“Watch those curves!” Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Base your answers to questions 1 to 4 on diagram 1.

\_\_\_\_1. The activation energy of the forward reaction

is indicated by arrow...



\_\_\_\_2 ΔH for this reaction is indicated by arrow....

\_\_\_\_3. Diagram 1 represents

A) an endothermic reaction that releases heat

B) an exothermic reaction that releases heat

C) an endothermic reaction that absorbs heat

D) an exothermic reaction that absorbs heat

\_\_\_\_4. In diagram 1, line D represents

A) the potential energy of the reactant

B) the activation energy of the reverse reaction

C) the potential energy of the product

D) the potential energy of the activated complex

\_\_\_\_5. Based on table I, diagram **2** could be representing

A)the formation of NO(g) from N2(g) and O2(g)

B) the formation of NH3(g) from H2(g) and N2(g)

C) the formation of CO2(g) from C(s) and O2(g) D) the formation of H2O(g) from H2(g) and O2(g)

\_\_\_\_6. The heat of reaction in diagram 2 is equal to the value of

A) line 1 + line 2 B) line 3 – line 1 C) line 3 – line 2 D) line 2 – line 3

\_\_\_\_7. In diagram 2, a catalyst would change the value of

A) line 1 only B) line 2 only C) line 3 only D) lines 1 and 3

\_\_\_\_8. An exothermic reaction produces 45 kJ/mol. If the activation energy of this reaction

is 15 kJ/mol in the forward direction, then the **reverse** activation energy is

A) 30 kJ/mol B) 45 kJ/mol C) 60 kJ/mol D) 15 kJ/mol

\_\_\_\_9. Which best describes a chemical reaction that has reached equilibrium?

A) the forward reaction has stopped B) the reverse reaction has stopped

C)the rates of the forward and reverse reactions are equal

D)the concentrations of product and reactant are equal

\_\_\_\_10. Which reacts **fastest?** A) zinc strips in dilute acid B) zinc strips in concentrated

acid C) zinc powder in dilute acid D) zinc powder in concentrated acid.

\_\_\_\_\_11. As the temperature increases, the effectiveness of collisions between reacting particles

A) decreases B) increases C) remains the same

\_\_\_\_\_12. A student wished to speed up the reaction Mg(s) + 2 HCl(aq) ➞ MgCl2 + H2 so

she added some hot water to the flask containing the Mg and HCl(aq). She was surprised when the reaction actually got *slower*. This was because by adding water she

A) decreased the temperature of the system B) increased the temperature of the system C) decreased the concentration of the acid D) increased the concentration of the acid.

\_\_\_\_\_13. A reaction between the gases SO2 and O2 will become *slower* if you increase the

A) temperature B) volume of the container C) pressure of SO2 D) pressure of O2

\_\_\_\_14. Which statement correctly describes a chemical reaction at equilibrium?

1) The concentrations of products and reactants are constant

2) The concentrations of products and reactants are equal

3) The rate of the forward reaction is less than the rate of the reverse reaction

4) The rate of the forward reaction is greater than the rate of the reverse reaction.

CH4(g) + 2 O2(g) ⇄ CO2(g) + 2 H2O(*l*) ΔH = –890.4 kJ

\_\_\_\_\_15. In the reaction above, the amount of CO2(g) at equilibrium will increase if there

is a **decrease** in the A) pressure B) temperature C) amount of CH4 D) amount of O2

C3H8(g) + 5 O2(g) ⇄ 3 CO2(g) + 4 H2O(g) ΔH = –2043.2 kJ

\_\_\_\_\_16. In the reaction above, a decrease in the volume of the reaction vessel would produce

an increase in the equilibrium quantity of A) CO2 B) C3H8 C) H2O

D) none of these

\_\_\_\_\_17. If additional H2O gas is added to the system above, the system will shift to the

A) left, and the amount of CO2 will increase B) left, and the amount of CO2 will decrease

C) right, and the amount of C3H8 will increase D) right, and the amount of C3H8 will decrease

N2(g) + 2 O2(g) ⇄ 2 NO2(g) ΔH = + 66.4 kJ.

\_\_\_\_\_18. To produce the maximum amount of NO2 at equilibrium, we should use conditions

of A) low temperature and low pressure B) low temperature and high pressure

C) high temperature and high pressure D) high temperature and low pressure.

N2(g)  + 3 H2(g) ⇄ 2 NH3(g) + 91.8 kJ

\_\_\_\_\_19. An increase in the temperature would cause the equilibrium system above to produce

A) more NH3 and less H2 B) more N2 and less H2 C) more N2 and less NH2

D) less N2 and less H2

\_\_\_\_\_20. As the average kinetic energies of the reacting chemicals increase, the rate of the

reaction between them A) decreases B) increases C) stays the same