

## Empirical Formula of Chlorides

### Calculations

1. Calculate the slope of the graphs. This slope will give you the ratio of metal chloride mass to metal mass
2. In terms of moles,  
Slope =  $((\text{atomic mass of metal}) + (\text{atomic mass Cl}) r) / (\text{atomic mass metal})$   
where  $r$  is the ratio of metal to Cl in the metal chloride
3. Solve for  $r$   
 $r$  is the ratio of metal to chloride in the compound
4. If  $r =$  about 1, the formula is  $MCl$   
If  $r =$  about 2, the formula is  $MCl_2$   
If  $r =$  about 3, the formula is  $MCl_3$   
 $M$  is the Metal:

Example: Calcium Chloride

Slope of the graph is 2.7

$$2.7 = (40.0\text{g/mol Ca} + 35.5r \text{ g/mol Cl}) / 40.0 \text{ g/mol Ca}$$

$$2.7 = 1 + 35.5r/40.0$$

$$1.7 = 35.5r/40.0$$

$$r = (1.7 \times 40.0) / 35.5$$

$$r = 1.94$$

Thus the ratio of Ca to Cl in Calcium Chloride is about 1:2

The empirical formula of Calcium Chloride is  $CaCl_2$

