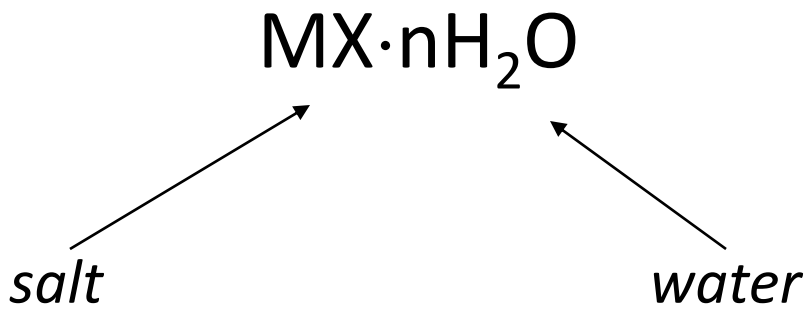
Hydrates Lab Notes

Hydrates

A hydrate is a substance composed of an inorganic salt and physically bound water.



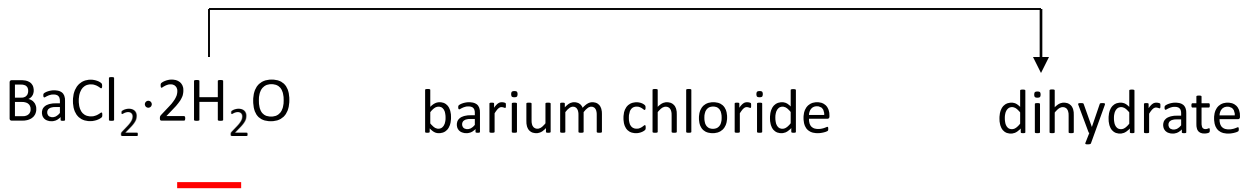
n = is the ratio of moles of water to 1 mole of the salt

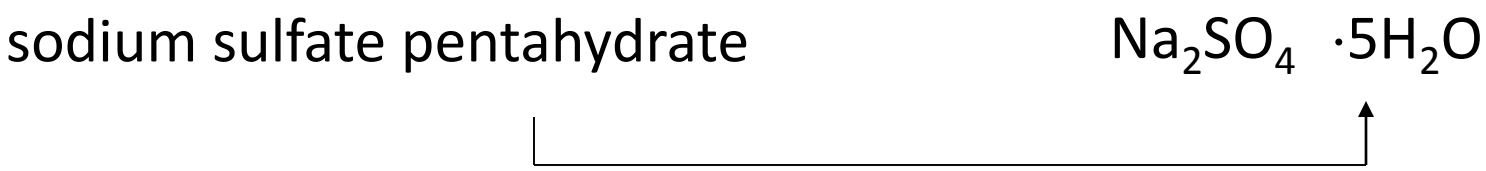
$$n = \frac{mols\,H_2O}{mols\,MX}$$

Naming Hydrates

Salt name + prefix hydrate

prefix: mono, di, tri etc…





Molar Mass of a Hydrate

$BaCl_2 \cdot 2H_2O$

1 x Ba:	1 x 137.33g/mol
2 x Cl:	2 x 35.45 g/mol
4 x H:	4 x 1.01 g/mol
2 x O:	2 x 16.00 g/mol
	244.27 g/mol

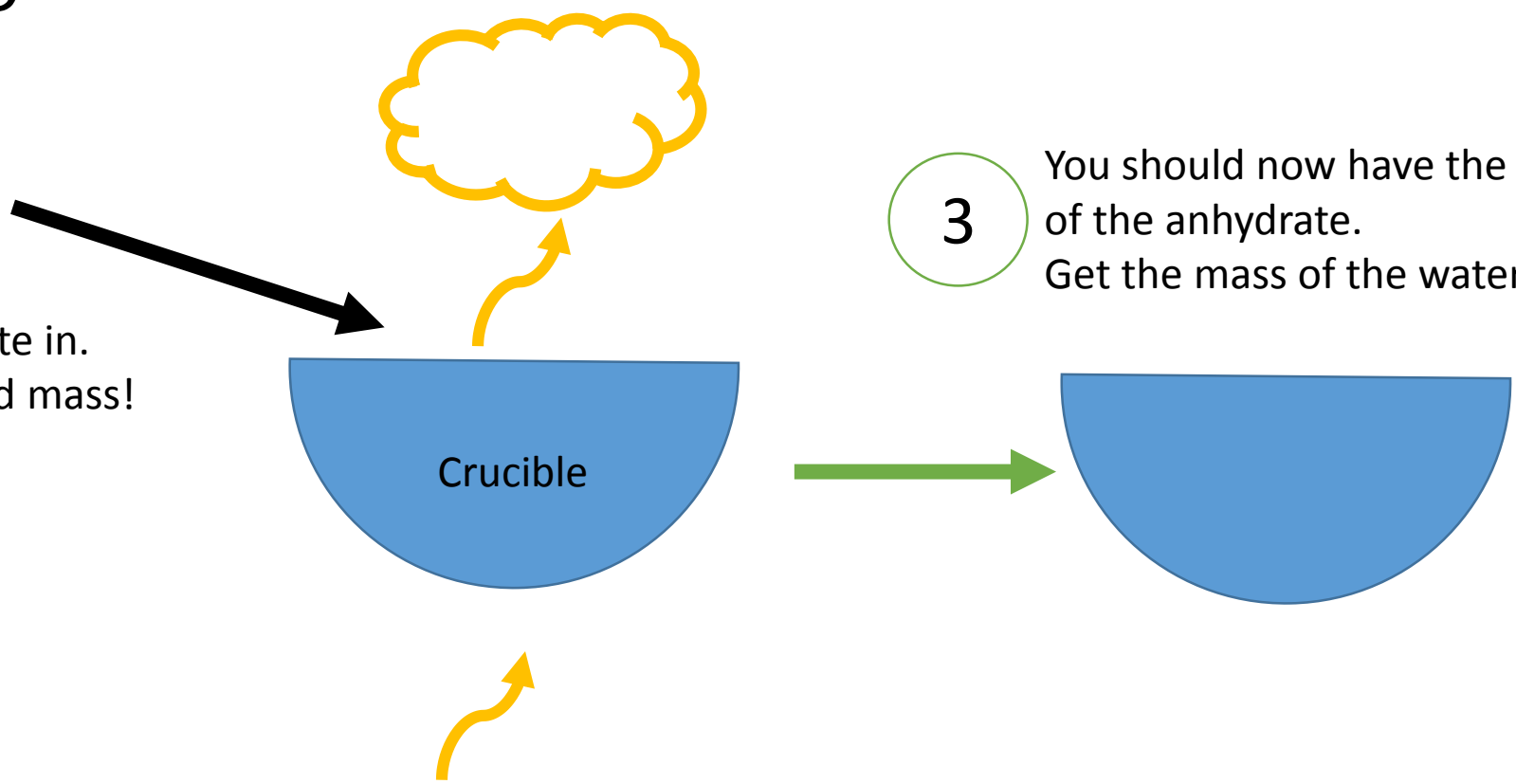
Purpose of Lab

- Determine the value of n for your hydrate:

$$MX \cdot nH_2O$$

- You will know the formula for MX.

HOW?



1 Hydrate in.
Record mass!

2 Heat.
This will drive off the hydrating waters.
Continue this until mass inside crucible no longer changes.

3 You should now have the mass
of the anhydrate.
Get the mass of the water by subtraction.

HOW?

- Now, convert the mass of anhydrate and mass of water to MOLES!
  - Use the molar mass of water and the molar mass of the anhydrate here.

- Next, determine the whole number ratio of the moles.
  - Divide the number of moles of water by the number of moles of anhydrate.
  - This should come out to be a whole number. If not, you should round to the nearest whole number.

- The number you calculated above is the value of n you need!

$$MX \cdot nH_2O$$

SAFETY!

- This is the most dangerous lab you will do this semester!
- Flame!
  - No loose hair or sleeves.
- The crucible gets VERY HOT, and STAYS HOT even after the glow has faded.
  - Do NOT be a Hero! Avoid catching the lid or crucible if it falls.
- Always heat crucible with the lid cracked! If it is all the way closed, the gases can’t escape and your lid may fly.

PROCEDURE

- How to get a good flame.
- Heat washed crucible and lid to constant mass.
  - Continue this process (heat, cool, mass…heat, cool, mass…) until the mass of the crucible is constant (within 0.005g of the previous mass).
  - I would recommend also massing the dry crucible and dry lid separately (just in case you break the lid…you will usually not need these numbers)
- Add sample.
- Heat hydrate to constant mass.
  - Gently at first. Crucible should NOT glow for the first 10 minutes. Then heat more aggressively for the last 5.
  - “Constant” means .005g just like before.