

AP Chemistry: Unit - 4 - Applications of Thermodynamics Practice Test

Questions 1

The specific heat of liquid bromine is 0.2 J/gK. How much heat is required to raise the temperature of 100 grams of bromine from 15 K to 25 K?

- A. 30 J
- B. 500 J
- C. 20 J
- D. 200 J

Questions 2

The specific heat of liquid bromine is 0.20 J/gK. What is the MOLAR heat capacity of this substance?

- A. 32 J/gK
- B. 16 J/gK
- C. 9.0 J/gK
- D. 0.23 J/gK

Questions 3

What is the FINAL temperature of a 10.0 gram sample of water, at 25 C, if it absorbs 100 calories of heat? Specific heat of water is 1 calorie/gC

- A. 15
- B. 25
- C. 35
- D. 25,000

Questions 4

The specific heat of water is 1 calorie/g C. What is the molar heat capacity?

- A. 18 calorie/mol C
- B. 0.056 calorie/mol C
- C. 4.2 calorie/mol C
- D. 76 calorie/mol C

Questions 5

How much heat is released when 36 grams of water is frozen at 0 C? The heat of solidification is 6.02 kJ/mol.

- A. 18 kJ
- B. 220 kJ
- C. 12 kJ
- D. 2 kJ

Questions 6

What is the heat of fusion, in kJ/g, if 150 gram sample absorbs 750 kJ when it melts at a constant temperature?

- A. 900 kJ/g
- B. 0.20 kJ/g
- C. 110,000 kJ/g
- D. 5.0 kJ/g

Questions 7

The enthalpy change for $2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$ is -35 kJ. What is the heat of reaction for $2\text{NaCl} \rightarrow 2\text{Na} + \text{Cl}_2$

- A. - 35 kJ
- B. 35 kJ
- C. 70 kJ
- D. - 70 kJ

Questions 8

How much heat is released when 3 moles of methane is reacted? $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} + 80 \text{ kJ}$.

- A. 1300 kJ
- B. 0.038 kJ
- C. 27 kJ
- D. 240 kJ

Questions 9

Which would have the highest heat capacity?

- A. 50 grams of Al, $C_p = 4.7 \text{ J/gK}$
- B. 50 grams of H_2O , $C_p = 4.2 \text{ J/gK}$
- C. 50 grams C, $C_p = 0.78 \text{ J/gK}$
- D. 50 grams of Cu, $C_p = 0.39 \text{ J/gK}$

Questions 10

Which has a positive sign for S?

- A. $2\text{Na (s)} + \text{Cl}_2 \text{ (g)} \rightarrow 2\text{NaCl (s)}$
- B. $\text{H}_2\text{O (g)} \rightarrow \text{H}_2\text{O (l)}$
- C. $\text{H}^+ \text{ (aq)} + \text{NO}_3^- \text{ (aq)} \rightarrow \text{HNO}_3 \text{ (l)}$
- D. $\text{CaCl}_2 \text{ (s)} \rightarrow \text{Ca}^{2+} \text{ (aq)} + 2\text{Cl}^- \text{ (aq)}$

Questions 11

Which substance would be able to absorb the most energy if each sample experiences the same temperature change?

- A. 50 grams of aluminium
- B. 5 grams of aluminium
- C. 150 grams of aluminium
- D. 1000 gram of aluminium

Questions 12

Which substance would experience the biggest temperature change if each sample absorbed the same energy?

- A. 100 grams of water
- B. 5 grams of water
- C. 25 grams of water
- D. 2500 grams of water

Questions 13

The following is a list of specific heat capacities for a few metals.

$$C_{copper} = 0.385$$

$$C_{iron} = 0.444$$

$$C_{silver} = 0.240$$

$$C_{aluminum} = 0.900$$

A 50g sample of an unknown metal is heated with 800 joules. If the temperature of the metal increases by 41.6°C, what is the identity of the unknown metal?

- A. Copper
- B. Silver
- C. Iron
- D. Aluminum

Questions 14

How much heat does it take to heat 100g ice at 0°C to boiling point?

$$C_{ice} = 2.1 \text{ J/g}^\circ\text{C}$$

$$C_{water} = 4.2 \text{ J/g}^\circ\text{C}$$

$$\Delta H_{vap} = 2260 \text{ J/g}$$

$$\Delta H_{fus} = 334 \text{ J/g}$$

- A. 42 kJ
- B. 300.5 kJ
- C. 33.4 kJ
- D. 55.4 kJ
- E. 75.4 kJ

Questions 15

The specific heat capacity of an unknown liquid is $0.32 \frac{J}{kg \cdot K}$. The density of the liquid is $0.0321 \frac{g}{mL}$. If a chemist applies 243 J of heat to 300 mL of this liquid starting at $27.1^{\circ}C$, what is the final temperature?

- A. $2700.1^{\circ}C$
- B. $270.1^{\circ}C$
- C. 78882 K
- D. $78882^{\circ}C$

Questions 16

How much heat is needed to raise 5 grams of aluminum by $20^{\circ}C$?

$$C_{aluminum} = 0.900 \frac{J}{g \cdot ^{\circ}C}$$

- A. 45 J
- B. 9 J
- C. 120 J
- D. 90 J

Questions 17

A 20g sample of iron at a temperature of $120^{\circ}C$ is placed into a container of water. There are 300 milliliters of water in the container at a temperature of $30^{\circ}C$.

$$C_{iron} = 0.444 \frac{J}{g \cdot ^{\circ}C}$$

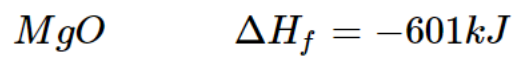
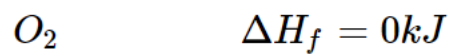
$$C_{water} = 4.184 \frac{J}{g \cdot ^{\circ}C}$$

$$\rho_{water} = 1 \frac{g}{mL}$$

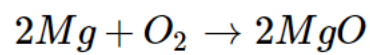
What is the final temperature of the water?

- A. 30.63°C
- B. 34.87°C
- C. 36.0°C
- D. 114.0°C
- E. 32.71°C

Questions 18



What is the change in enthalpy for the following reaction?



- A. $-1202 \frac{kJ}{mol}$
- B. $601 \frac{kJ}{mol}$
- C. $-300.5 \frac{kJ}{mol}$
- D. $1202 \frac{kJ}{mol}$

Answer Key

1. D
2. A
3. C
4. A
5. C
6. D
7. B
8. D
9. A
- 10.D
- 11.D
- 12.B
- 13.A
- 14.E
- 15.D
- 16.D
- 17.A
- 18.A