

Energy & Gases: SOL Review #6

Chapters 12, 13

Name: _____

Chapter 12: Energy

- Endothermic, Exothermic
- Catalyst
- Phase Change, Phase Diagram, Heating Curve
- Kinetic Energy and Temperature, Kelvin, Absolute zero
- Specific Heat calculations
- Heat of Vaporization, Heat of Fusion calculations
- Entropy

Chapter 13: Gases

- Properties of Gases
- Partial Pressures
- Pressure/Volume Relationships, Boyle's Law
- Temperature/Volume Relationships, Charles's Law
- Combined Gas Law
- Ideal Gas Law

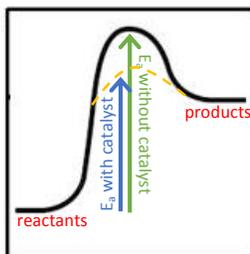
Energy

1) Explain three differences between exothermic and endothermic reactions.

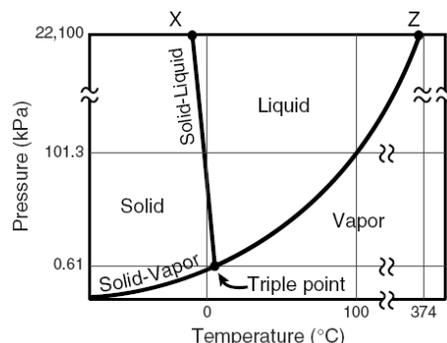
- Exothermic = energy is released, $\Delta H = \ominus$
- Endothermic = energy is absorbed, $\Delta H = \oplus$

2) Indicate the three parts of the definition of a catalyst.

- speeds up a reaction
- lowers activation energy
- is not used up



3) Label the following on the graph:
 reactants, products, E_a with catalyst,
 E_a without catalyst, is it exothermic or endothermic
 endothermic



4) What is the "triple point" of water? (see graphic)

All phase changes occur simultaneously in equilibrium.

5) Describe the relationship between kinetic energy and an increase in temperature.

As temperature increases, kinetic energy increases.

6) What happens at absolute zero? What is the temperature of absolute zero in Kelvin and Celsius?

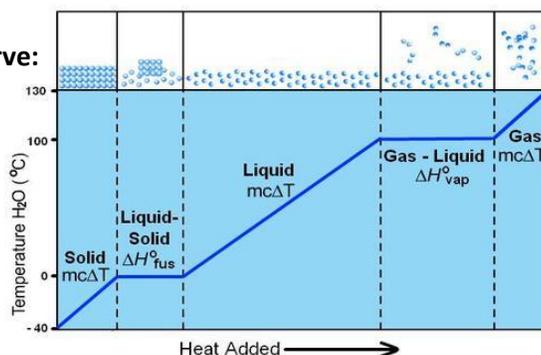
All molecular motion stops. 0 Kelvin or -273°C

7) What is entropy? disorder

8) Define each phase change:

- Sublimation: solid to gas
- Condensation: gas to liquid
- Melting: solid to liquid
- Deposition: gas to solid
- Boiling: liquid to gas
- Freezing: liquid to solid

9) Label each part of the heating curve:



Specific Heat calculations

- 10) What is specific heat? **The energy required to raise the temperature of 1 gram of a substance by 1°C.**
- 11) How many calories of energy are required to raise the temperature of 105g of water from 30.0°C to 70.0°C?

4200 cal

- 12) A 83.7g sample of nickel absorbs 483 cal of energy when the temperature increases from 13.8°C to 26.8°C. What is the specific heat of nickel?

$0.44 \frac{\text{cal}}{\text{g} \cdot ^\circ\text{C}}$

Heat of Vaporization, Heat of Fusion calculations

- 13) If the heat of fusion of water is 80 cal/g, the amount of heat energy required to change 15.0 grams of ice at 0°C to 15.0 grams of water at 0°C is –
a) 80 cal b) 560 cal **c) 1200 cal** d) 2400 cal

Molar Heat of Fusion and Melting Point for Selected Substances

Substance	Melting Point (°C)	ΔH_{fus} (kJ/mol)
Argon	-190	1.18
Benzene	5.5	9.87
Mercury	-39	2.29
Water	0	6.01

- 14) According to the data in the table, which substance will release the greatest amount of heat when 1.00 mol is frozen?

Gases

- 15) The total pressure of an O₂-Ar-He gas mixture is 644 mmHg. If the partial pressure of Ar is 183 mmHg and the partial pressure of He is 375 mmHg, what is the partial pressure of O₂? Type: [Dalton's Law of Partial Pressures](#)

86 mm Hg

- 16) An expandable container of oxygen gas has a volume of 125 mL at a temperature of 25.0°C. What volume will the gas occupy at 55.0°C? Type: [Charles's Law](#)

137.58 mL

- 17) A gas cylinder is filled with 4.00 moles of oxygen gas at 300.0 K. The piston is compressed to yield a pressure of 400.0 kPa. What is the volume inside the cylinder? Type: [Ideal Gas Law](#)

$$R = \frac{8.31 \text{ kPa} \cdot \text{dm}^3}{\text{moles} \cdot \text{K}}$$

24.93 dm³ (remember: 1 dm³ = 1 L)

- 18) A sample of nitrogen occupies 10.0 liters at 25°C and 98.7 kPa. What would be the volume at 20°C and 102.7 kPa? Type: [Combined Gas Law](#)

9.45 L

- 19) A mixture of gases with a pressure of 800.0 mm Hg contains 60% nitrogen and 40% oxygen by volume. What is the partial pressure of oxygen in this mixture? Type: [Dalton's Law of Partial Pressures](#)

320 mm Hg

- 20) A gas has a volume of 100.0 mL at a pressure of 600.0 mm Hg. If the temperature is held constant, what is the volume of the gas at a pressure of 800.0 mm Hg? Type: [Boyle's Law](#)

75 mL