

1) If the energy required to remove the electron from an H atom in its ground state is 2.18×10^{-18} J, how much energy is required to remove an electron from a Li^{2+} atom?

2) What is the maximum kinetic energy for photoelectrons expelled from a potassium surface by light from a 500nm source? $W_p = 3.60 \times 10^{-19}$ J

3) Calculate the wavelength of light emitted when a hydrogen electron falls from the fourth to the second energy level.

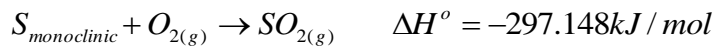
4) Draw the VSEPR structure for SF₄. State the electronic and molecular structures, along with the hybridization of the central atom. Is the molecule polar or nonpolar?

5) List the forces that exist in a liquid sample of HF.

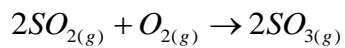
6) Iron has a body-centered cubic lattice and a density of 7.86g/cm³. Calculate the atomic radius of iron.

7) Calculate q , w and the change in energy for the vaporization of 2.00 mol of liquid ammonia at its normal boiling point of -33.4°C and a pressure of 1.00atm. At this temperature, one mole of liquid ammonia has a volume of 0.04L and to vaporize it requires 23.3 kJ of heat.

8) Given the following information, calculate the enthalpy change accompanying the conversion of one allotrope of sulfur to another (rhombic to monoclinic):



9) Calculate the equilibrium constant at 298K for the reaction:

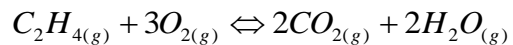


$$\Delta G_f^\circ(SO_2) = -300.4 \text{ kJ/mol}$$

$$\Delta G_f^\circ(SO_3) = -370.4 \text{ kJ/mol}$$

10) Find the change in entropy of the system and the universe for the transformation of 1.00 mol of liquid benzene to benzene vapor at 1.00 atm pressure and at its normal boiling point, which is 353K. The enthalpy of vaporization of benzene at its normal boiling point is 3.08×10^4 J/mol.

11) For the following exothermic reaction, state what happens when **(a)** the temperature is increased at constant pressure and **(b)** the pressure is increased at constant temperature.



12) Determine the concentrations of H_3O^+ , OH^- , $HOCl$, and OCl^- ions and the pH of the equilibrium solution when 0.50 mol of $HOCl$ is added to sufficient water to produce a final volume of 1.0L.

$$K_A(HOCl) = 3.7 \times 10^{-8}$$

13) Determine the equilibrium constant at 298K for the reduction of V^{2+} by Cr^{2+} according to the following reaction:

