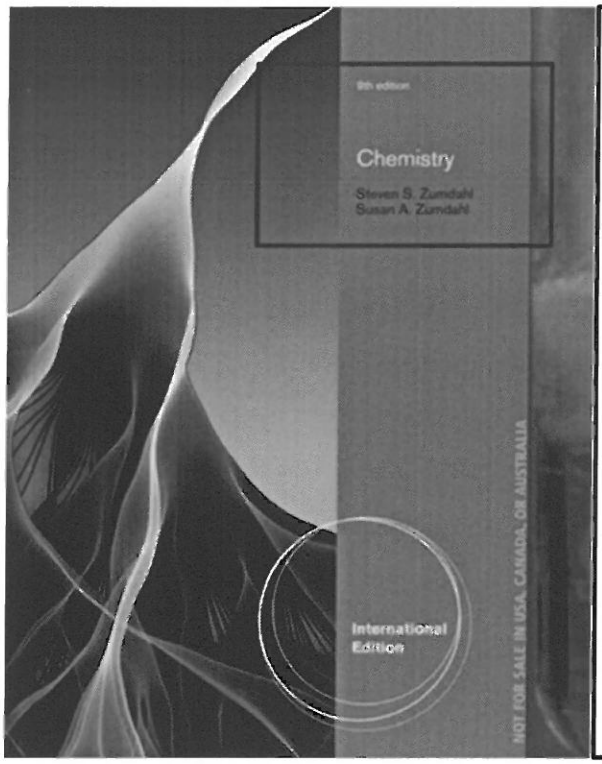
2018학년도 2학기 기초자연과학영역
학점취득특별시험 안내

Ⅳ. 일반화학2

1. 교재 : Chemistry
   (제9판, 저자: Zumdahl)

2. 시험 범위 : Chapter12. Chemical Kinetics ~
   Chapter22. Organic and Biological Molecules
   (참고: Chapter 19는 범위가 아님)



12 Chemical Kinetics
13 Chemical Equilibrium
14 Acids and Bases
15 Acid-Base Equilbria
16 Solubility and Complex Ion
17 Spontaneity, Entropy, and Free Energy
18 Electrochemistry
20 The Representative Elements
21 Transition Metals and Coordination Chemistry
22 Organic and Biological Molecules

3. 문제 및 답변 언어 : 영어로 문제 출제 및 영어로 답변
4. 출제 경향 및 안내 사항 : 객관식, 단답식, 주관식 풀이식으로 출제됨 (기출 문제 참조)

5. 2018년도 2학기 학점취득특별시험 예제 문제 및 모범 답안

1. Fill the blanks with 'T' for correct description or 'F' for false one in the following statements. [5 pt each]

(T) Crystal lattice energy is always negative.
(F) Nitrous acid is one of the strong acids.

2. Fill the blanks in the following statements. [5 pt]

(Thermodynamics) is the study of the energy transfers accompanying physical and chemical processes.

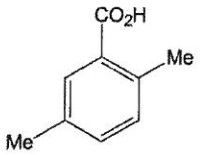
3. Select correct answer for the following questions. [10 pt]

(c) Estimate the temperature at which $\triangle G$ = 0 for the following reaction.
$NH_3(g) + HCl(g) \rightarrow NH_4Cl(s)$
$\triangle H$ = -176 kJ; $\triangle S$ = -284.5 J/K

(a) 467 K (b) 582 K (c) 619 K (d) 634 K (e) 680 K

4. Draw structure of following organic compound. [10 pt]

2,4-dimethylbenzoic acid.

[answer] 

5. Calculate pH and concentration of S^{2-}, $[S^{2-}]$ of 0.10 *M* H_2S solution. For the H_2S, K_a values are as following. K_{a1} = 1.0 × 10^{-7}, K_{a2} = 1.0 × 10^{-19}. [20 pt]

[answer]

Because K_{a_1} for H_2S is so small, we can ignore the H^+ contribution from the K_{a_2} reaction.

$H_2S \rightleftharpoons H^+ + HS^- \quad K_{a_1} = 1.0 \times 10^{-7}$

	H_2S	H^+	HS^-
Initial	0.10 *M*	~0	0
Equil.	$0.10 - x$	x	x

$K_{a_1} = 1.0 \times 10^{-7} = \frac{x^2}{0.10 - x} \approx \frac{x^2}{0.10}$, $x = [H^+] = 1.0 \times 10^{-4}$; assumptions good.

$pH = -\log(1.0 \times 10^{-4}) = 4.00$

Use the K_{a_2} reaction to determine $[S^{2-}]$.

$HS^- \rightleftharpoons H^+ + S^{2-}$

	HS^-	H^+	S^{2-}
Initial	1.0×10^{-4} *M*	1.0×10^{-4} *M*	0
Equil.	$1.0 \times 10^{-4} - x$	$1.0 \times 10^{-4} + x$	x

$K_{a_2} = 1.0 \times 10^{-19} = \frac{(1.0 \times 10^{-4} + x)x}{(1.0 \times 10^{-4} - x)} \approx \frac{(1.0 \times 10^{-4})x}{1.0 \times 10^{-4}}$

$x = [S^{2-}] = 1.0 \times 10^{-19}$ *M*; assumptions good.