/35

AP Chemistry – Fun with Phases – 27

Name _____Per ___

1. What is the coordination number of

(a) Na^+ in NaCl

(b) Zn^{2+} in ZnS

(c) Ca^{2+} in CaF_2

2. The compound CaS crystallizes like NaCl, with alternating Ca^{2+} and S^{2-} ions in three dimensions. There are a total of 4 Ca^{2+} in the corners, 4 S^{2-} in the opposite corners, 2 Ca^{2+} along the edges, and 2 S^{2-} on the opposite edges of each unit cell. If the length of the unit cell of CaS is 2.845 Å, calculate the density of CaS.

3. For each of the following pairs of substances, predict which will have the higher melting point and indicate why:

(a) Ar or Xe

(b) SiO_2 or CO_2

(c) KBr or Br_2

(d) C_6Cl_6 or C_6H_6

4. Gold crystallizes in a face-centered cubic unit cell that has an edge of 4.078 Å. The gold atom in the center is in contact with those in the corners. Calculate the radius of a gold atom.

5. To minimize the rate of evaporation of the tungsten filament, 1.4×10^{-5} moles of argon is placed in a 600. cm^3 lightbulb. What is the pressure of argon in the lightbulb at $23^{\circ C}$?

6. Assume that a single cylinder of an automobile engine has a volume of 524 cm^3.

(a) If the cylinder is full of air at $74^{\circ C}$ and 0.980 atm, how many moles of O_2 (mole fraction in dry air is 0.2095) are present?

(b) How many grams of C_8H_{18} could be combusted by this quantity of O_2 through complete combustion with only CO_2 and H_2O as products?

7. A sample of 1.42 g of helium and an unmassed quantity of O_2 are mixed in a flask at room temperature. The partial pressure of helium in the flask is 42.5 torr and the partial pressure of oxygen is 158 torr. What is the mass of the oxygen in the container?