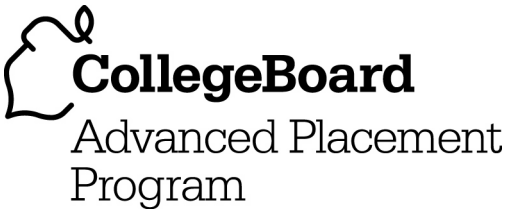

AP® Chemistry
2004 Scoring Commentary
Form B

AP® CHEMISTRY
2004 SCORING COMMENTARY (Form B)

Question 1

Sample: 1A
Score: 10

This response earns a perfect score of 10 points: 2 points for part (a), 1 point for part (b)(i), 2 points for part (b)(ii), 2 points for part (c), 1 point for part (d)(i), and 2 points for part (d)(ii).

Sample: 1B
Score: 8

Only 1 out of 2 points is earned in part (c): 1 point is earned for correctly calculating *n*, but the wrong *R* is used. Only 1 out of 2 points is earned in part (d)(ii) because one of the K_p values is multiplied by two when it should be squared.

Sample: 1C
Score: 6

Only 1 out of 2 points is earned in part (a) because molar concentrations are used in the K_p expression, as indicated by the brackets. No points are earned in part (b)(ii) because the prediction and explanation are incorrect. Only 1 out of 2 points is earned in part (c): 1 point is earned for correctly calculating *n*, but there is a math error in the calculation of K_c.

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Question 2

Sample: 2A
Score: 10

This response earns a perfect score of 10 points: 3 point for part (a), 2 points for part (b)(i), 1 point for part (b)(ii), 2 points for part (c), and 2 points for part (d).

Sample: 2B
Score: 8

No points are earned in part (c). The pressures are divided by volume when they should be multiplied, and vice versa.

Sample: 2C
Score: 6

No points are earned in part (c) or in part (d).

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Question 3

Sample: 3A
Score: 10

This response earns a perfect score of 10 points: 3 points for part (a)(i), 1 point for part (a)(ii), 2 points for part (b)(i), 1 point for part (b)(ii), 2 points for part (b)(iii), and 1 point for part (b)(iv).

Sample: 3B
Score: 7

Only 1 out of 2 points is earned in part (b)(i) because the rate law is not given. The explanation, which includes the fact that the reaction is first order and mentions the rate constant, earns 1 point. Only 1 out of 2 points is earned in part (b)(iii) because the units for the rate constant are not correct. The point is not earned in part (b)(iv): the negative sign is dropped in the calculation.

Sample: 3C
Score: 5

No points are earned in parts (b)(i), (b)(iii), and (b)(iv); no rate law is given in (b)(i), the work shown is on the wrong track in (b)(iii), and the graph seems to be misread in (b)(iv).

Question 4

Sample: 4A
Score: 15

This response earns a perfect score of 15 points. In each part, 1 point is earned for the correct reactant(s) and 2 points are earned for the correct product(s).

Sample: 4B
Score: 12

Only 1 out of 3 points is earned in part (b): the reactant point is not earned, and 1 product point is earned for Mg^{2+}. Only the 2 product points are earned in part (f) because the formula for the reactant, barium oxide, is incorrect.

Sample: 4C
Score: 11

In part (g), 1 point is earned for the correct reactants. In part (h), only 2 points are earned because the formula for the reactant, potassium carbonate, is incorrect. In part (b), the 1 reactant point and only 1 product point are earned.

Question 5

Sample: 5A
Score: 10

This response earns a perfect score of 10 points: 1 point for part (a), 1 point for part (b), 1 point for part (c), 1 point for part (d), 1 point for part (e), 3 points for part (f), 1 point for part (g)(i), and 1 point for part (g)(ii).

Sample: 5B
Score: 8

The point is not earned in part (b). The point is not earned in part (g)(i) because the calculated molar mass will be higher than the actual molar mass.

Sample: 5C
Score: 6

The point is not earned in part (a) because there is no mention of initial and final volumes or change in volume, just "volume". Only 2 out of 3 points are earned in part (f) because the indicator is not included. The point is not earned in part (g)(i) because the justification given does not provide any additional information: there is no explanation that the mass corresponding to a given n seems larger than it actually is, so the calculated molar mass is higher than the actual molar mass. The point is not earned in part (g)(ii) because the additional water has no effect.

Question 6

Sample: 6A
Score: 8

This response earns a perfect score of 8 points: 2 points for part (a), 1 point for part (b), 1 point for part (c)(i), 2 points for part (c)(ii), and 2 points for part (d).

Sample: 6B
Score: 6

Only 1 out of 2 points is earned in part (c)(ii) because the $AgNO_3$ concentration is incorrect. In part (d), 1 out of 2 points is earned for stating that a precipitate forms. It is true that the cell potential decreases, but the explanation is not sufficient to earn the second point (the cell potential would *increase* if the precipitate formed in the other chamber).

Sample: 6C
Score: 4

In part (a), 1 out of 2 points is earned because the equation shows the reaction going in the correct direction, but it is not balanced and it is not in net-ionic form. The point is not earned in part (c)(i) because the electrodes are labeled incorrectly. No points are earned in part (d).

Question 7

Sample: 7A
Score: 8

This response earns a perfect score of 8 points: 2 points for part (a), 2 points for part (b), 2 points for part (c), 1 point for part (d), and 1 point for part (e).

Sample: 7B
Score: 7

In part (b), 1 point is earned for saying that the reactants are favored, but the justification point is not earned.

Sample: 7C
Score: 5

The points are not earned in part (a) because the sum of the bond strengths of the reactants is greater than the sum of the bond strengths of the product. In part (b), 1 point is earned for saying that the reactants are favored, but the justification point is not earned.

Question 8

Sample: 8A
Score: 8

This response earns a perfect score of 8 points: 2 points for part (a), 2 points for part (b), 2 points for part (c), and 2 points for part (d).

Sample: 8B
Score: 6

In part (b), 1 point is earned for stating that the reaction would proceed to the right, but the point is not earned for the justification, which is not sufficient. In part (d), 1 point is earned for the isomer structure, but the name is not included.

Sample: 8C
Score: 4

In part (b), 1 point is earned for stating that the reaction would proceed to the right, but the justification point is not earned. The points are not earned in part (c) because the answer and explanation are incorrect. In part (d), 1 point is earned for the isomer structure, but the name is incorrect.