Chemistry 141 Name Key

Cary Willard

Quiz 5a (20 points) October 8, 2009

All work must be show to receive credit. Remember, significant figures are important!

|  |  |  |
| --- | --- | --- |
| Specific heat ice | 2.06 J/g oC | 37.1 J/mol oC |
| Specific heat water | 4.184 J/g oC | 75.4 J/mol oC |
| Specific heat steam | 2.0 J/g oC | 36 J/mol oC |
| Heat of fusion (water) | 333 J/g | 6.01 kJ/mol |
| Heat of vaporization (water) | 2260 J/g | 40.7 kJ/mol |

1. (10 points) Steam at a temperature of 110oC is bubbled through cool water with a temperature of 25oC. If 350 grams of water is heated to 72.3oC by the steam, what mass of steam was added to the water. (All of the steam condenses into the water.)

Heat lost = heat gained

Heat lost steam cooling 110-100oC + heat lost steam condensing + heat lost water cooling 100-72.3oC = heat gained water warming 25-72.3oC

Heat lost steam cooling

Heat lost steam condensing

Heat lost hot water cooling

Heat gained cool water warming

1. (10 points) When a 15.3 gram sample of a acetylene, C2H2, is burned with excess oxygen in a bomb calorimeter the temperature increases from 21.2oC to 84.6oC. The calorimeter contains 750.0 g of water and has a calorimeter constant of 1.20 kJ/K.
   1. Calculate the q of the reaction. (Remember sign conventions!)

Heat lost = heat gained

Heat lost reaction = heat gained water warming + heat gained calorimeter warming

Heat gained water warming

Heat gained calorimeter warming

Heat lost reaction = 199000J + 76200 J = 275000 J or 275 J

qreaction = −275 kJ

* 1. Calculate q in kJ/g for the reaction.
  2. Calculate H in kJ/mol for the reaction.

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Quiz 5b (20 points) October 8, 2009

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|  |  |  |
| --- | --- | --- |
| Specific heat ice | 2.06 J/g oC | 37.1 J/mol oC |
| Specific heat water | 4.184 J/g oC | 75.4 J/mol oC |
| Specific heat steam | 2.0 J/g oC | 36 J/mol oC |
| Heat of fusion (water) | 333 J/g | 6.01 kJ/mol |
| Heat of vaporization (water) | 2260 J/g | 40.7 kJ/mol |

1. (10 points) Steam at a temperature of 110oC is bubbled through cool water with a temperature of 25oC. If 450 grams of water is heated to 62.3oC by the steam, what mass of steam added to the water. (All of the steam condenses into the water.)

Heat lost = heat gained

Heat lost steam cooling 110-100oC + heat lost steam condensing + heat lost water cooling 100-72.3oC = heat gained water warming 25-72.3oC

Heat lost steam cooling

Heat lost steam condensing

Heat lost hot water cooling

Heat gained cool water warming

1. (10 points) When a 15.3 gram sample of a ethane, C2H6, is burned with excess oxygen in a bomb calorimeter the temperature increases from 21.2oC to 84.6oC. The calorimeter contains 850.0 g of water and has a calorimeter constant of 0.790 kJ/K.
   1. Calculate the q of the reaction. (Remember sign conventions!)

Heat lost = heat gained

Heat lost reaction = heat gained water warming + heat gained calorimeter warming

Heat gained water warming

Heat gained calorimeter warming

Heat lost reaction = 226000J + 50200 J = 276000 J or 276 J

qreaction = −276 kJ

1. Calculate q in kJ/g for the reaction.
2. Calculate H in kJ/mol for the reaction.