

## Activity 1.3 (Formula Analysis)

## Practice 1.3 (Formula Analysis)

### 1. Notes

#### a) Formula Analysis

#### b) Lab Techniques

## 2. Practice

a) A 15.67 g sample of a hydrate of magnesium carbonate,  $\text{MgCO}_3$  was heated, without decomposing the carbonate, to drive off the water. The mass was reduced to 7.58 g. What is the formula of the hydrate?

b) A hydrate of  $\text{Na}_2\text{CO}_3$  has a mass of 4.31 g before heating. After heating, the mass of the anhydrous compound is found to be 3.22 g. Determine the formula of the hydrate.

Anhydrous lithium perchlorate,  $\text{LiClO}_4$  (4.78 g) was dissolved in water and recrystallized. Care was taken to isolate all the lithium perchlorate as its hydrate. The mass of the hydrated salt obtained was 7.21 g. What hydrate is it?

A 5.00 g sample of hydrated barium chloride,  $\text{BaCl}_2 \cdot n\text{H}_2\text{O}$ , is heated to drive off the water. After heating, 4.26 g of anhydrous barium chloride,  $\text{BaCl}_2$ , remains. What is the value of  $n$  in the hydrate formula?

A 1.98 g sample of a cobalt(II) chloride,  $\text{CoCl}_2$ , hydrate is heated over a burner. When cooled, the mass of the remaining dehydrated compound is found to be 1.55 g. What is the formula for the original hydrate? How can you make sure that all of the water of hydration has been removed?

f) Determine the formula of a calcium chloride dihydrate given the data below:

<b>Data Table</b>	
Mass of hydrate ( $\text{CaCl}_2 \cdot x\text{H}_2\text{O}$ )	<u>4.72 g</u>
Mass of anhydrate ( $\text{CaCl}_2$ )	<u>3.56 g</u>
Mass of water	<u>1.18 g</u>

g) Determine the formula of a magnesium chloride,  $\text{MgCl}_2$ , hydrate given the data below:

Mass of empty container	22.347 g
Initial mass of sample and container	25.825 g
Mass of sample and container after first heating	23.982 g
Mass of sample and container after second heating	23.976 g
Mass of sample and container after third heating	23.977 g

h) A hydrocarbon is discovered that is 52% carbon, 13% hydrogen and the rest is oxygen.

i) A common household cleaner is 17.7% hydrogen and the rest is nitrogen.

j) Formaldehyde is a typical hydrocarbon used to preserve organic tissue. Formaldehyde is 6.7% H, 53.3% O and the rest is C.