

Simple Heat Exchange: $Q=mc\Delta t$

1. Numerical response question

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Left justify your answer in the boxes provided.

Cody adds 566 J of thermal energy to a sample of water. The water sample changes temperature from 10.5 °C to 15.0 °C. This sample of water has a mass of _____ g.

2. Numerical response question

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Left justify your answer in the boxes provided.

An alcohol burner releases 40.0 kJ of energy as it heats up 300 mL of water at 24.0 °C. What is the final temperature of the water?

3. Numerical response question

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Left justify your answer in the boxes provided.

An alcohol burner releases 25.0 kJ of energy as it heats 100 mL of water. Calculate the temperature change for the water.

4. A Bunsen burner was used to heat 40 mL of water for a period of five minutes. The same burner was used to heat 200 mL of water for a period of five minutes. Both samples of water were at the same initial temperature and no phase changes were observed during the five minute period. Which statement is **false**?

a	The kinetic energy of both samples increased
b	The final temperature of 200 mL sample is lower than the final temperature of the 40 mL sample
c	The 40 mL sample absorbed the same amount of heat as the 200 mL sample
d	The average kinetic energy of the 200 mL sample is greater than that of the 40 mL sample

5. A sample of water is heated and its temperature changes from 22 °C to 56 °C. This change is due to _____.

a	An increase in kinetic energy
b	A decrease in kinetic energy
c	An increase in kinetic energy and a decrease in potential energy
d	A decrease in kinetic energy and a decrease in potential energy

6. The human body contains about 70% water by mass. A body temperature close to 37 °C is vital to survival. The property of water that allows the body to maintain an almost constant temperature despite sudden changes in ambient temperature is its high _____

a	Enthalpy of combustion
b	Molar mass
c	Specific heat capacity
d	Enthalpy of formation

7. The substance that requires the most energy to raise 1.00 g of it by 1.00° C is

a	Copper
b	Aluminium
c	Polystyrene foam cup
d	tin

8. A 75.0 g sample of a liquid molecular solvent requires the removal of 4.36 kJ of heat to decrease its temperature from 35.7 °C to 15.0 °C. The specific heat capacity of this molecular solvent is _____

$$\frac{J}{g^{\circ}C}$$

a	2.98
b	2.58
c	2.81
d	1.15

9. The combustion of a 5.00 g sample of a hydrocarbon fuel in a bomb calorimeter causes 2.35 kg of water to increase in temperature from 70.9 °C to 75.0 °C. The heat produced by this reaction is _____.

a	85.9 J
b	8.07 kJ
c	19.4 kJ

d	40.4 kJ
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10. A student warms 150 g of methanol from 13.6°C to 25.9 °C. Specific heat capacity of methanol is 2.53

$\frac{J}{g^{\circ}C}$. The heat required to warm the methanol is _____ kJ

a	3.64
b	4.67
c	6.03
d	4.50

11. A chemical reaction occurs in a calorimeter. The temperature of the calorimeter decreases from 36.5°C to 19.8°C. If a 1.50 kg sample of water is contained in the calorimeter, _____ kJ of energy was lost by the water.

a	73.5
b	105
c	94.5
d	354

12. What amount of heat is required to change temperature of 18.5 g of Freon-12 (specific heat capacity

$\frac{J}{g^{\circ}C}$) by 25.0 °C?

a	577 J
b	1.94 kJ
c	278 J
d	237 J

13. When 18.2 kJ of energy is added to a 25.0 kg mass of Cu(s), the change of temperature will be an increase of _____ °C

a	1.89
b	2.03
c	3.21
d	8.11

14. When 3.90 kJ of energy is removed from a 8.65 kg mass of Sn(s), the change of temperature will be an decrease of _____ °C.

a	0.446
b	1.17
c	1.99
d	1.68

15. A 25.0 g sample of aluminium metal gains 150 J of heat. The sample will show a(n) _____ in temperature of _____ °C.

a	Decrease	6.69
b	Increase	6.69
c	Decrease	7.60
d	Increase	7.60

16. A sample of tin metal undergoes a temperature change of 8.20 °C when 300 J of heat is added. The mass of the tin sample is _____ g

a	161
b	95.0
c	40.8
d	36.2

17. The burning of 12.0 g of urea, $\text{CO}(\text{NH}_2)_2$, raised the temperature of 1.00 L of water by 30.0 °C

The heat released by the combustion of this sample of urea is _____ kJ

a	151
b	629
c	126
d	25.1

18. A 10 g sample of tin metal is heated from 20°C to 80°C. The amount of energy gained by this system is _____ kJ of thermal energy.

a	0.54
b	0.23
c	0.16
d	0.14

Answers:

1. 30.0
2. 55.8
3. 59.7
4. D
5. A
6. C
7. C
8. C
9. D
10. B
11. B
12. C
13. A
14. C
15. B
16. A
17. C
18. D