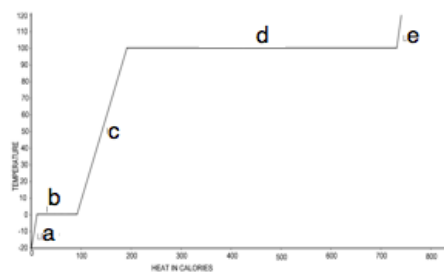


Unit 7 Review: Kinetics and Thermodynamics

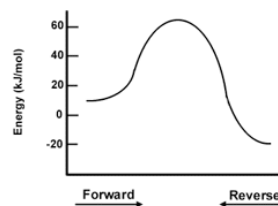
1. Define the following terms: Joule, Calorie, Energy, Heat change(ΔH), Calorimeter, Exothermic, Endothermic, Critical point, Critical temperature, Critical pressure, Specific heat, Activation Energy, Rate-determining step, Catalyst, Reversible reaction, Chemical Equilibrium, Le Chatelier's Principle
2. The specific heat of water is $4.18 \text{ J}/(\text{g} \cdot ^\circ\text{C})$. How many joules are required to heat 100 grams of water from 25°C to 35°C ?
A. _____ J
3. A 5 gram piece of a metal at 0°C absorbs 1000 J of energy, after which the temperature of the metal is 400°C . What is the specific heat of the metal?
A. _____ $\text{J}/(\text{g} \cdot ^\circ\text{C})$
4. The molar heat of fusion for water is 6 kJ/mol . How much energy must be removed from 10 moles of water at 0°C in order to convert it to ice at 0°C ?
A. _____ kJ
5. Name three factors that will always increase the rate of a chemical reaction.
6. An increase in temperature increases the rate of a chemical reaction by (increasing/decreasing) the frequency of molecule collisions.
7. Catalysts increase the rate of a chemical reaction by lowering (temperature/ activation energy/ collision energy).
8. In chemical reactions, electricity, a spark, and sunlight are all ways in which (reactants/ activation energy/ catalysts) may be provided.
9. Name two factors that must be present for an effective collision to take place.
10. Name three factors that will always slow down the rate of a chemical reaction?
11. At 25°C , a certain reaction is able to produce 0.80 moles of product per minute? The rate of reaction will (increase/decrease) at 35°C .
12. At 25°C , a certain reaction is able to produce 0.80 moles of product per minute? The rate of reaction will (increase/decrease) at 15°C .
13. In the chemical reaction below, energy is (given off/ absorbed), so the reaction is (endothermic/ exothermic).
 $2 \text{ HCl}(\text{aq}) + \text{Mg}(\text{s}) \rightleftharpoons \text{MgCl}_2(\text{aq}) + \text{H}_2(\text{g}) + \text{heat}$
14. Given the following reaction:
 $\text{P}_4(\text{s}) + 5 \text{ O}_2(\text{g}) \rightarrow 2 \text{ P}_2\text{O}_5(\text{s})$
If the initial rate of the reaction consumes 1 mole of phosphorus, P_4 , per second, what is the rate at which oxygen, O_2 , is consumed initially? What is the rate at which diphosphorus pentoxide, P_2O_5 , is formed initially?
A. _____ mole per second (O_2)
B. _____ mole per second (P_2O_5)

Use the the diagram below for questions 15-20.



15. According to the diagram, the process of converting ice to water occurs by (adding /removing /not changing) energy.
16. According to the diagram, the phase change taking place, in the right-to-left direction, along "b" is _____.
17. According to the diagram, the phase change taking place, in the right-to-left direction, along "d" is _____.
18. According to the diagram, the phase of water present along "c" of the diagram is _____.
19. According to the diagram, the phase of water present along "e" of the diagram is _____.
20. According to the diagram, ice can be colder than _____ $^\circ\text{C}$.

Use the following diagram for questions 23-25



21. For the forward reaction depicted in this diagram, $\Delta H =$ _____ kJ/mol
22. For the forward reaction depicted in this diagram, the Activation Energy, $E_a =$ _____ kJ/mol
23. The forward reaction depicted in this diagram is (isothermic, exothermic, endothermic).
24. When extra NH_3 is added to the following system at equilibrium, in order to restore equilibrium, the reaction shifts towards the _____.
 $3 \text{ H}_2(\text{g}) + \text{N}_2(\text{g}) \rightleftharpoons 2 \text{ NH}_3(\text{g})$
25. When N_2 is removed from the following system at equilibrium, in order to restore equilibrium, the reaction shifts towards the _____.
 $3 \text{ H}_2(\text{g}) + \text{N}_2(\text{g}) \rightleftharpoons 2 \text{ NH}_3(\text{g})$
26. When the pressure is increased on the following system at equilibrium, in order to restore equilibrium, the reaction shifts towards the _____.
 $3 \text{ H}_2(\text{g}) + \text{N}_2(\text{g}) \rightleftharpoons 2 \text{ NH}_3(\text{g})$
27. When the temperature is decreased on the following system at equilibrium, in order to restore equilibrium, the reaction shifts towards the _____.
 $2 \text{ HCl}(\text{aq}) + \text{Mg}(\text{s}) \rightleftharpoons \text{MgCl}_2(\text{aq}) + \text{H}_2(\text{g}) + \text{heat}$