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1. Law of thermodynamics which states that energy can neither be created nor be destroyed is _____
a) The second law of thermodynamics
b) Third law of thermodynamics
c) First law of thermodynamics
d) Zero-order kinetics
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Answer: c
Explanation: First law of thermodynamics depicts that energy can neither be created nor be destroyed but it can transform from one form to another. This shows that the energy remains constant in the system and in surroundings.

2. Gibb's free energy is the portion of the total energy which is available for useful work.
a) True
b) False
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Answer: a
Explanation: Gibb's free energy is also known as chemical potential and is denoted by ΔG. It is the portion of total energy in a system which is available for work.

3. Which of the following equation shows the relationship between free energy change (ΔG) and the change in entropy (ΔS), under constant temperature and pressure?
a) $\Delta G = T\Delta H - \Delta S$
b) $\Delta G = T\Delta H/\Delta S$
c) $\Delta G = \Delta H/T\Delta S$
d) $\Delta G = \Delta H - T\Delta S$
View Answer

Answer: d
Explanation: The relationship between free energy change and change in entropy of a reacting system under constant temperature and pressure is given by equation $\Delta G = \Delta H - T\Delta S$, where ΔH is the change in enthalpy and T is temperature.

4. What is the value of ΔG, when a system is in equilibrium?
a) $\Delta G = 0$
b) $\Delta G = 1$
c) $\Delta G = -1$
d) $\Delta G = \Delta G^{\circ}$
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Answer: a
Explanation: Under equilibrium, both forward and reverse reactions occur at equal rates which make a change in free energy zero.

5. Which of the following factor is not responsible for the actual change in free energy (ΔG)?
a) Temperature
b) Pressure
c) The initial concentration of reactant and products
d) pH
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Answer: d
Explanation: During a reaction, the actual change in free energy is influenced by temperature, pressure, and the concentration of reactant and product at an initial level while ph does not affect the rate of reaction.

6. Which of the following equation gives the relationship between ΔG° and Keq?
a) $\Delta G^{\circ} = -RT \ln K_{eq}$
b) $\Delta G^{\circ} = \ln K_{eq}$
c) $\Delta G = \Delta G^{\circ} (-RT K_{eq})$
d) $\Delta G = -RT \ln K_{eq}$
View Answer

Answer: a
Explanation: Equation $\Delta G^{\circ} = -RT \ln Keq$is correct as Keq is the equilibrium constant, R is the gas constant and T is the absolute temperature. This equation shows the simple prediction about the rate of reaction as if it proceeds forward, reverse or is at equilibrium.

7. What is the standard free energy change of ATP?
a) Small and negative
b) Large and positive
c) Large and negative
d) Small and positive
View Answer

Answer: c
Explanation: The phosphoryl transfer potential determines the negative free energy values. ATP has a higher tendency to transfer its terminal phosphoryl group to water during hydrolysis and generate large and negative free energy change.

8. Which of the following act as a storage form of high energy phosphate?
a) Glucose-6-phosphate
b) Phosphoenolpyruvate
c) Phosphagens
d) Glycerol phosphate
View Answer

Answer: c
Explanation: High energy phosphate stored as the phosphagens. It is of two types, creatine phosphate in vertebrates and arginine phosphate in invertebrates. Phosphagens maintains the concentration of ATP when it is utilized as a source of energy.

9. What is the name of the molecule which donates its electrons?
a) Reducing agent

b) Oxidative agent
c) Standard reduction potential
d) Oxidant
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Answer: a
Explanation: An electron-donating molecule in an oxidation-reduction reaction is called the reducing agent while an electron accepting molecule is called an oxidizing agent or oxidant.

10. What is reduction potential?
a) The molecule loses an electron
b) An atom/molecule gains an electron
c) Reducing the power of an electron
d) Oxidation power of an electron
View Answer

Answer: b
Explanation: Reduction potential is the readiness with which a molecule gains an electron. It is calculated in volts (V). Electrons move more rapidly from less positive reduction potential to molecules having more reduction potential.