

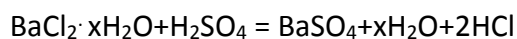
## Question #41592 – Chemistry – Other

### Question:

the formula of a hydrated salt of barium is  $\text{BaCl}_2 \cdot x\text{H}_2\text{O}$ . If 1.936 g of this compound gives 1.846 g of anhydrous  $\text{BaSO}_4$  upon treatment with  $\text{H}_2\text{SO}_4$ , calculate  $x$ .

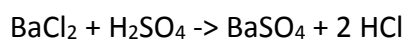
### Answer:

General reaction equation:



Barium chloride reacts with sulfuric acid to produce HCl and barium sulphate ( $\text{BaSO}_4$ ):

$y$ .....1.864



1 mole.....1 mole

208g.....233g

$y$  is the mass of "anhydrous"  $\text{BaCl}_2$  in the 1.936 g of hydrate.

$$y = (208 \cdot 1.864) / 233$$

$$y = 387.712 / 233$$

$$y = 1.664 \text{ g}$$

One mole of  $\text{BaCl}_2$  is 208g, so 1.664g will have  $1.664 / 208 = 0.008$  moles  $\text{BaCl}_2$ .

The water in the original  $\text{BaCl}_2 \cdot x\text{H}_2\text{O}$  is:  $1.936\text{g} - 1.664\text{g} = 0.272\text{g}$ . In moles, this is  $0.272 / 18 = 0.0151$  moles of water.

We have 0.008 moles  $\text{BaCl}_2$  and 0.0151 moles of water together.

$$x = 0.0151 / 0.008 = 1.88 \approx 2$$

So, the formula of compound is  $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$