# Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Hour: \_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_

# Chemistry: *Calorimetry Problems 1*

*Solve the following problems. As always, include work and show the units to ensure full credit.*

1. A 445 g sample of ice at –58oC is heated until its temperature reaches –29oC. Find the change in heat content of the system.

2. A 152 g sample of ice at –37oC is heated until it turns into liquid water at 0oC. Find the change in heat content of the system.

3. A 218 g sample of steam at 121oC is cooled to ice at –14oC. Find the change in heat content of the system.

4. If 161 g of water at 85oC is cooled to ice at 0oC, find the change in heat content of the system.

5. A 79 g sample of water at 21oC is heated until it becomes steam with a temperature of 143oC. Find the change in heat content of the system.

6. If a 348 g sample of steam at 127oC is cooled to 103oC, find the change in heat content of the system.

7. In going from ice at –34oC to steam at 138oC, a sample of water absorbs 1.41 x 105 J. Find the mass of the sample.

Answers: 1. 2.68 x 104 J 2. 6.23 x 104 J 3. –6.71 x 105 J 4. –1.11 x 105 J 5. 2.11 x 105 J 6. –1.71 x 104 J 7. 44.7 g

*Find the energy change of the system required to change…*

8. …150 g of ice at –15oC to ice at –63oC.

9. …200 g of water at 4oC to water at 88oC.

10. …54 g of steam at 150oC to steam at 112oC.

11. …18 g of water at 0oC to ice at 0oC.

12. …215 g of water at 100oC to steam at 100oC.

13. …44 g of ice at –13oC to water at 58oC.

14. …330 g of steam at 100oC to ice at 0oC.

15. …1200 g of steam at 118oC to water at 100oC.

16. …60 g of water at 43oC to steam at 140oC.

17. …400 g of ice at –38oC to steam at 160oC.

Answers: 1. –1.50 x 104 J 3. –4.19 x 103 J 5. 4.85 x 105 J 7. –9.92 x 105 J 9. 1.55 x 105 J

2. 7.02 x 104 J 4. –5.99 x 103 J 6. 2.65 x 104 J 8. –2.75 x 106 J 10. 1.28 x 106 J

# Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Hour: \_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_

# Chemistry: *Calorimetry Problems 2*

*Solve the following problems. As always, include work and show the units to ensure full credit.*

1. If 20 g of silver at 350oC are mixed with 200 g of water at 30oC, find the final temperature of the system.

2. If 26 g of water at 18oC are mixed with 49 g of water at 70oC, find the final temperature of the system.

3. If 84 g of water at 22oC are mixed with 150 g of ethanol at 88oC, find the final temperature of the system.

4. If 24 g of sodium chloride at 25oC are mixed with 272 g of mercury at 50oC, find the final temperature.

5. 240 g of water (initially at 20oC) are mixed with an unknown mass of iron (initially at 500oC). When thermal equilibrium is reached, the system has a temperature of 42oC. Find the mass of the iron.

6. 135 g of aluminum (initially at 400oC) are mixed with an unknown mass of water (initially at 25oC). When thermal equilibrium is reached, the system has a temperature of 80oC. Find the mass of the water.

7. In the lab, an experimenter mixes 75.0 g of water (initially at 30oC) with 83.8 g of a solid metal (initially at 600oC). At thermal equilibrium, he measures a final temperature of 50.0oC. What metal did the experimenter probably use?

Answers: 1. 31.8oC 2. 52.0oC 3. 55.7oC 4. 41.1oC 5. 107.3 g 6. 168.6 g 7. tungsten

8. A 97 g sample of gold at 785oC is dropped into 323 g of water, which has an initial temperature of 15oC. If gold has a specific heat of 0.129 J/g.oC, what is the final temperature of the mixture? Assume that the gold experiences no change in its state of matter.

9. If 59 g of water at 13oC are mixed with 87 g of water at 72oC, find the final temperature of the system.

10. A 38 g sample of ice at –11oC is placed into 214 g of water at 56oC. Find the system’s final temperature.

11. 25 g of 116oC steam are bubbled into 0.2384 kg of water at 8oC. Find the final temperature of the system.

12. A 322 g sample of lead (specific heat = 0.138 J/goC) is placed into 264 g of water at 25oC. If the system’s final temperature is 46oC, what was the initial temperature of the lead?

13. A sample of ice at –12oC is placed into 68 g of water at 85oC. If the final temperature of the system is 24oC, what was the mass of the ice?

Answers: 8. 22.1oC 9. 48.2oC 10. 34.7oC 11. 68.7oC 12. 568oC 13. 37.8 g