

120 Homework. Chapter 8.

1. Which law describes the relationship of disorder to spontaneity?

- a) First law of thermodynamics b) Second law of thermodynamics c) Law of conservation of mass
d) Law of mass action

2. Which of the following processes involve an increase in entropy (S) or disorder?

1. $\text{Br}_2(\text{l}) \rightarrow \text{Br}_2(\text{g})$ 2. $2\text{NO}(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{NO}_2(\text{g})$
3. $\text{MgSO}_4(\text{s}) \rightarrow \text{MgO}(\text{s}) + \text{SO}_3(\text{g})$ 4. $2\text{HgO}(\text{s}) \rightarrow 2\text{Hg}(\text{l}) + \text{O}_2(\text{g})$
a. 1 and 2 b. 2 and 3 c. 3 and 4 d. 1, 3, and 4
e. 1, 2, 3, and 4

3. A reaction always will be spontaneous if it is

- a) exothermic b) endothermic c) exothermic and positive entropy of the system
d) negative entropy of the system

4. What is the name and symbol of the single thermodynamic quantity (function) which determines whether or not a reaction is spontaneous?

- a) enthalpy, H b) entropy, S c) free energy, G ($\Delta G = \Delta H - T\Delta S$) d) temperature, T

5. A candy sample is completely combusted in a bomb calorimeter. The calorimeter contains 982 g of water, and the measured temperature increase is 2.62°C. What is the fuel value of the candy sample in nutritional Calories?

- a) 982 cal b) 4.75 cal c) 6.78 cal
d) 2.57 cal e) 5.01 cal

6. Kinetics deals with the

- a) thermodynamics of a reaction b) equilibrium position of a reaction
c) reaction rates d) calculating the amount of precuts in a reaction

7. What is the term used for the height of the energy barrier the reactants must overcome in order to form products in a reaction?

- a) reaction mechanism b) reaction

- energy diagram c) activation energy
d) activated complex

8. A reaction is first order in reactant A, second order in B and first order in C. Write down the rate equation for this reaction.

- a) $\text{rate} = k[\text{A}][\text{B}][\text{C}]^2$ b) $\text{rate} = k[\text{A}][\text{B}]^2[\text{C}]$ c) $\text{rate} = k[\text{A}][\text{B}][\text{C}]$ d) $\text{rate} = k[\text{A}][\text{B}]^2$

9. Which is not a way to speed up the reaction rate.

- a) increase concentrations of reactants
b) increase temperature c) add a catalyst d) increase the products

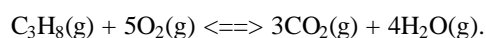
10. Which process is not spontaneous?

- a) diffusion of the odor from cooking food
b) dissolving of sugar in coffee
c) decomposition of iron ore into pure iron
d) burning a candle
e) melting ice at 25 degrees Celsius

11. Dust suspended in the air in grain elevators can sometimes explode because:

- a) the tiny dust particles will result in a very high surface area.
b) the dust particles have a very flammable material.
c) flammable gases are always present in the elevators.
d) of the high temperatures always present in the elevators.
e) of the constant sources of ignition.

12. The equilibrium constant expression, K_c , for the reaction

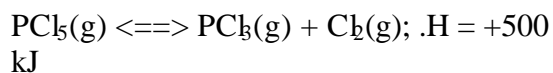


- $$K_c = \frac{[\text{C}_3\text{H}_8][\text{O}_2]}{[\text{CO}_2]^3 [\text{H}_2\text{O}]^4}$$

a) $K_c = \frac{[\text{CO}_2]^3 [\text{H}_2\text{O}]^4}{[\text{C}_3\text{H}_8][\text{O}_2]}$
b) $K_c = \frac{[\text{CO}_2]^3 [\text{H}_2\text{O}]^4}{[\text{C}_3\text{H}_8][\text{O}_2]}$
c) $K_c = \frac{[\text{C}_3\text{H}_8][\text{O}_2]^5}{[\text{C}_3\text{H}_8][\text{O}_2]^5}$
d) $K_c = \frac{[\text{C}_3\text{H}_8][\text{O}_2]^5}{[\text{C}_3\text{H}_8][\text{O}_2]^5}$
e) $K_c = \frac{[\text{CO}_2]^5 [\text{H}_2\text{O}]^4}{[\text{C}_3\text{H}_8][\text{O}_2]}$

13. Chemical equilibrium exists when

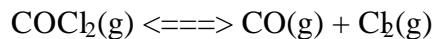
- a) reactants are completely changed to products.
- b) there are equal amounts of reactants and products.
- c) the rate at which reactants form products becomes zero.
- d) the rate at which reactants form products is the same as the rate at which products form reactants.

14. Consider following system at equilibrium:

Which of the following changes will shift

the equilibrium to the LEFT?

- a) increasing temperature
- b) increasing volume
- c) increasing pressure
- d) removing $\text{Cl}_2(\text{g})$
- e) adding $\text{PCl}_5(\text{g})$

15. Consider the reaction

At equilibrium, $[\text{CO}] = 4.14 \times 10^{-6} \text{ M}$; $[\text{Cl}_2] = 4.14 \times 10^{-6} \text{ M}$; and $[\text{COCl}_2] = 0.0627 \text{ M}$. Calculate the value of the equilibrium constant.

- a) 1.32×10^{-4}
- b) 1.51×10^4
- c) 2.73×10^{-10}
- d) 3.66×10^9
- e) 6.60×10^{-5}