## Chemical Equilibria Quiz

1. If the reaction $\mathrm{H}_{2}+\mathrm{I}_{2} \geqslant 2 \mathrm{HI}$ is conducted at such a temperature that the reaction is $72 \%$ complete, then if 1.0 mole of $\mathrm{H}_{2}$ and 1.0 mole of $\mathrm{I}_{2}$ were initially reacted, the moles of HI at equilibrium will be:
(A) 2.0 moles
(C) 0.72 moles
(B) 1.44 moles
(D) 72 moles
2. If the reaction $A+B \geqslant C+D$ is initially at equilibrium, and then more $A$ is added, which of the following is not true?
A More collisions of A with B will
(C) The equilibrium will shift to the right. occur, and the rate of the forward reaction will increase.
(B) The moles of $D$ will be increased. D The moles of $B$ will be increased.
3. For the reaction $\mathrm{N}_{2} \mathrm{O}_{4}(\mathrm{~g}) \rightleftharpoons 2 \mathrm{NO}_{2}(\mathrm{~g})$, the expression for the equilibrium constant would be:
(A) $\frac{\left[\mathrm{N}_{2} \mathrm{O}_{4}\right]}{\left[\mathrm{NO}_{2}\right]^{2}}$
(C) $\left[\mathrm{NO}_{2}\right]^{2}\left[\mathrm{~N}_{2} \mathrm{O}_{4}\right]$
(B) $\frac{\left[\mathrm{NO}_{2}\right]^{2}}{\left[\mathrm{~N}_{2} \mathrm{O}_{4}\right]}$
(D) $\frac{\left[\mathrm{NO}_{2}\right]}{\left[\mathrm{N}_{2} \mathrm{O}_{4}\right]}$
4. For the reaction $3 \mathrm{H}_{2(\mathrm{~g})}+\mathrm{N}_{2(\mathrm{~g})} \rightleftharpoons 2 \mathrm{NH}_{3(\mathrm{~g})}+$ heat, the best set of conditions to produce more product are:
(A) high temperature and low pressure $\mathbf{C}$ low temperature and low pressure
(B) low temperature and high pressure high temperature and high pressure
5. The study of reaction rates is known as chemical kinetics.
T true
F false
6. For the reaction: $\mathrm{H}_{2(\mathrm{~g})}+\mathrm{I}_{2(\mathrm{~g})}+52 \mathrm{~kJ} \rightarrow 2 \mathrm{HI}(\mathrm{g})$, the product has a greater amount of stored potential energy than do the reactants.
T true
F false
7. The change in enthalpy during a chemical reaction is the difference between the chemical potential energy of the products and the chemical potential energy of the reactants.
T] true
F false
8. When the concentration of the reactants is decreased, the forward reaction rate generally decreases.
T true
F false
9. A catalyst is consumed in a chemical reaction.
T true
F false
10.At equilibrium, the concentration of the products is equal to the concentration of the reactants.
T] true
F false
11.A reversible reaction is one in which the products formed in a chemical reaction can react to produce the original reactants.
T true
F false
12.If a reaction is exothermic, the speed of that reaction can be increased by increasing the temperature.
T true
F false
13.After the establishment of a chemical equilibrium, the forward and reverse reactions stop.
T true
F false
14.When the temperature of a chemical reaction decreases, the reaction rate generally increases.
T] true
F false
15.For the equilibrium: $2 \mathrm{NO}_{2}(\mathrm{~g}) \approx \mathrm{N}_{2} \mathrm{O}_{4}(\mathrm{~g})+57 \mathrm{~kJ}$, decreasing the pressure will initially increase the rate of the reverse reaction.
T true
(F) false
16.When heat is applied to a system in equilibrium, the reaction that absorbs heat is favoured.
T true
F false
17.For the reaction: $\mathrm{H}_{2}{ }_{(\mathrm{g})}+\mathrm{I}_{2(\mathrm{~g})}+52 \mathrm{~kJ} \rightarrow 2 \mathrm{HI}_{(\mathrm{g})}, 52 \mathrm{~kJ}$ is the activation energy.
T true
F false
10. The equilibrium in the reaction $\mathrm{N}_{2}+3 \mathrm{H}_{2} \geqslant 2 \mathrm{NH}_{3}$ will be shifted towards the left by an increase in pressure.
T true
F false
19.The equation $\mathrm{Ba}(\mathrm{OH})_{2}+\mathrm{H}_{2} \mathrm{SO}_{4} \stackrel{2}{\rightleftharpoons} \mathrm{H}_{2} \mathrm{O}+\mathrm{BaSO}_{4}$ implies that:

A If you start with $1 \mathrm{~mol} \mathrm{Ba}(\mathrm{OH})_{2}$ and If $\mathrm{H}_{2} \mathrm{O}$ and $\mathrm{BaSO}_{4}$ and mixed, $1 \mathrm{~mol} \mathrm{H}_{2} \mathrm{SO}_{4}$, then $1 \mathrm{~mol} \mathrm{H}_{2} \mathrm{O}$ and $\mathrm{Ba}(\mathrm{OH})_{2}$ and $\mathrm{H}_{2} \mathrm{SO}_{4}$ will be formed. $1 \mathrm{~mol}_{\mathrm{BaSO}}^{4}$ will be produced.
(B) The reaction proceeds all the way At equilibrium, equal molar amounts to the products, then reverses, going of all four substances will exist. all the way to the reactants.
20.Solids are not included in the equilibrium constant because:
(A) of their molecular geometry.
(B) their concentrations vary a great deal.
(C) their concentrations are relatively constant
(D) they are very often ionic in nature.

## SOLUTIONS

(1) B
(2) $D$
(3) B
(4) $B$
(5) T
(6) T
(7) T
(8) T
(9) F
(10) F
(11) T
(12) T
(13) F
(17) F
(14) F
(15) T
(16) T
(20) C

