1. **Question 10 37**

In the following reaction, $SO_2(g) + CuO(s) \longrightarrow Cu(s) + SO_3(g)$, sulfur dioxide _____ reduce copper(II) oxide at 298 K.

substance	ΔH°_f, (kJ/mol)	S°, J/K?mol
$SO_2(g)$	-296.2	248.5
$CuO(s)$	-157.3	42.7
$Cu(s)$	0	33.5
$SO_3(g)$	-395.4	256.1

	Student Response	Value	Correct Answer	Feedback
a.	will; ΔG° is positive.			
b.	will; ΔG° is negative.			
c.	will not; ΔG° is positive.			
d.	will not; ΔG° is negative.			
e.	will not; $\Delta G^\circ = 0$.			

Score: 5/5

2. **017 Chapter #082**

If the pH of a buffer solution is greater than the pK_a value of the buffer acid, the buffer will have more capacity to neutralize added base than added acid.

	Student Response	Value	Correct Answer	Feedback
a.	TRUE			

b.	FALSE

Score: 5/5

3. Question 2 35

Without consulting entropy tables, predict the sign of ΔS for the following process and choose the correct reasoning for your prediction: $N_2(g, 10\ atm)$ ----> $N_2(g, 1\ atm)$. The mass of N_2 remains constant.

	Student Response	Value	Correct Answer	Feedback
a.	positive; there is an increase in the number of gas molecules.			
b.	positive; the gas expands into a larger volume.			
c.	negative; the gas is compressed into a smaller volume.			
d.	negative; the gas expands into a larger volume.			
e.	negative; there is a decrease in the number of gas molecules.			

Score: 5/5

4. Question 8 35

Sodium carbonate can be prepared by heating sodium bicarbonate.

$2\ NaHCO_3(s)$ ----> $Na_2CO_3(s) + CO_2(g) + H_2O(g)$.

Given that ΔH^o = 128.9 kJ and ΔS^o = 321 J/K?mol for this reaction, at what temperature will K = 1?

	Student Response	Value	Correct Answer	Feedback
a.	401.6 K			
b.	401.6 °C			
c.	33.1 K			
d.	33.1			

Score: 5/5

5. 017 Chapter #012

You are asked to go into the lab and prepare an acetic acid-sodium acetate buffer solution with a pH of 4.00 ± 0.02. What molar ratio of CH_3COOH to CH_3COONa should be used?

	Student Response	Value	Correct Answer	Feedback
a.	0.18			
b.	0.84			
c.	1.19			
d.	5.50			
e.	0.10			

Score: 5/5

6. Question 7 34

K_{eq} = 7.0 at 35 °C for the reaction A + B ----> C + Calculate ΔG^o for this reaction.

	Student	Value	Correct	Feedback

	Response	Answer
a.	- 4.98 kJ	
b.	2.46 kJ	
c.	- 5.66 kJ	
d.	4983 kJ	

Score: 5/5

7. **Question 4 34**

Rubidium has a heat of vaporization of 69.0 kJ/mol and an entropy of vaporization of 71.9 J/K.mol. Calculate the boiling point of rubidium.

	Student Response	Value	Correct Answer	Feedback
a.	687 K			
b.	273 K			
c.	32 °F			
d.	687 °C			

Score: 5/5

8. **Question 3 34**

Which of the following reactions will have the most positive ΔH^{o}?

	Student Response	Value	Correct Answer	Feedback
a.	$N_2(g)$ ---> 2 N(g)			
b.	$F_2(g)$ ----> 2 F(g)			
c.	$O_2(g)$ ---> 2 O(g)			
d.	These reactions would all have the			

same ΔH^o.	

Score: 5/5

9. **017 Chapter #023**

A buffer is prepared by adding 300.0 mL of 2.0 *M* NaOH to 500.0 mL of 2.0 *M* CH_3COOH. What is the pH of this buffer? $K_a = 1.8 \times 10^{-5}$

	Student Response	Value	Correct Answer	Feedback
a.	4.57			
b.	4.52			
c.	4.87			
d.	4.92			
e.	4.97			

Score: 5/5

10. **017 Chapter #032**

A 50.0-mL sample of 0.50 *M* HCl is titrated with 0.50 *M* NaOH. What is the pH of the solution after 28.0 mL of NaOH have been added to the acid?

	Student Response	Value	Correct Answer	Feedback
a.	1.85			
b.	2.96			
c.	2.85			
d.	1.49			
e.	3.81			

Score: 5/5

11. **017 Chapter #049**

When a weak acid is titrated with a weak base, the pH at the equivalence point:

	Student Response	Value	Correct Answer	Feedback
a.	is greater than 7.0.			
b.	is equal to 7.0.			
c.	is less than 7.0.			
d.	is determined by the sizes of K_a and K_b.			
e.	is no longer affected by addition of base.			

Score: 5/5

12. Question 1 35

Which of the following reactions shows the greatest increase in entropy?

	Student Response	Value	Correct Answer	Feedback
a.	$SO_3(g)$ -----> 2 $SO_2(g)$ + $O_2(g)$			
b.	$H_2O(l)$ ----> $H_2O(s)$			
c.	$Br_2(l)$ ----> $Br_2(g)$			
d.	$H_2O_2(l)$ ----> $H_2O(l)$ + 1/2 $O_2(g)$			

Score: 5/5

13. 017 Chapter #067

Will a precipitate (ppt) form when 20.0 mL of 1.1×10^{-3} M $Ba(NO_3)_2$ are added to 80.0 mL of 8.4×10^{-4} M Na_2CO_3?

	Student Response	Value	Correct Answer	Feedback

a. Yes, the ppt is $Ba(NO_3)_2$.			
b. Yes, the ppt is $NaNO_3$.			
c. Yes, the ppt is $BaCO_3$.			
d. Yes, the ppt is Na_2CO_3.			
e. No, a precipitate will not form.			

Score: 5/5

14. Question 6 35

For the process $C_6H_6(l)$ ----> $C_6H_6(s)$ at a temperature above the freezing point of C_6H_6,

Student Response	Value	Correct Answer	Feedback
a. ΔS is positive.			
b. ΔH is positive.			
c. ΔG is positive.			
d. ΔG = O.			

Score: 5/5

15. 017 Chapter #045

Which of the following indicators would be the best to use when 0.050 *M* benzoic acid ($K_a = 6.6 \times 10^{-5}$) is titrated with 0.05 *M* NaOH?

	Student Response	Value	Correct Answer	Feedback
a.	bromphenol blue, pH range: 3.0-4.5			
b.	bromcresol green, pH range: 3.8-5.4			
c.	alizarin, pH range: 5.7-7.2			
d.	phenol red, pH range: 6.9-8.5			

Score: 5/5

16. **017 Chapter #062**

Calculate the minimum concentration of Mg^{2+} that must be added to 0.10 M NaF in order to initiate a precipitate of magnesium fluoride. (For MgF_2, $K_{sp} = 6.9 \times 10^{-9}$.)

	Student Response	Value	Correct Answer	Feedback
a.	1.4×10^{7} M			
b.	6.9×10^{-9} M			
c.	6.9×10^{-8} M			
d.	1.7×10^{-7} M			
e.	6.9×10^{-7} M			

Score: 5/5

17. **017 Chapter #003**

Which of the following aqueous mixtures would be a buffer system?

	Student Response	Value	Correct Answer	Feedback
a.	HCl, NaCl			

b.	HNO_3, $NaNO_3$
c.	H_3PO_4, NaH_2PO_4
d.	H_2SO_4, CH_3COOH
e.	NH_3, NaOH

Score: 5/5

18. Question 5 34

Calculate ΔS^o_{rxn} for the following reaction:

4 Cr(s) + 3 O_2(g) ----> 2 Cr_2O_3(s).

Substance	ΔS^o, J/K?mol
Cr(s)	23.77
O_2(g)	205.138
Cr_2O_3(s)	81.2

	Student Response	Value	Correct Answer	Feedback
a.	548.1 J/K			
b.	147.7 J/K			
c.	-147.7 J/K			
d.	-548.1 J/K			

Score: 5/5

19. Question 9 36

Consider the reaction SO_2(g) + NO_2(g) ----> SO $_3$(g) + NO(g), which occurs at 298 K. Given the information below, determine which of the following choices is correct.

compound	ΔG^o, kJ/mol
SO_2(g)	-300.4

$SO_3(g)$	-370.4
$NO(g)$	86.7
NO_2	51.8

Student Response	Value	Correct Answer	Feedback
a. $K > 1$; $\Delta G > 0$			
b. $K > 1$; $\Delta G < 0$			
c. $K < 0$; $\Delta G > 0$			
d. $K < 0$; $\Delta G < 0$			

Score: 5/5

20. 017 Chapter #076

Which cation would form an insoluble chloride when reacted with HCl?

Student Response	Value	Correct Answer	Feedback
a. Na^+			
b. Ag^+			
c. B^{3+}			
d. Ca^{2+}			
e. Cs^+			

Score: 5/5