea 4		50, 58, 61	73, 76, 83, 84
Key idea 5		36	
Standard 4			
Key Idea 3	1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 18, 19, 20, 22, 23, 24, 25, 26, 27, 28, 29	31, 32, 33, 34, 37, 38, 39, 40, 41, 43, 44, 45, 46, 47, 48, 49, 51, 52, 53, 54, 57, 59, 60, 62, 63, 64, 65	66, 67, 68, 69, 70, 71, 72, 74, 75, 77, 78, 79, 80, 81, 82, 85
Key Idea 4	17, 21, 30	42, 50, 58, 61	73, 76, 83, 84
Key Idea 5	7, 12, 13, 14, 15, 16	35, 36, 55, 56	
Reference Tables			
2011 Edition	1, 3, 4, 8, 13, 16, 24, 26, 27, 29	33, 34, 35, 36, 39, 40, 42, 43, 47, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 62, 64	66, 67, 69, 75, 76, 79, 81, 82, 83, 84, 85