# FOR TEACHERS ONLY

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

# P.S.–CH PHYSICAL SETTING/CHEMISTRY

**Wednesday,** January 27, 2016 — 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 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 . . . . . **4** . . . . . | 9 . . . . . **1** . . . . . | 17 . . . . . **3** . . . . . | 25 . . . . . **2** . . . . . |
| 2 . . . . . **2** . . . . . | 10 . . . . . **1** . . . . . | 18 . . . . . **4** . . . . . | 26 . . . . . **1** . . . . . |
| 3 . . . . . **1** . . . . . | 11 . . . . . **4** . . . . . | 19 . . . . . **1** . . . . . | 27 . . . . . **4** . . . . . |
| 4 . . . . . **3** . . . . . | 12 . . . . . **2** . . . . . | 20 . . . . . **2** . . . . . | 28 . . . . . **1** . . . . . |
| 5 . . . . . **2** . . . . . | 13 . . . . . **2** . . . . . | 21 . . . . . **1** . . . . . | 29 . . . . . **4** . . . . . |
| 6 . . . . . **2** . . . . . | 14 . . . . . **4** . . . . . | 22 . . . . . **3** . . . . . | 30 . . . . . **2** . . . . . |
| 7 . . . . . **3** . . . . . | 15 . . . . . **3** . . . . . | 23 . . . . . **3** . . . . . | |
| 8 . . . . . **2** . . . . . | 16 . . . . . **1** . . . . .. | 24 . . . . . **1** . . . . . | |

**Part B–1**

| | | | |
|---|---|---|---|
| 31 . . . . . **2** . . . . . | 36 . . . . . **4** . . . . . | 41 . . . . . **1** . . . . . | 46 . . . . . **2** . . . . . |
| 32 . . . . . **2** . . . . . | 37 . . . . . **3** . . . . . | 42 . . . . . **2** . . . . . | 47 . . . . . **3** . . . . . |
| 33 . . . . . **4** . . . . . | 38 . . . . . **2** . . . . . | 43 . . . . . **3** . . . . . | 48 . . . . . **2** . . . . . |
| 34 . . . . . **1** . . . . . | 39 . . . . . **4** . . . . . | 44 . . . . . **2** . . . . . | 49 . . . . . **4** . . . . . |
| 35 . . . . . **4** . . . . . | 40 . . . . . **1** . . . . . | 45 . . . . . **1** . . . . . | 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 27, 2016. 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 any value from 84 kPa to 87 kPa, inclusive.

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

$$\frac{28.0855\ \text{g}}{28.0855\ \text{g} + 2(15.9994\ \text{g})} \times 100$$

$$\frac{28.1\ \text{u}}{60.1\ \text{u}} \times 100$$

$$\frac{28(100)}{60}$$

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

A metal reacts with a nonmetal to produce an ionic compound.

Potassium is a metal and oxygen is a nonmetal.

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

Not all of the wavelengths of element *A* are shown in the wavelengths of the mixture.

The mixture has no spectral line at 700 nm.

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

The wavelengths of the spectral lines for element *Z* are independent of the mass of the sample.

All atoms of element *Z* have the same electron configuration in the ground state.

The intensive properties of an element remain constant.

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

Different colors of light are produced when electrons return from higher energy states to lower energy states.

Light energy can be emitted when electrons in excited atoms return to lower shells.

Electrons release energy as they move toward the ground state.

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

Valence electrons are lost by potassium and gained by bromine.

The ions form as a result of a transfer of electrons between the atoms.

**58** [1] Allow 1 credit for 6 *or* six.

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

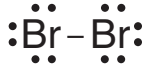
Charge is symmetrically distributed.

The molecule has uniform charge distribution.

The centers of positive charge and negative charge coincide.

**60** [1] Allow 1 credit. The positions of the electrons can vary.

**Examples of 1-credit responses:**



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

argon

Ar

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

titration

volumetric analysis

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

$HCl(aq) + NaOH(aq) \rightarrow \underline{H_2O(\ell)} + \underline{NaCl(aq)}$

$HCl(aq) + NaOH(aq) \rightarrow \underline{NaCl} + \underline{HOH}$

**64** [1] Allow 1 credit for 2 *or* two.

**65** [1] Allow 1 credit for 0.12 M. Significant figures do *not* need to be shown.

## 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 for a correct combination of the location and the total charge of the protons. Acceptable responses include, but are not limited to:

Location of protons:

in the nucleus

the small, dense center of an atom

center of an atom

Total charge of protons:

+28

28+

28

**67** [1] Allow 1 credit for 161.

**68** [1] Allow 1 credit for metal *or* transition metal.

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

The gaseous products have greater entropy than the liquid reactant.

The products are more disordered.

**70** [1] Allow 1 credit for 0.8 *or* .8.

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

Hydrazine is very soluble in water because the molecular polarity of hydrazine is similar to the molecular polarity of water.

Water and hydrazine are both polar.

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

The intermolecular forces in hydrazine must be greater than the intermolecular forces in water.

The intermolecular forces in $H_2O$ are weaker.

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

sodium nitrate

$NaNO_3$

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

Sodium nitrate and potassium chromate are both soluble in water and are good conductors in solution. Therefore, the melting points are needed to identify the substance.

Solubility alone cannot be used because two of the substances are soluble in water.

Two of the substances melt below 450.°C.

Electrical conductivity is not sufficient to differentiate the two salts.

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

An aqueous solution of potassium chromate has mobile ions that conduct electricity.

The $K_2CrO_4$ dissociated into mobile ions.

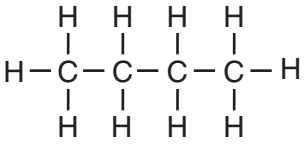
Aqueous potassium chromate has charged particles that can move.

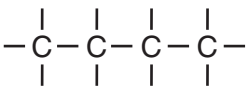
The $K^+(aq)$ and $CrO_4^{2-}(aq)$ move freely.

**76** [1] Allow 1 credit for $C_nH_{2n+2}$.

**77** [1] Allow 1 credit.

**Examples of 1-credit responses:**





**78** [1] Allow 1 credit. The order of the elements in each compound may vary.

$\underline{SO_3}(g) + H_2O(\ell) \rightarrow \underline{H_2SO_4}(aq)$

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

The ratio by mass of $NH_4Cl$ to $H_2O$ in mixture *A* is 40. g/100. g, and the ratio in mixture *B* is 10. g/100. g.

Both mixtures have the same total mass, but have different amounts of sand.

Mixture *B* has more sand.

The mixtures have different proportions of $NH_4Cl$.

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

heterogeneous

nonuniform mixture

**81** [1] Allow 1 credit for any value from 23°C to 26°C, inclusive.

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

Sand is insoluble in water.

Sand particles are too large to pass through filter paper.

Sand is more dense than $NH_4Cl(aq)$.

Sand remains a solid in the mixture.

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

The hydrogen could replace the use of fossil fuel.

The use of hydrogen as a car fuel could reduce air pollution.

The $H_2$ fuel is renewable.

Water is a nonpolluting product.

The leaf uses renewable resources.

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

Sunlight is used as an external power source for the cell.

Sunlight is required to cause a nonspontaneous chemical change.

Energy is required.

**85** [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

**Regents Examination in Physical Setting/Chemistry**

**January 2016**

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

**The *Chart for Determining the Final Examination Score for the January 2016 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 27, 2016. 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 2016 Physical Setting/Chemistry | | | |
|---|---|---|---|
| **Question Numbers** | | | |
| Key Ideas/Performance Indicators | Part A | Part B | Part C |
| **Standard 1** | | | |
| Math Key Idea 1 | | 52, 64 | |
| Math Key Idea 2 | | 33, 44, 50, 51 | 73 |
| Math Key Idea 3 | | 32, 34, 38, 39, 65 | 67, 70, 85 |
| Science Inquiry Key Idea 1 | | 53, 55, 56, 57, 59, 61, 62 | 66, 71, 72, 74, 75, 79, 80, 82, 84 |
| Science Inquiry Key Idea 2 | | | |
| Science Inquiry Key Idea 3 | | 32, 36, 40, 45, 46, 47, 49, 51, 54, 58, 63 | 66, 69, 73, 74, 76, 78, 79, 80, 85 |
| Engineering Design Key Idea 1 | | | |
| **Standard 2** | | | |
| Key Idea 1 | | | 68 |
| Key Idea 2 | | | |
| Key Idea 3 | | | |
| **Standard 6** | | | |
| Key Idea 1 | | | |
| Key Idea 2 | | | |
| Key Idea 3 | | 46 | |
| Key Idea 4 | | | |
| Key Idea 5 | | 43 | 81 |
| **Standard 7** | | | |
| Key Idea 1 | | | 83 |
| Key Idea 2 | | | |
| **Standard 4 Process Skills** | | | |
| Key Idea 3 | | 31, 33, 34, 35, 37, 38, 41, 45, 47, 52, 54, 63, 65 | 67, 68, 69, 71, 77, 78, 81, 84 |
| Key Idea 4 | | 39, 42, 43, 44, 48, 49, 50 | |
| Key idea 5 | | 57, 60, 61 | 72 |
| **Standard 4** | | | |
| Key Idea 3 | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 14, 15, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 28, 30 | 31, 33, 34, 35, 36, 37, 38, 41, 44, 45, 46, 47, 52, 54, 55, 56, 62, 63, 64, 65 | 66, 67, 68, 69, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85 |
| Key Idea 4 | 16, 20 | 32, 39, 42, 43, 49, 50 | |
| Key Idea 5 | 11, 12, 29 | 40, 48, 51, 53, 57, 58, 59, 60, 61 | 70, 71, 72 |
| **Reference Tables** | | | |
| 2011 Edition | 1, 2, 5, 6, 8, 11, 13, 14, 27, 30 | 31, 32, 33, 34, 38, 39, 41, 42, 45, 47, 49, 51, 52, 53, 60, 61, 63, 65 | 67, 68, 70, 76, 77, 78, 81, 85 |