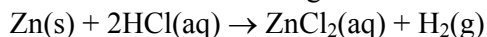


## Multiple Choice

1. Calculate the work done (in kJ) against atmospheric pressure of 1.0 atm when 500.0 g of zinc dissolves in excess HCl at 30.0°C according to:



- A) -22.4      B) -19.3      C) -17.6      D) -15.2

2. A gas is compressed in a cylinder by a constant pressure of 10 atm from a volume of 10.0 L to 2.0 L. If the gas absorbs 250 J of heat from the surroundings. What are the values of  $q$ ,  $w$  and  $\Delta E$  (in J)?

	$q$	$w$	$\Delta E$
<input type="radio"/> A)	+250	+20265	+20515
B)	+250	-18238	-17988
C)	-250	+20265	+20015
D)	+250	+18238	+18488

3. The solubility of nitrogen gas at 25°C and 522 mmHg is  $4.7 \times 10^{-4}$  mol/L. What is the value of Henry's law constant at 25°C in mol/L??

- A)  $6.8 \times 10^{-4}$       B)  $7.5 \times 10^{-4}$   
C)  $8.2 \times 10^{-4}$       D)  $3.8 \times 10^{-4}$

4. Heptane ( $\text{C}_7\text{H}_{16}$ ) has a vapor pressure of 792 torr at 100°C. At this same temperature, octane ( $\text{C}_8\text{H}_{18}$ ) has a vapor pressure of 352 torr. What will be the vapor pressure in torr of an ideal solution prepared from 25.0 g of heptane and 85.5 g of octane at 100°C?

- A) 653      B) 564      C) 462      D) 418

5. The vapor pressure of water at 20°C is 17.5 mmHg. What is the vapor pressure over a solution prepared from 200.0 g of table sugar ( $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ ) and 350.0 g water (in mmHg) at 20°C?

- A) 17.0      B) 16.5      C) 16.0      D) 15.5

6. What is the freezing point (in °C) of an aqueous solution of Glucose ( $\text{C}_6\text{H}_{12}\text{O}_6$ ) that has a boiling point of 102.5°C (at 1.0 atm)? For water,  $K_b = 1.86^\circ\text{C}/m$  and  $K_f = 0.52^\circ\text{C}/m$ .

- A) -0.7      B) -8.9      C) -6.3      D) -5.8

7. 0.102 g of a nonelectrolyte dissolved in 100.0 mL water has an osmotic pressure of 28.1 mmHg at 20°C. Calculate the molar mass of this compound (in g/mol).

- A) 297      B) 396      C) 548      D) 663

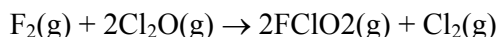
8. For the hypothetical reaction:



The rate appearance of C given by  $\Delta[\text{C}]/\Delta t$  may also be expressed as:

- A) ???      B) ???      C) ???      D) ???

9. For the reaction.



The following initial rates of reaction have been measured for the given reagent concentrations:

Experiment	F <sub>2</sub> (M)	Cl <sub>2</sub> O (M)	Rate (M/s)
1	0.05	0.010	5.0×10 <sup>-4</sup>
2	0.05	0.040	2.0×10 <sup>-3</sup>
3	0.10	0.010	1.0×10 <sup>-3</sup>

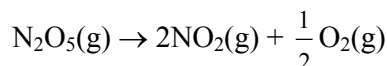
What of the following is the rate law for this reaction?

- A) rate = k [F<sub>2</sub>] [Cl<sub>2</sub>O]<sup>2</sup>      B) rate = k [F<sub>2</sub>] [Cl<sub>2</sub>O]  
C) rate = k [F<sub>2</sub>]<sup>2</sup> [Cl<sub>2</sub>O]<sup>2</sup>      D) rate = k [F<sub>2</sub>]<sup>2</sup> [Cl<sub>2</sub>O]

10. A certain first order reaction A → B is 25% complete in 42 min at 25°C. What is the half life of the reaction (in min)?

- A) 84                      B) 92                      C) 101                      D) 120

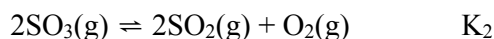
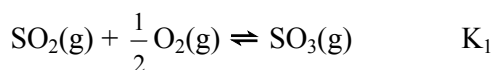
11. The activation energy (E<sub>a</sub>) for the following first-order reaction is 102 kJ/mol.



The value of the rate constant (k) is 1.35×10<sup>-4</sup> s<sup>-1</sup> at 35°C. What is the value of k at 0°C in s<sup>-1</sup> unit?

- A) 8.17×10<sup>-7</sup>                      B) 6.27×10<sup>-6</sup>  
C) 7.48×10<sup>-5</sup>                      D) 4.2×10<sup>-4</sup>

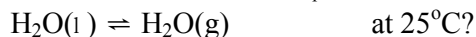
12. Consider the two gaseous equilibria:



The values of the equilibrium constants K<sub>1</sub> and K<sub>2</sub> are related by:

- A) K<sub>2</sub> = (K<sub>1</sub>)<sup>2</sup>                      B) (K<sub>2</sub>)<sup>2</sup> = K<sub>1</sub>  
C) K<sub>2</sub> = (K<sub>1</sub>)<sup>-2</sup>                      D) K<sub>2</sub> = (K<sub>1</sub>)<sup>-1</sup>

13. What are the values of K<sub>p</sub> and K<sub>c</sub> for the reaction:



Given the vapor pressure of water at 25°C is 23.8 torr.

- A) 2.38×10<sup>-2</sup> atm, 5.82×10<sup>-1</sup> mol/L  
B) 2.38×10<sup>-2</sup> atm, 9.73×10<sup>-5</sup> mol/L  
C) 3.13×10<sup>-2</sup> atm, 7.66×10<sup>-1</sup> mol/L  
D) 3.13×10<sup>-2</sup> atm, 1.28×10<sup>-3</sup> mol/L

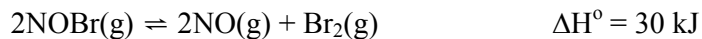
14. Hydrogen iodide decomposes according to:



A 0.550 mol sample of HI was injected in a 2.0 L reaction vessel held at 400°C. Calculate (in mol/L) the concentration of H<sub>2</sub> at equilibrium?

- A) 0.055      B) 0.0275      C) 0.275      D) 0.22
- 

15. For the reaction at equilibrium, which one of the changes below would cause the equilibrium to shift to the left:



- A) Remove some NO  
B) Add more NOBr  
C) Compress the gas mixture to a smaller volume  
D) Increase the temperature
-