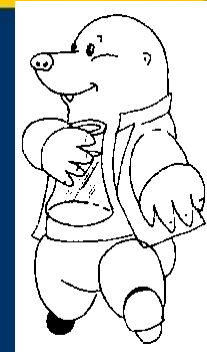




## Cycle 2 Chemistry 2 Hydrate Prelab

**LAB TOMORROW! DRESS ACCORDINGLY!**



### Warmup:

Sodium thiosulfate has the formula  $\text{Na}_2\text{S}_2\text{O}_3$ . Find the % mass of sodium, sulfur, and oxygen in this compound.



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## Cycle 2 Chemistry 2 Hydrate Prelab

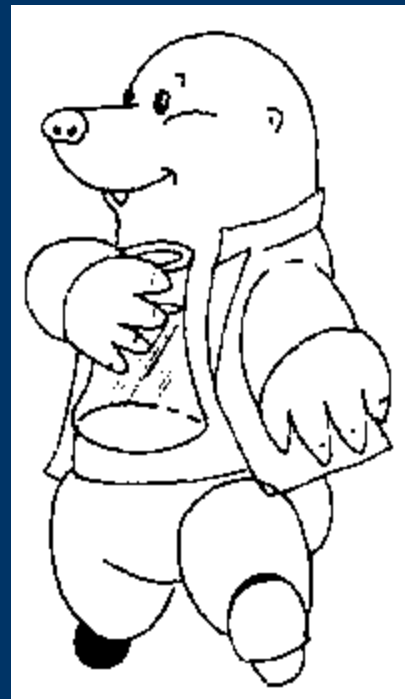
LAB TOMORROW! DRESS ACCORDINGLY!

### Agenda:

- Decomposition of Hydrates
- Video of Hydrate Decomposition

### Classwork:

- Calculate MM and % Composition of a hydrate compound.
- Prelab Questions



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## Hydrate Compounds

Sometimes chemical compounds contain chemically-bound water – they are called “**hydrates**”. The water is part of the crystal lattice in the solid state.

Bound waters are separated from the formula by a dot.

**Example:**  $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$  – this is Sodium Thiosulfate Pentahydrate. (Thiosulfate is  $\text{S}_2\text{O}_3^{-2}$ ) (“Penta” is ?)  
Sodium Thiosulfate is almost always sold as the pentahydrate.

## Hydrate Compounds

**Example:**  $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$

### Pair up and Work:

- 1) What is the molar mass of this compound? You can start with the molar mass of  $\text{Na}_2\text{S}_2\text{O}_3$  and add 10 hydrogens and 5 oxygens.
- 2) What is the % mass of Na? What is the % mass of S?
- 3) Compare with your warmup answers. How are these different?



## Heating of Cobalt (II) Chloride Hexahydrate ( $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$ )



In Words: “One mole of cobalt chloride hexahydrate yields one mole of cobalt chloride and six moles of water.



Dramatic Video:

[https://www.youtube.com/watch?v=-0a\\_zi0vhaE0](https://www.youtube.com/watch?v=-0a_zi0vhaE0)



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## Decomposing 1 Mole of $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$



Molar Mass of  $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$  is 237.96 grams

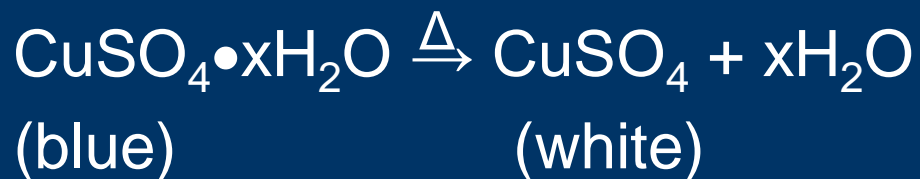
Molar Mass of  $\text{CoCl}_2$  is 129.84 grams

Molar Mass of  $\text{H}_2\text{O}$  is 18.02 grams

6 Moles of  $\text{H}_2\text{O}$  have a mass of 108.12 g

$237.96 \text{ g} = 129.84 \text{ g} + 108.12 \text{ g}$  Mass is **CONSERVED!**

## Tomorrow's Lab – Finding Formula of a Hydrate



$$\text{Mass H}_2\text{O} = \text{Mass CuSO}_4 \cdot x\text{H}_2\text{O} - \text{Mass CuSO}_4$$

## Tomorrow's Lab – Finding Formula of a Hydrate



(blue)

(white)

$$\text{Mass H}_2\text{O} = \text{Mass CuSO}_4 \cdot x\text{H}_2\text{O} - \text{Mass CuSO}_4$$

$$\text{Moles H}_2\text{O} = \text{Mass H}_2\text{O} / 18.02 \text{ g}$$

$$\text{Moles CuSO}_4 = \text{Mass CuSO}_4 / 159.62 \text{ g}$$

$$x = \text{Moles H}_2\text{O} / \text{Moles CuSO}_4 \text{ (do you understand WHY?)}$$

### Prelab Question 1:

106.8 grams of  $\text{CuSO}_4 \cdot x\text{H}_2\text{O}$  yields 79.80 grams of  $\text{CuSO}_4$ . What is 'x'?



## Tomorrow's Lab – Finding Formula of a Hydrate

### Prelab Question 1:

106.8 grams of  $\text{CuSO}_4 \cdot x\text{H}_2\text{O}$  yields 79.80 grams of  $\text{CuSO}_4$ . What is 'x'?

### Prelab Question 2 [HONORS]:

Suppose you dehydrate 496.4 grams of  $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$  by heating. How many grams of anhydrous  $\text{Na}_2\text{S}_2\text{O}_3$  would you obtain?

**[HINT:** Find moles of  $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ . Multiply by ? to get moles of bound  $\text{H}_2\text{O}$ . Convert to grams  $\text{H}_2\text{O}$  and subtract from original mass!]