Simple Heat Exchange: Q=mcΔt

1. **Numerical response question**

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Left justify your answer in the boxes provided.

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| Cody adds 566 J of thermal energy to a sample of water. The water sample changes temperature from 10.5 oC to 15.0 oC. This sample of water has a mass of \_\_\_\_\_\_\_\_ g. |

1. **Numerical response question**

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Left justify your answer in the boxes provided.

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

1. **Numerical response question**

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Left justify your answer in the boxes provided.

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

1. 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**?

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| 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 |

1. A sample of water is heated and its temperature changes from 22 oC to 56 oC. This change is due to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

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| --- | --- |
| 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 |

1. The human body contains about 70% water by mass. A body temperature close to 37 o 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 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

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

|  |  |
| --- | --- |
| a | Copper |
| b | Aluminium |
| c | Polystyrene foam cup |
| d | tin |

1. 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 oC to 15.0 oC. The specific heat capacity of this molecular solvent is \_\_\_\_\_\_

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| --- | --- |
| a | 2.98 |
| b | 2.58 |
| c | 2.81 |
| d | 1.15 |

1. 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 oC to 75.0 oC. The heat produced by this reaction is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

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| a | 85.9 J |
| b | 8.07 kJ |
| c | 19.4 kJ |
| d | 40.4 kJ |

1. A student warms 150 g of methanol from 13.6oC to 25.9 oC. Specific heat capacity of methanol is 2.53 . The heat required to warm the methanol is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ kJ

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| a | 3.64 |
| b | 4.67 |
| c | 6.03 |
| d | 4.50 |

1. A chemical reaction occurs in a calorimeter. The temperature of the calorimeter decreases from 36.5oC to 19.8oC. If a 1.50 kg sample of water is contained in the calorimeter,\_\_\_\_\_\_\_ kJ of energy was lost by the water.

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| a | 73.5 |
| b | 105 |
| c | 94.5 |
| d | 354 |

1. What amount of heat is required to change temperature of 18.5 g of Freon-12 (specific heat capacity 0.60  ) by 25.0 oC?

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

1. 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 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ oC

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| a | 1.89 |
| b | 2.03 |
| c | 3.21 |
| d | 8.11 |

1. 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 \_\_\_\_\_\_\_\_\_\_\_\_\_ oC.

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| a | 0.446 |
| b | 1.17 |
| c | 1.99 |
| d | 1.68 |

1. A 25.0 g sample of aluminium metal gains 150 J of heat. The sample will show a(n) \_\_\_\_\_\_\_\_\_\_\_ in temperature of \_\_\_\_\_\_\_\_oC.

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

1. A sample of tin metal undergoes a temperature change of 8.20 o C when 300 J of heat is added. The mass of the tin sample is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ g

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| a | 161 |
| b | 95.0 |
| c | 40.8 |
| d | 36.2 |

1. The burning of 12.0 g of urea, CO(NH2)2 ,  raised the temperature of 1.00 L of water by 30.0 oC

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

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| a | 151 |
| b | 629 |
| c | 126 |
| d | 25.1 |

1. A 10 g sample of tin metal is heated from 20oC to 80oC. The amount of energy gained by this system is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ kJ of thermal energy.

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| 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