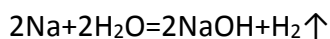# Answer on Question #41279, Chemistry, Other

Task:

Calculate the volume, mass and number of molecules liberated when 299g of sodium reacts with excess water at STP.

Answer:

The chemical reaction for this process is:

$2Na+2H_2O=2NaOH+H_2\uparrow$

The amount of sodium in the process is:

$$v(Na)=\frac{m}{A_r(Na)}$$

where m-mass, grams;

A_r -atomic mass, gram/mol.

$$v(Na)=\frac{299}{23}=13\,moles$$

We can assume from the reaction, that:

$$\frac{v(Na)}{v(H_2)}=\frac{2}{1}$$

That is why:

$$v(H_2)=\frac{13}{2}=6.5\,moles$$

For STP conditions:

$$v(H_2)=v_m\cdot v$$

$V(H_2)=22.4\times6.5=145.6$ L

The mass from the amount of substance could be found as:

$$m(H_2)=v(H_2)\cdot A(H_2)=6.5\cdot2=13g$$

The number of molecules could be calculated over Avogadro's number ($N_A=6.02\cdot10^{23}$ mol^{-1}):

$$N=N_A\cdot v(H_2)=6.02\cdot10^{23}\cdot6.5=39.13\cdot10^{23}$$