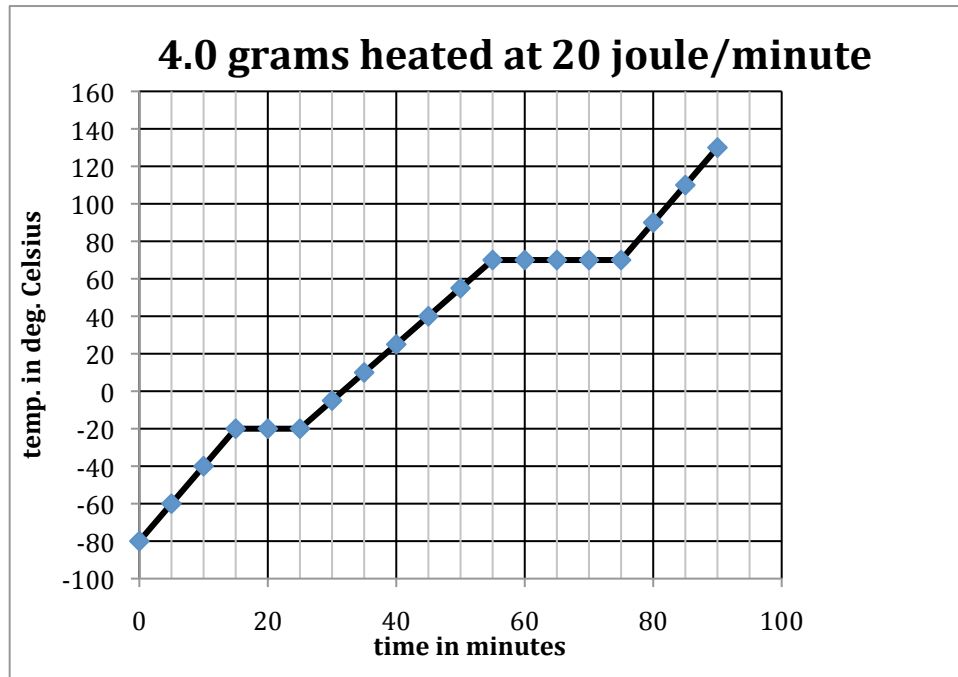


Name \_\_\_\_\_ "Curves ahead"



Base your answers to questions 1 to 8 on the heating curve of a pure substance, shown above.

- \_\_\_\_\_ 1. How long does it take to heat this substance in the liquid state, from its melting point to its boiling point? A) 15 minutes B) 10 minutes C) 20 minutes D) 30 minutes
- \_\_\_\_\_ 2. The melting point of the substance is A)  $-80^{\circ}$  B)  $-20^{\circ}$  C)  $0^{\circ}$  D)  $70^{\circ}$
- \_\_\_\_\_ 3. The freezing point of the substance is A)  $-80^{\circ}$  B)  $-20^{\circ}$  C)  $0^{\circ}$  D)  $70^{\circ}$
- \_\_\_\_\_ 4. How long does it take to melt the entire 4.0 grams of solid, at the melting point? A) 4 minutes B) 10 minutes C) 25 minutes D) 55 minutes
- \_\_\_\_\_ 5. How much heat is needed to **boil** the entire 4.0 gram sample of liquid, at its boiling point? A) 400 joules B) 160 joules C) 200 joules D) 20 joules
- \_\_\_\_\_ 6. At the same rate of heating, how long would it take to boil an 8.0 gram sample, at its boiling point? A) 10 minutes B) 20 minutes C) 40 minutes D) 80 minutes
- \_\_\_\_\_ 7. At a temperature of  $0^{\circ}\text{C}$ , this substance is best described as  
A) solid and liquid together B) solid only C) liquid only  
D) liquid and gas together

- \_\_\_\_\_8. Between the 60 minute and 70 minute marks on this graph, the average kinetic energy of the substance A) increases B) decreases C) remains the same
- \_\_\_\_\_9. True substances include A) elements only B) elements and compounds only C) compounds only D) elements, compounds, and mixtures
- \_\_\_\_\_10. When grey zinc and yellow sulfur are heated together, there is a bright flash of light, and a white substance appears. The best description of this process is A) a physical change that forms a compound B) a physical change that forms a mixture C) a chemical change that forms a compound D) a chemical change that forms a mixture
- \_\_\_\_\_11. Which is an element? A) brass B) alcohol C) tin D) air
- \_\_\_\_\_12. Which is a mixture? A) carbon dioxide B) lead C) air D) water
- \_\_\_\_\_13. Which is a compound? A) iodine B) gold C) NaCl D) O<sub>2</sub>
- \_\_\_\_\_14. How many mL are there in 0.250 liters? A) 25 B) 250. C) 2.50 x 10<sup>4</sup> D) 2.50 x 10<sup>-4</sup>
- \_\_\_\_\_15. 3.40 x 10<sup>-3</sup> can be written, maintaining the same number of significant figures, as A) 0.034 B) 0.0340 C) 0.0034 D) 0.00340
- \_\_\_\_\_16. Which is an exothermic, **physical** change? A) boiling water B) freezing water C) burning paper D) evaporating alcohol

Numerical Fill-in items. Include units in your answers.

- \_\_\_\_\_17. How many grams of ice can be melted using 1250 joules of heat?
- \_\_\_\_\_18. How much heat is needed to boil 0.200 grams of water?
- \_\_\_\_\_19. How much heat is needed to raise the temperature of 10.0 grams of water from 20°C to 50°C?
- \_\_\_\_\_20. Convert a temperature of 37° C to Kelvin
- \_\_\_\_\_21. When the same amount of heat is applied to 10.0 grams of aluminum, and to 10.0 grams of lead, there is a much larger change in temperature in the **lead**. From this information we can tell that  
A) lead has a higher specific heat than aluminum  
B) lead has a smaller specific heat than aluminum C) lead has a higher melting point than aluminum D) lead has a lower melting point than aluminum
- \_\_\_\_\_22. How many significant figures are there in the number 0.0065010?  
A) 4 B) 5 C) 7 D) 8

Problems: You must show work!

I. A student attempts to measure the heat of fusion,  $\Delta H_f$ , of ice and gets the result 382 joules/gram. Find the % error in the student's experiment.

II. An endothermic reaction occurs in 200. grams of water, initially at a temperature of 50.0°C. The reaction absorbs 25080 joules from the water.

A. What is the **change** in temperature of the water?

B. What is the **new** temperature of the water?

Extra Credit:

I. What is the specific heat of the liquid that is shown in the heating curve on page 1 ?

II. A reaction produces 14100 joules of heat, which is transferred to cup containing 20.0 grams of water, initially at 25°C.

A. What is the final temperature of the water?

B. How much water remains in the cup?

(note that part B contains a hint as to the answer to part A)