

Unknown metal called M reacts with unknown halogen called X consists compound MX₂. If we are heating this compound MX₂ it happens reaction : $2 \text{MX}_2(\text{k}) > 2 \text{MX}(\text{k}) + \text{X}_2(\text{d})$.

When we are having 1,12 g compound we get 0,720 compound MX and 56,0ml of gas. This reaction happened by normal conditions.

What is formula of metal M?

What is formula of Halogen X?

Solution:

Chemical reaction:



$$V(\text{X}_2)=56.0\text{ml}$$

$$n(\text{X}_2)=56.0 \cdot 10^{-3} / 22.4 = 2.5 \cdot 10^{-3} \text{ mol}$$

from (1)

$$n(\text{M})=n(\text{MX}_2)=2n(\text{X}_2)= 5.0 \cdot 10^{-3} \text{ mol}$$

$$m(\text{M})=1.12\text{g}$$

$$\text{Mr}(\text{MX}_2)=m/n=1.12\text{g}/5.0 \cdot 10^{-3} \text{ mol}=224\text{g} \cdot \text{mol}^{-1}$$

$$\text{Mr}(\text{MX})=m/n=0.720/0.005=144\text{g} \cdot \text{mol}^{-1}$$

$$\text{Mr}(\text{X})= \text{Mr}(\text{MX}_2)- \text{Mr}(\text{MX})=224-144=80\text{g} \cdot \text{mol}^{-1}$$

So Unknown halogen is Br

$$\text{Mr}(\text{M})=224-2 \cdot \text{Mr}(\text{Br})=224-180=64\text{g} \cdot \text{mol}^{-1}$$

So unknown metal is Cu

Unknown compound CuBr₂

Answer: Cu and Br.