

If you are having difficulty please make use of the examples on page 2 of NS 6.4 first.

Show your work clearly and carefully so that you can refer to it later to check for mistakes, use for review and/or share your expertise with others.

1. Calculate the % water in $\text{MgSO}_4 \cdot 7 \text{H}_2\text{O}$
2. Calculate the percentage of water in potassium aluminum sulfate dodecahydrate. (Check your NS 6.4 for help on)
3. Determine the formula for a cobalt (II) chloride hydrate that had an original mass of 1.62 g and was heated to remove the water then had a mass of 0.88 g.
4. Determine the formula for a calcium sulfate hydrate that was determined to be 44 % water.
5. Determine the formula for a lead(II) acetate hydrate that had an original mass of 1.21 g and when heated, its mass decreased by 0.17 g
6. Anhydrous lithium perchlorate (4.78 g) was dissolved in water and re-crystallized. Care was taken to isolate all the lithium perchlorate as its hydrate. The mass of the hydrated salt obtained was 7.21 g. What is the formula and name of this hydrate?
7. Calculate the theoretical % of water in aluminum nitrate nonohydrate.
8. Calculate the theoretical % of water in copper(II) sulfate pentahydrate.
9. If you heated a salt that had water locked up inside its crystals (this type of salt is called a hydrate) and the mass of the salt before heating (hydrate) was 1.46 g and then after heating the dried salt (anhydrate) had a mass of 1.25 g, calculate the % of water in this original salt (the hydrate).
10. The mass of 5.67 g hydrate weighed 3.95 after being heated to the anhydrate. Determine the % of water in the original hydrate.
11. A barium chloride hydrate was determined to be 14.7 % water. Write the chemical formula of this hydrate.
12. 11.59 g of a hydrate compound was heated and the anhydrate weighed 8.93 g. The anhydrate was further analyzed and determined to be 2.06 g iron and 1.55 g nitrogen, and the rest oxygen. Determine the formula of this hydrate. What is the name of this hydrate?
13. Determine the formula of a hydrate that was only 17.97 % copper, 1.13 % hydrogen, 9.05 % oxygen, and the rest iodine. Assume that the anhydrate is a binary ionic compound. What is the name of this compound?
14. The magnesium sulfite hydrate is heated to remove its water, the water removed is nearly the same mass as the anhydrate itself. What is the formula and name of this hydrate?
15. A hydrate was determined to be 22.1 % water. The anhydrate was analyzed to be 44.1% iron and 55.9% chlorine. Determine the formula of this hydrate
16. A chromium sulfite hydrate was analyzed and found to be 12.43% chromium, 23.00% sulfur, 61.2% oxygen and 3.37% hydrogen. Determine the formula of this hydrate and then name it.

1. 51.2% water
2. 45.6% water
3. $\text{CoCl}_2 \cdot 6 \text{H}_2\text{O}$
4. $\text{CaSO}_4 \cdot 6 \text{H}_2\text{O}$
5. $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{H}_2\text{O}$
6. $\text{LiClO}_4 \cdot 3\text{H}_2\text{O}$
7. $\text{Al}(\text{NO}_3)_3 \cdot 9 \text{H}_2\text{O}$ 43.2 % water [$\text{MM} = 26.98 + 3(14.01) + 9(16) + 9(18.02) = 375.19$ so $(9(18.02)/375.19) \times 100$]
8. $\text{CuSO}_4 \cdot 5 \text{H}_2\text{O}$ 36.1 % water [$\text{MM} = 63.55 + 32.07 + 4(16) + 5(18.02) = 159.62$ so $(5(18.02)/249.72) \times 100$]
9. 14.4 % water in the original hydrate salt [$1.46 - 1.25 = 0.21$ g water so $(0.21/1.46) \times 100$]
10. 30.3 % water in the original hydrous salt [$5.67 - 3.95 = 1.72$ g water so $1.72/5.67 \times 100$]
11. $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$
12. $\text{Fe}(\text{NO}_3)_3 \cdot 4\text{H}_2\text{O}$ iron(III) nitrate tetrahydrate
13. $\text{CuI}_2 \cdot 2 \text{H}_2\text{O}$
14. $\text{MgSO}_3 \cdot 6\text{H}_2\text{O}$
15. $\text{FeCl}_2 \cdot 2 \text{H}_2\text{O}$
16. $\text{Cr}(\text{SO}_3)_3 \cdot 7\text{H}_2\text{O}$