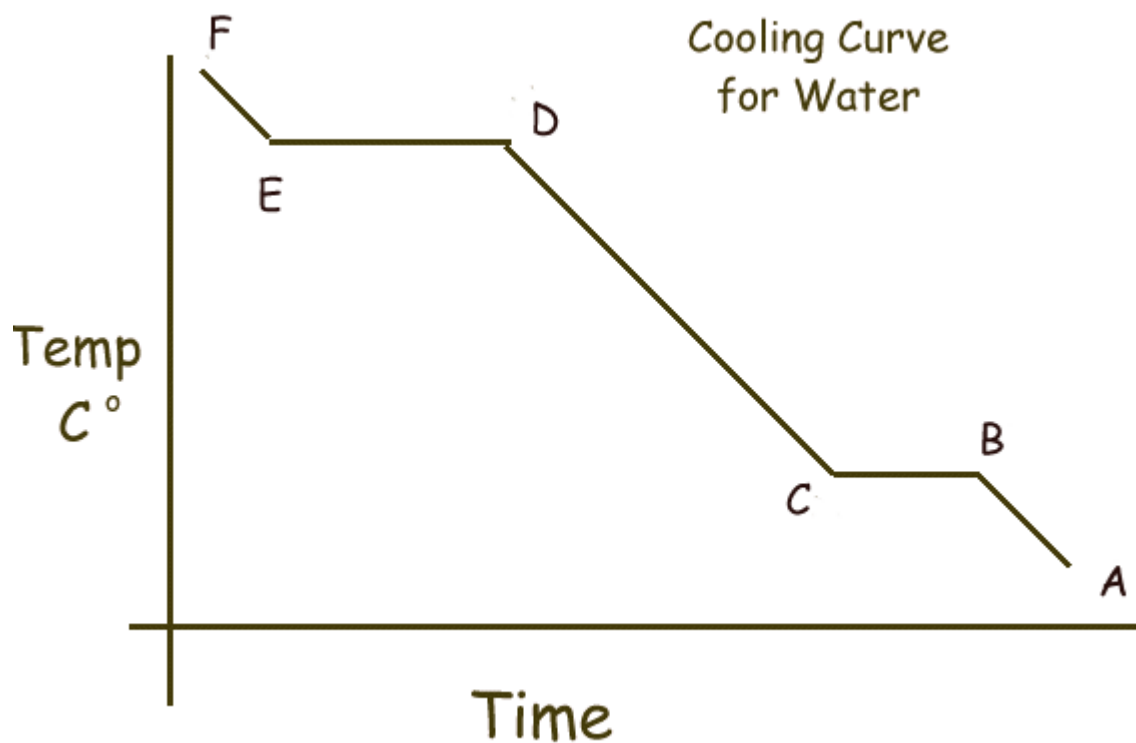


Practice Test for Thermochemistry

Show all work, this is not just about answers, it's about how you think.

1. Calculate the number of joules of energy are needed to melt a 10.0 pound block of ice at zero degrees centigrade into water at the same temperature. (don't forget that 1 pound = 454 grams).
2. Convert the number of joules you just calculated in question #1 into kilo-joules, calories, and Calories.
3. Calculate how many joules of energy are needed to vaporize 4.54 kg of liquid water at 100°C to steam at the same temperature. (don't forget that 1 kg = 1000 grams).
4. Convert the number of joules you just calculated in question #3 into kilo-joules, calories, and Calories.
5. Calculate how much energy in joules is required to warm 73.2 g pure water at 17.0°C to 29.5°C.
6. Convert the number of joules you just calculated in question #5 into kilo-joules, calories, and Calories.
7. Which of each of these pairs of reactions is MOST ENDOTHERMIC?
 - A. One mole C_2H_2 synthesizes or two moles nitrogen monoxide synthesizes
 - B. One mole NaCl ionizes in water or one mole ammonium chloride does the same
 - C. Two moles NO_2 synthesizes or two moles KNO_3 ionizes in water
8. If you dissolve 120. grams NaOH solid into 1.0 liters of water which is at 11.0°C, how much energy is released (in joules)?
9. Using the info in question number 8, if you did dissolve that NaOH into the water, what would the final temperature of the water be?
10. How much energy is required to cool 712 grams of steam at 101.0°C to ice at -1.25°C? (Note: $C_{\text{steam}} = 1.7 \text{ J/g}\cdot^\circ\text{C}$, while the $C_{\text{ice}} = 2.10 \text{ J/g}\cdot^\circ\text{C}$) This is a **5** step Thermochemistry problem, which exceeds the regents demands, but you are from Vestal, so you can do this. Add the total joules together for one final answer.
11. You synthesize 1250 grams of aluminum oxide. How much energy is released, or absorbed?
12. At which temperature does copper have the most kinetic energy?
 - A. 225 K
 - B. 272 K
 - C. 0°C
 - D. 5°C
13. You can skip this one, take a breath, note that your body warms the air now in your lungs in a measurable way! Gas Chemistry is coming soon to a theatre near you!



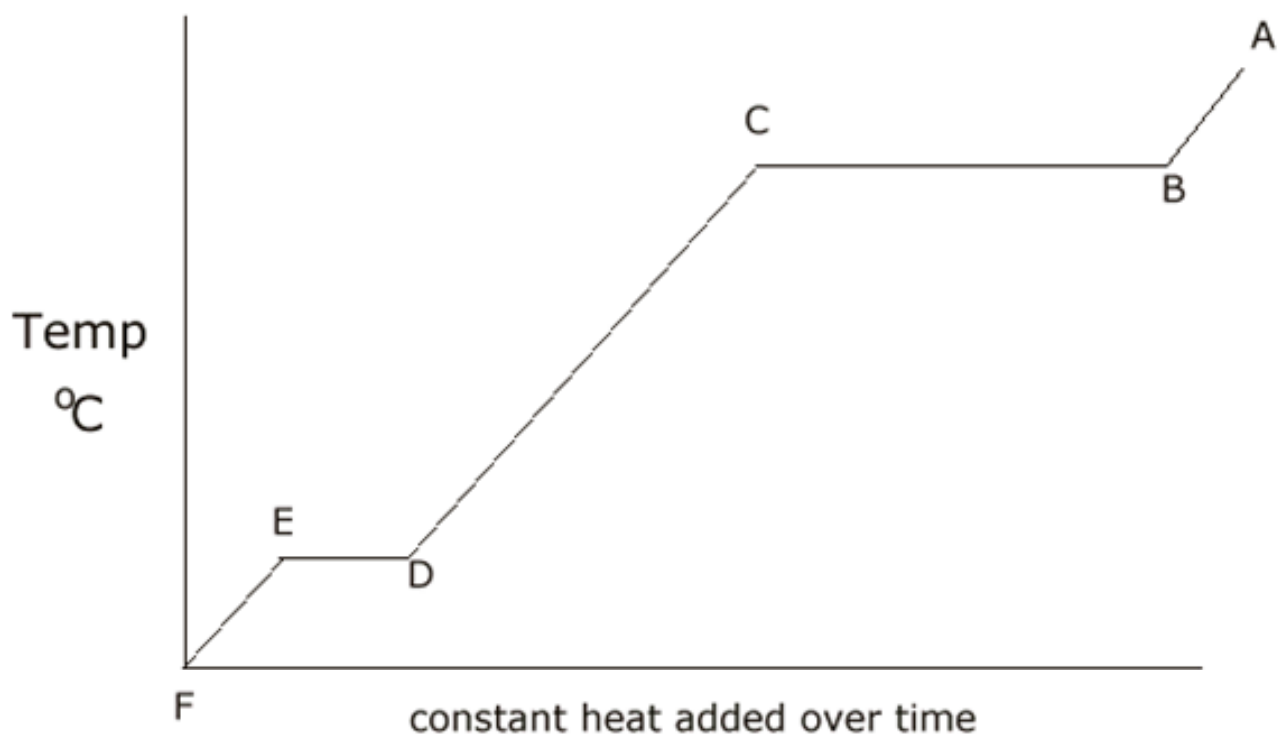
On this cooling curve for water, heat energy is being removed at a constant rate.

14. What is the temperature at CB? Does this temperature have a name?
15. What is the temperature at ED? Does this temperature have a name?

16. If you were doing Thermochemistry problems, what formulas would you use for each segment listed in this chart? What unit for H₂O would you use?

segment	formula	water unit
FE		
ED		
DC		
CB		
BA		

Heating Curve for Water



On this heating curve for water, heat energy is being added at a constant rate.

17. What is the temperature at CB? Does this temperature have a name?

18. What is the temperature at ED? Does this temperature have a name?

19. If you were doing Thermochemistry problems, what formulas would you use for each segment listed in this chart? What unit for H₂O would you use?

segment	formula	water unit
FE		
ED		
DC		
CB		
BA		

20. How much energy is released from 35.0 grams of copper ($C = 0.39 \text{ J/g}\cdot^\circ\text{C}$) if it cools from 93.5 to 18.2 degrees centigrade?
21. 52.3 g Hg changes temperature from 12.00°C to 33.25°C when 155.6 joules of heat are added. Calculate the specific heat capacity for mercury.
22. On both the heating curve & cooling curve, why is the line segment at 100°C so much longer than at 0°C? Use the numbers 334 and 2260 (with units) in your answer. How much difference is there between the two segments?
23. If $\text{O}_{2(\text{G})} \longrightarrow \text{O}_{(\text{G})} + \text{O}_{(\text{G})}$
Which best describes the process of this chemical reaction?
- A. energy is absorbed when a bond is broken
 - B. energy is absorbed when a bond forms
 - C. energy is released when a bond is broken
 - D. energy is released when a bond is formed
24. If $\text{I} + \text{I} \longrightarrow \text{I}_2$
Which statement best describes this chemical process?
- A. a bond forms and energy is absorbed
 - B. a bond forms and energy is released
 - C. a bond breaks and energy is absorbed
 - D. a bond breaks and energy is released
25. In a reaction on Table I you find that $\Delta H = +182.6 \text{ kJ}$. This reaction is
- A. endothermic, the reaction absorbs energy
 - B. endothermic, the reaction releases energy
 - C. exothermic, the reaction absorbs energy
 - D. exothermic, the reaction releases energy
26. In a different reaction you find that $\Delta H = -571.6 \text{ kJ}$. This reaction is
- A. endothermic, the reaction absorbs energy
 - B. endothermic, the reaction releases energy
 - C. exothermic, the reaction absorbs energy
 - D. exothermic, the reaction releases energy