

AP Chemistry Daily Videos: 6.4 Heat Capacity and Calorimetry

Video #1

1. What is Heat Capacity? Discuss a general description and a description with units.
2. What the difference between specific heat and molar heat capacity? What do you need to be careful with and watch for during this unit?
3. What happens if the heat capacity increases?
4. Pause the video at 2:30 to read and attempt the problem, then evaluate how you did and identify any errors.

Metal	Heat Capacity ($J g^{-1}K^{-1}$)	If equal masses were used, which metal can absorb the most heat before the temperature would increase by $1^{\circ}C$? Justify your answer.
Al	0.897	
Fe	0.412	
Pb	0.129	
Cd	0.231	

CLAIM:	
EVIDENCE:	
REASONING:	

5. What is the heat transfer equation we will use during our calculations? (Include the units for each piece in the equation.)
6. How do we compare heat lost to heat gained. What does the difference in signs tell us? How does this relate to the First Law of Thermodynamics?
7. When we look at the heat transfer equation for the salt dissolving in water, what is the mass made up of? Explain.

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Video #2

1. Pause the video at 0:52 to read and attempt the problem, then evaluate how you did and identify any errors. (You only need to list the specific measurements required, but I would also recommend listing necessary equations you may need!)



(a) The equipment shown above is provided so that the student can determine the value of the molar heat of solution for calcium chloride (CaCl_2). Knowing that the specific heat of the solution is $4.18 \text{ J}/(\text{g}\cdot^\circ\text{C})$, list the specific measurements that are required to be made during the experiment.

2. Pause the video at 2:35 to read and attempt the problem, then evaluate how you did and identify any errors.

Use the data in the table to answer the following questions.

Mass calorimeter (g)	11.31
Mass calorimeter and water (g)	56.57
Mass calorimeter, water, and salt (g)	61.54
Initial temperature ($^\circ\text{C}$)	20.0
Final temperature ($^\circ\text{C}$)	36.5

- (b) Is the dissolving process exothermic or endothermic? Justify using only the data.
- (c) Calculate the mass of solution used.
- (d) Determine the change in temperature.
- (e) Calculate the moles of CaCl_2 dissolved. The molar mass of CaCl_2 110.98 g/mol.
- (f) Calculate the molar heat of solution in J/mol.

3. Pause the video at 4:57 to read and attempt the problem, then evaluate how you did and identify any errors.

A 27.00 g sample of an unknown metal was heated until 420 J of heat had been added. The graph to the right shows the data collected during the experiment.

(a) Determine the temperature change of the metal.

(b) Determine the specific heat capacity of the metal. Include units in your answer.

