SI Worksheet

4/24/22

Agenda:

Worksheet

**Chapter 7: Thermochemistry**

1. Calculate the change in the internal energy of a system if 300J of heat energy is absorbed by the system and if 400J of work is done on the system.
2. A sample of unknown metal with a mass of 192 g heated to a temperature of 100 °C was immersed into a brass calorimeter with a mass of 0.128 kg containing 240 g of water at a temperature of 8.4 °C. Provided that the water temperature stabilized at 21.5 °C, calculate the specific heat capacity of the metal and based on this value of capacity identify the metal.

Assume that the specific heat capacity of brass is 0.402 J/g\*C, and water is 4.184 J/g\*C

|  |  |
| --- | --- |
| **Substance** | **Specific Heat (J/g\*C)** |
| Helium | 5.193 |
| Aluminum | 0.897 |
| Lead | 0.130 |

How much heat will be released when 11.8 g of iron reacts with excess O2 according to the following equation?

**Fe + O2 🡪 Fe3O4 Hrxn=-1120.48 kJ**

1. Given the following equations

(1) H3BO3(aq )→ HBO2(aq) + H2O(l) ΔH = - 0.02 kJ

(2) H2B4O7(aq) + H2O(l )→ 4HBO2(aq) ΔH = - 11.3 kJ

(3) H2B4O7(aq) → 2B2O3(s) + H2O(l) ΔH = 17.5 kJ

Find the ΔH for this overall reaction: **2H3BO3(aq) → B2O3(s) + 3H2O(l)**



**Chapter 8: Quantum Mechanical Model of an Atom**

1. The wavelength of an X-ray is 0.483 Å. What is its frequency (in Hz)? The speed of light is 3.00 x 108 m/s. 1 Å=10-10m.
2. What is the energy (in J) of an X-ray photon with a wavelength of 4.83 x 10-2 nm? The speed of light is 3.00 x 108 m/s.

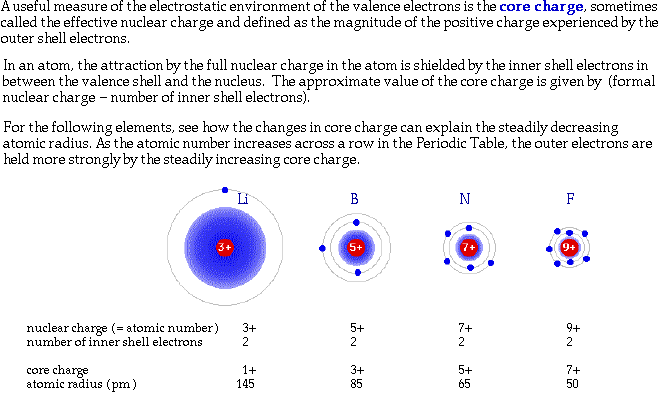


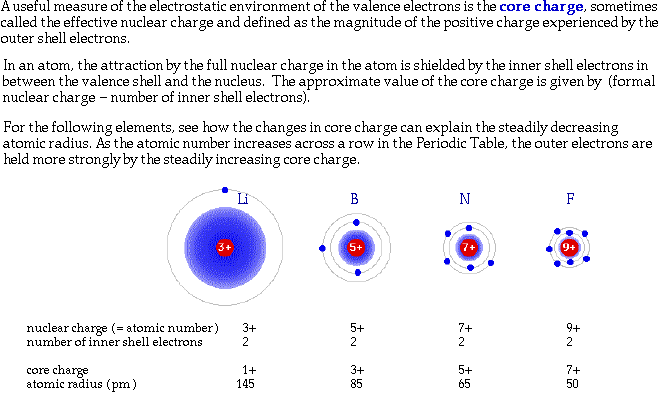
1. Identify the subshell in which electron with the following quantum numbers are found:
   1. n = 3, l = 2
   2. n = 1, l = 0
   3. n = 4, l = 3

**Chapter 9: Periodic Properties of Elements**

1. Draw the box diagram and electron configuration for each of the following elements.

|  |  |  |
| --- | --- | --- |
| Element | Box Diagram | Electron Configuration |
| Boron |  |  |
| Lithium |  |  |
| Oxygen |  |  |
| Phosphorus |  |  |
| Chlorine |  |  |
| Potassium |  |  |
| Aluminum |  |  |

1. Reactivity of halogens \_\_\_\_\_\_\_\_\_\_ down the group
2. What is the approximate “net” charge felt by the valence electron of…
   1. Lithium
   2. Magnesium
   3. Oxygen
3. The valence electron in which if the following atoms experience a larger attractive force from the core charge/effective nuclear charge?



* 1. Which one is smaller?

1. List the following ions in order of increasing radius: As3–, Br–, K+, Mg2+.