

# AP CHEMISTRY SUMMER ASSIGNMENT 2011

The purpose of this year's summer assignment is to cover a wide breadth of chemistry, most of which has been covered in the regents class. Where applicable, you will be required to read certain sections of chapters to synthesize new knowledge in order to answer questions.

The questions you will answer this summer are a preview of the first few chapters in the course. I suggest that you read and familiarize yourself with the chapters that the questions come from. Due to the fast pace of the course, little time will be spent reviewing concepts from regents chemistry. There are two parts to the summer assignment:

## ***1) Questions in Brown & LeMay:***

- 1) pg. 29 # 19, 20, 23, 36, 38, 52
- 2) pg. 67 # 16, 24, 54
- 3) pg. 105 # 18, 28, 32, 40, 56
- 4) pg. 145 # 14, 40, 54, 68
- 5) pg. 191 # 48
- 6) pg. 267 # 28
- 7) pg. 309 # 44
- 8) pg. 357 # 12

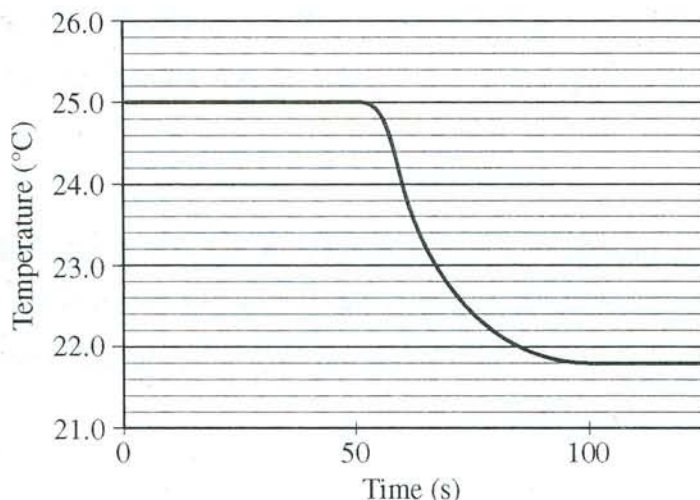
## ***2) AP Free Response Questions:***

The free response section of the AP Chemistry Exam requires you to perform calculations based on information given. Examples of free response questions are included in this summer assignment. Submit the answers to these questions as a part of your summer assignment.

If you have any questions or concerns, feel free to email me at [pdamico@erhsnyc.net](mailto:pdamico@erhsnyc.net) and I will try to get back to you as soon as I can. Remember, these questions may seem challenging at first. It is important not only to answer the questions correctly, but to learn how to use the textbook that is supplied to you. Exhaust all avenues in doing so before contacting me. Good luck and enjoy your summer!

2010 AP<sup>®</sup> CHEMISTRY FREE-RESPONSE QUESTIONS

2. A student performs an experiment to determine the molar enthalpy of solution of urea,  $\text{H}_2\text{NCONH}_2$ . The student places 91.95 g of water at  $25^\circ\text{C}$  into a coffee-cup calorimeter and immerses a thermometer in the water. After 50 s, the student adds 5.13 g of solid urea, also at  $25^\circ\text{C}$ , to the water and measures the temperature of the solution as the urea dissolves. A plot of the temperature data is shown in the graph below.



- (a) Determine the change in temperature of the solution that results from the dissolution of the urea.
- (b) According to the data, is the dissolution of urea in water an endothermic process or an exothermic process? Justify your answer.
- (c) Assume that the specific heat capacity of the calorimeter is negligible and that the specific heat capacity of the solution of urea and water is  $4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$  throughout the experiment.
- (i) Calculate the heat of dissolution of the urea in joules.
- (ii) Calculate the molar enthalpy of solution,  $\Delta H_{\text{soln}}^\circ$ , of urea in  $\text{kJ mol}^{-1}$ .
- (d) Using the information in the table below, calculate the value of the molar entropy of solution,  $\Delta S_{\text{soln}}^\circ$ , of urea at 298 K. Include units with your answer.

	Accepted Value
$\Delta H_{\text{soln}}^\circ$ of urea	$14.0 \text{ kJ mol}^{-1}$
$\Delta G_{\text{soln}}^\circ$ of urea	$-6.9 \text{ kJ mol}^{-1}$

Note:  $\Delta G = \Delta H - T\Delta S$

- (e) The student repeats the experiment and this time obtains a result for  $\Delta H_{\text{soln}}^\circ$  of urea that is 11 percent below the accepted value. Calculate the value of  $\Delta H_{\text{soln}}^\circ$  that the student obtained in this second trial.
- (f) The student performs a third trial of the experiment but this time adds urea that has been taken directly from a refrigerator at  $5^\circ\text{C}$ . What effect, if any, would using the cold urea instead of urea at  $25^\circ\text{C}$  have on the experimentally obtained value of  $\Delta H_{\text{soln}}^\circ$ ? Justify your answer.

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