AP CHEMISTRY CHAPTER 6 PRACTICE TEST

1. For which chemical equation will the heat of reaction ΔHo, correspond to the molar heat of formation of liquid water?
2. H2(g) + 1/2O2(g) → H2O(l)
3. H(g) + H(g) +O(g) → H2O(l)
4. 2H2(g) + O2(g) → 2H2O(l)
5. H+(aq) + OH-(aq) → H2O(l)
6. For the process H2(g) + 1/2O2(g) → H2O(l) , ΔH = -247 kJ. The numeric value of

 -242 kJ represents heat energy that is

1. absorbed by the reaction
2. required to break the H-H and O=O bond
3. stored as potential energy
4. released by the reaction
5. An 11.0 g sample of propane is placed in a bomb calorimeter with excess oxygen and is ignited. The initial temperature of the calorimeter is 25.00oC and its total heat capacity is 97.1 kJ/oC. The reaction raises the temperature of the calorimeter is 30.75oC. The approximate molar heat of combustion for propane is
6. -50.6 kJ/mol
7. -558 kJ/mol
8. -2.24 x 103 kJ/mol
9. -1.20 x 104 kJ/mol
10. What is the change in enthalpy at 25oC and 1 atm for the production of 3.00 mol SnO(s)?

Sn(s) + SnO2(s) → 2SnO(s) ΔHo = 16.2 kJ

1. 24.3 kJ
2. 16.2 kJ
3. 5.40 kJ
4. -16.2 kJ
5. -24.3 kJ
6. How much heat is liberated at constant pressure if 0.896 g of calcium carbonate reacts with 92.3 mL of 0.584 M hydrochloric acid?

CaCO3(s) + 2HCl(aq) → CaCl2(aq) + H2O(l) + CO2(g) ΔHo = -15.2 kJ

1. -0.410 kJ
2. -8.88 kJ
3. -13.6 kJ
4. -0.546 kJ
5. -0.136 kJ
6. The quantity of heat required to raise the temperature of 1g of a substance by 1o is the sample’s
7. enthalpy
8. calorimetry
9. work
10. specific heat
11. heat
12. Two metals of equal mass with different specific heats are subjected to the same amount of heat. Which undergoes the smaller change in temperature?
13. both undergo the same change in temperature
14. you need to know the initial temperatures of the metals
15. you need to know which metals your have
16. the metal with the higher specific heat undergoes the smaller temperature change
17. the metal with the lower specific heat undergoes the smaller temperature change
18. Using the following data, calculate the standard enthalpy of reaction for the coal gasification process

2C(s) + 2H2O(l) → CH4(g) + CO2(g)

C(s) + H2O(g) → CO(g) + H2(g) ΔHo = +131.3 kJ

CO(g) + H2O(g) → CO2(g) + H2(g) ΔHo = -41.2 kJ

CO(g) + 3H2(g) → CH4(g) + H2O(g) ΔHo = -206.1 kJ

1. 378.6 kJ
2. -378.6 kJ
3. -157.2 kJ
4. -116.0 kJ
5. +15.3 kJ
6. Which of the following has a standard enthalpy of formation value of zero at 25oC?
7. N2(l)
8. N2(s)
9. N(s)
10. N(g)
11. N2(g)
12. From the following information, determine the ΔHfo of malonic acid, CH2(COOH)2(s).

CH2(COOH)2(s) + 2O2(g) → 3CO2(g) + 2H2O(l) ΔHo = -861.0 kJ

|  |  |
| --- | --- |
| Substance | ΔHfo (kJ/mol) |
| CO2(g) | -393.5 |
| H2O(l) | -285.8 |

1. -891.1 kJ
2. -1540.3 kJ
3. -2613.1 kJ
4. 2613.1 kJ
5. 891.1 kJ
6. Consider the balanced thermochemical equation below. According to this balanced equation, one can conclude that

2H2S(g) + 3O2(g) → 2SO2(g) + 2H2O(g)  ΔH = -1037 kJ

1. 1037 kJ of heat is absorbed from the surroundings by reaction of 1 mole of O2
2. 1037 kJ of heat is absorbed from the surroundings by reaction of 3 mole of O2
3. 1037 kJ of heat is released to the surroundings by reaction of 1 mole of O2
4. 1037 kJ of heat is released to the surroundings by reaction of 3 mole of O2
5. Calculate the work for the expansion of H2O(g) from 2.0 to 3.5 liters against a pressure of 2.0 atm.
6. 1.5 liter-atm
7. 3.0 liter-atm
8. 0
9. -1.5 liter-atm
10. -3.0 liter-atm
11. A coffee-cup calorimeter contains 150 g of water at 24.6oC. A 110-g block of molybdenum metal is heated to 100.0oC and then placed in the water in the calorimeter. The contents of the calorimeter come to an average temperature of 28.0oC. What is the specific heat of the molybdenum metal? Assume that no energy is lost to the calorimeter or the surroundings.
12. 0.27 J/g .oC
13. 0.064 J/g . oC
14. 30. J/g . oC
15. 15 J/g . oC
16. 0.81 J/g . oC
17. What is the specific heat capacity of mercury if it requires 167 J to change the temperature of 15.0 g of mercury from 25.0 oC to 33.0oC?
18. 6.92 x 10-3 J/g .oC
19. 1.12 x 10-2 J/g .oC
20. 0.445 J/g .oC
21. 1.39 J/g .oC
22. 313 J/g .oC
23. The first law of thermodynamics states
24. heat is a flow of energy due to a temperature difference
25. in an exothermic process, heat flows out of the system
26. energy cannot be transferred from one form to another
27. the energy of the universe is constant
28. none of these
29. Consider the hydrocarbon pentane, C5H12 (molar mass 72.15 g)
30. Write the balanced equation for the combustion of pentane to yield carbon dioxide and water. (5)
31. What volume of dry carbon dioxide, measured at 25oC and 785 mm Hg, will result from the complete combustion of 2.50 g pentane? (5)
32. The complete combustion of 5.00 g pentane releases 243 kJ of heat. On the basis of this information, calculate the value of ΔH for the complete combustion of one mole of pentane. (5)
33. 30.0 mL of pure water at 280. K is mixed with 50.0 mL of pure water at 330. K. What is the final temperature of the mixture in K? Specific heat capacity of water is 4.18 J/g . K. You must show work for credit. (+5)

ANSWERS:

1. A
2. D
3. C
4. A
5. E
6. D
7. D
8. E
9. E
10. A
11. D
12. E
13. A
14. D
15. D
16. a. C5H12 + 8O2 → 5CO2 + 6H2O

b. 4.11 L CO2

c. -3510 kJ/mol

 17. 311K