Table B Physical Constants For Water

1 What is the total amount of heat required to vaporize 1.00 gram of $H_2O(\ell)$ at 100.°C and 1 atmosphere?

(1) 4.18 J (3) 373 J

(2) 334 J (4) 2260 J

2 What is the amount of heat energy released when 50.0 grams of water is cooled from 20.0°C to 10.0°C?

(1) 5.00×10^2 J (3) 1.67×10^5 J

(2) 2.09×10^3 J (4) 1.13×10^6 J

3 A 100.-gram sample of $H_2O(\ell)$ at 22.0°C absorbs 8360 joules of heat. What will be the final temperature of the water?

(1) 18.3°C (3) 25.7°C

(2) 20.0°C (4) 42.0°C

4 At standard pressure, the total amount of heat required to completely vaporize a 100.-gram sample of water at its boiling point is

(1) 2.26×10 J (3) 2.26×10^3 J

(2) 2.26×10^2 J (4) 2.26×10^5 J

5 What is the total amount of heat required to completely melt 347 grams of ice at its melting point?

(1) 334 J (3) 116 000 J

(2) 1450 J (4) 784 000 J

6 What is the amount of heat, in joules, required to increase the temperature of a 49.5-gram sample of water from 22°C to 66°C?

(1) 2.2×10^3 J (3) 9.1×10^3 J

(2) 4.6×10^3 J (4) 1.4×10^4 J

7 What is the amount of heat energy absorbed when 40.0 grams of water is heated from 10.0°C to 30.0°C?

(1) 1.67×10^3 J (3) 5.02×10^3 J

(2) 3.34×10^3 J (4) 2.67×10^5 J

8 What is the amount of heat released by 1.00 gram of liquid water at 0°C when it changes to 1.00 gram of ice at 0°C?

(1) 4.18 J (3) 334 J

(2) 273 J (4) 2260 J

Base your answers to questions 9 on the information below and on your knowledge of chemistry.

Fruit growers in Florida protect oranges when the temperature is near freezing by spraying water on them. It is the freezing of the water that protects the oranges from frost damage. When $H_2O(\ell)$ at 0°C changes to $H_2O(s)$ at 0°C, heat energy is released. This energy helps to prevent the temperature inside the orange from dropping below freezing, which could damage the fruit. After harvesting, oranges can be exposed to ethene gas, C_2H_4, to improve their color.

9 Determine the quantity of heat released when 2.00 grams of $H_2O(\ell)$ freezes at 0°C.

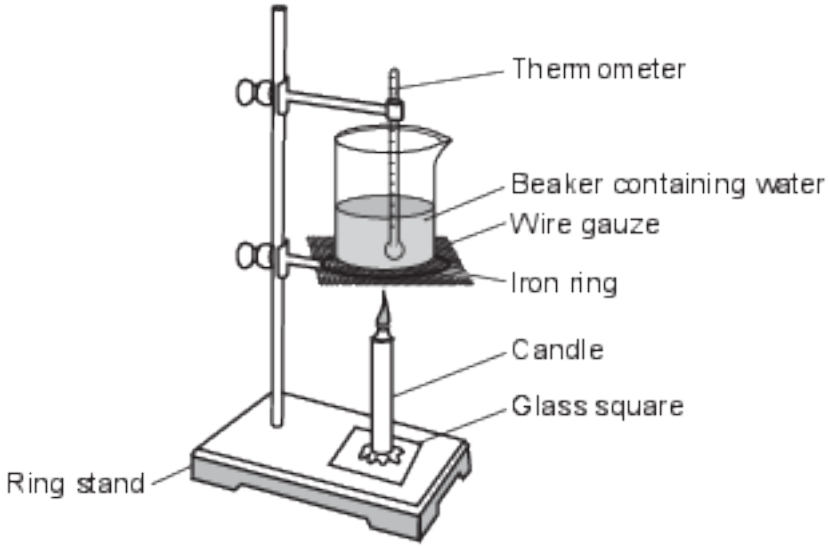
Base your answers to questions 10 on the information below and on your knowledge of chemistry.

A 100.-gram sample of liquid water is heated from 20.0°C to 50.0°C. Enough $KClO_3(s)$ is dissolved in the sample of water at 50.0°C to form a saturated solution.

10 Using the information on Table B, determine the amount of heat absorbed by the water when the water is heated from 20.0°C to 50.0°C.

Base your answers to questions 11 on the information below and on your knowledge of chemistry.

During a laboratory activity, a student heats a beaker containing 120.0 grams of water as shown in the diagram below.



The table below shows the mass of the water and the temperature of the water before and after heating. During this laboratory activity, appropriate safety equipment is used and safety procedures are followed.

Data for Heating Water

Mass of 120.0 mL of water	120.0 g
Temperature of water before heating	23.0°C
Temperature of water after heating 20.0 min	86.0°C

11 Show a numerical setup for calculating the amount of heat, in joules, absorbed by the water in the beaker as a result of the burning candle. [1]

Answer Keys

1 4

2 2

3 4

4 4

5 3

6 3

7 2

8 3

9 Allow 1 credit for 668 J or –668 J.

10 Allow 1 credit for 12 500 J or any value from 12 500 J to 13 000 J, inclusive.

11 Allow 1 credit. Acceptable responses include, but are not limited to:

- (120.0 g)(4.18 J/g•K)(86.0°C - 23.0°C)
- (120.0 g)(4.18 J/g•K)(359 K - 296 K)
- (120)(4.2)(63)