CHAPTER 5 SUMMARY

MAKE A SUMMARY

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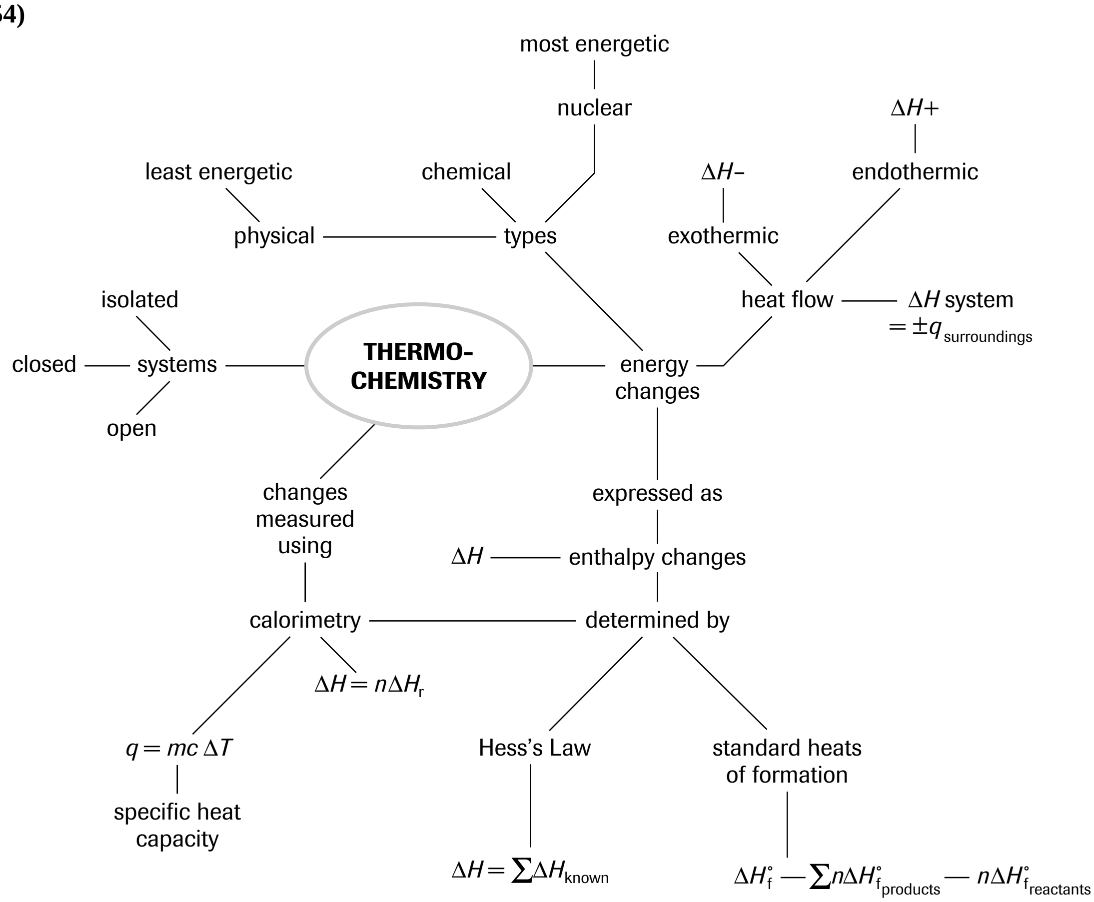

CHAPTER 5 SELF-QUIZ

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1. False: Nuclear changes generally *produce* more energy than chemical changes.
2. False: In exothermic reactions, the reactants have more *potential* energy than the products.
3. True
4. False: In endothermic reactions, the heat term is written on the *left* side of the equation.
5. True
6. True
7. False: Burning of gasoline is an example of an *exothermic* physical change.
8. True
9. False: Specific heat capacity is the amount of heat required to change *one gram* through 1°C.
10. True
11. (c)
12. (b)
13. (e)
14. (c)
15. (c)
16. (c)
17. (e)
18. (c)

Worked Answers:

13. $\Delta H_{\text{vap (methanol)}} = 32.0 \frac{\cancel{g}}{\text{mol}} \times 1.18 \frac{\text{kJ}}{\cancel{g}} = 37.8 \text{ kJ/mol}$ **(e)**

16. $\frac{120 \text{ g}}{(2 \text{ mol} \times 39.1 \text{ g/mol})} \times 160 \text{ kJ} = 246 \text{ kJ}$ **(c)**

CHAPTER 5 REVIEW

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Understanding Concepts

1.

Physical	Chemical	Nuclear
(a) change in state or change in arrangement of atoms in molecules	change in arrangement of atoms in molecules	change in arrangement of nuclei
(b) about 10 kJ/mol	about 10^3 kJ/mol	about 10^{11} kJ/mol
(c) freezing water or melting butter	burning gasoline or cooking food	uranium decay or hydrogen fusion in Sun

2. $c = \frac{q}{m\Delta T}$

$= \frac{16\,000 \text{ J}}{938 \text{ g} \times (35.0°\text{C} - 19.5°\text{C})}$

$c = 1.10 \text{ J/g}\bullet°\text{C}$

The specific heat capacity of the brick is 1.10 J/g•ºC.

3. We assume that no heat is lost to the environment, negligible heat is lost to the calorimeter materials unless specific information is given about the container, and dilute aqueous solutions have density and specific heat capacity of water.

4. $q_{\text{water}} = mc\Delta T$

$= 500 \text{ g} \times 4.18 \text{ J/g}\bullet°\text{C} \times (80°\text{C} - 20°\text{C})$

$q_{\text{water}} = 1.25 \times 10^5 \text{ J}$

$q_{\text{copper}} = mc\Delta T$

$= 2000 \text{ g} \times 0.385 \text{ J/g}\bullet°\text{C} \times (80°\text{C} - 20°\text{C})$

$q_{\text{copper}} = 4.6 \times 10^4 \text{ J}$

$q_{\text{total}} = q_{\text{water}} + q_{\text{copper}}$

$q_{\text{total}} = 1.7 \times 10^5 \text{ J, or } 170 \text{ kJ}$

170 kJ of heat is required.

5. $m_{\text{water}} = d \times V$

$= 1.00 \text{ g/mL} \times 200\,000 \text{ g}$

$m_{\text{water}} = 2.00 \times 10^5 \text{ g}$

$q_{\text{water}} = mc\Delta T$

$= 2.00 \times 10^5 \text{ g} \times 4.18 \text{ J/g}\bullet°\text{C} \times (65°\text{C} - 20°\text{C})$

$q_{\text{water}} = 3.76 \times 10^4 \text{ kJ}$