



Chemistry

Name: _____

Section _____

SPONTANEITY

Date: _____

Directions (1-4): For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Some questions may require the use of the 2011 Edition Reference Tables for Physical Setting/Chemistry.

1 Which term is defined as the disorder of a system?

- (1) heat (3) kinetic energy
(2) entropy (4) activation energy

2 Given the balanced equation representing a reaction:



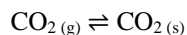
What occurred as a result of this reaction?

- (1) Energy was absorbed and entropy increased.
(2) Energy was absorbed and entropy decreased.
(3) Energy was released and entropy increased.
(4) Energy was released and entropy decreased.

3 Systems in nature tend to undergo changes toward

- (1) lower energy and lower entropy
(2) lower energy and higher entropy
(3) higher energy and lower entropy
(4) higher energy and higher entropy

4 Consider the following change of phase:



As $\text{CO}_{2(g)}$ changes to $\text{CO}_{2(s)}$, the entropy of the system

- (1) decreases
(2) increases
(3) remains the same
(4) depends on the enthalpy

Answer the following questions completely. Remember to avoid the use of pronouns.

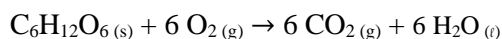
5 Compare the entropy of 30. grams of solid KNO_3 at $20.^\circ\text{C}$ with the entropy of 30. grams of KNO_3 dissolved in 100. grams of water at $20.^\circ\text{C}$.

The dissolved KNO_3 has a higher entropy.

6 Compare the entropy of the CO_2 molecules in the dry ice to the entropy of the CO_2 molecules in an inflated balloon.

The $\text{CO}_{2(g)}$ in the balloon has a higher entropy than the $\text{CO}_{2(s)}$ in the dry ice.

7 The balanced equation below represents the reaction of glucose, $\text{C}_6\text{H}_{12}\text{O}_6$, with oxygen at 298 K and 101.3 kPa.



Compare the entropy of the reactants to the entropy of the products.

The products have a higher entropy. [P and R both have 6 mole (g), but (l) has more entropy than (s)].

8 Explain, in terms of particle arrangement, why a sample of solid NaCl has *less* entropy than a sample of aqueous NaCl .

The particles (or ions) in $\text{NaCl}_{(aq)}$ are free to move about but they are trapped in $\text{NaCl}_{(s)}$.