Hydrate Practice Problems

1. Calculate the percent water in each of the following hydrates:
   a) Strontium chloride hexahydrate
   b) Zinc sulfate heptahydrate
   c) Beryllium nitrate trihydrate

2. Calculate the percentage of the given element in each of the following hydrates:
   a) Nickel in nickel (II) acetate tetrahydrate
   b) Chromium in sodium chromate tetrahydrate
   c) Cerium in cerium (IV) sulfate tetrahydrate

3. Heating copper (II) sulfate pentahydrate will evaporate the water from the crystals, leaving anhydrous copper (II) sulfate. What mass of anhydrous copper (II) sulfate would be produced by heating 500.0 grams of copper (II) sulfate pentahydrate?

4. Magnesium sulfate heptahydrate is heated until all the water is driven off. The sample loses 11.80 grams upon heating. What was the mass of the original sample?

5. A 5.018 gram sample of a certain hydrate of magnesium sulfate, MgSO₄•xH₂O, is heated until all the water is driven off. The resulting anhydrous compound weighs 2.449 grams. What is the formula of the hydrate?

6. Anhydrous sodium sulfate can absorb water vapor and be converted to the decahydrate. By how many grams would the mass of a 1.00 gram sample of the anhydrous compound increase if exposed to enough water to produce the decahydrate?

7. A certain hydrate is found to have the following percent composition by mass: 20.3% Cu, 8.95% Si, 36.3% F and 34.5% H₂O. What is the formula of this hydrate?

8. A 4.175 gram sample of a certain hydrate of copper (II) sulfate, CuSO₄•xH₂O, is heated until all the water is driven off. The resulting anhydrous compound weighs 3.120 grams. What is the formula of the hydrate?

Answers
1) a) 40.51% H₂O  b) 43.83% H₂O  c) 28.9% H₂O
2) a) 23.6% Ni  b) 22.2% Cr  c) 34.65% Ce
3) 320. grams (3.20 x 10² grams) CuSO₄
4) 23.07 grams MgSO₄•7H₂O
5) MgSO₄•7H₂O
6) 1.27 grams H₂O
7) CuSiF₆•6H₂O
8) CuSO₄•3H₂O