

12. Masa amonijaka pri 101,3 kPa i 25°C je 174 miligrama. Koji je volumen amonijaka pri tim uvjetima?

Zadano je: $p = 101,3 \text{ kPa} = 101\,300 \text{ Pa}$ $t = 25^\circ\text{C} = 298,15 \text{ K}$ $m(\text{NH}_3) = 174 \text{ mg} = 0,174 \text{ g}$	Traži se: $V(\text{NH}_3) = ?$
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Račun:

$$p \cdot V(\text{NH}_3) = n(\text{NH}_3) \cdot R \cdot T$$

$$V(\text{NH}_3) = \frac{n(\text{NH}_3) \cdot R \cdot T}{p} = \frac{0,0102 \text{ mol} \cdot 8,314 \text{ kPa L mol}^{-1} \text{K}^{-1} \cdot 298,15 \text{ K}}{101,3 \text{ kPa}} = 0,249 \text{ L}$$

$$n(\text{NH}_3) = \frac{m(\text{NH}_3)}{M(\text{NH}_3)} = \frac{0,174 \text{ g}}{17 \text{ g/mol}} = 0,0102 \text{ mol}$$

13. Formula gipsa je $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. Izračunaj maseni udio kristalne vode u gipsu.

Traži se:

$$w(\text{H}_2\text{O}) = ?$$

$$w(\text{H}_2\text{O}) = \frac{2 \cdot Mr(\text{H}_2\text{O})}{Mr(\text{CaSO}_4 \cdot 2\text{H}_2\text{O})} = \frac{2 \cdot 18}{172,06} = 0,2092 = 20,92\%$$

8. Analizom spoja utvrđeno je da sadrži 26,65% ugljika, 71,11% kisika a ostalo je vodik. Relativna molekulaska masa spoja je 90. Odredite molekulsku formulu spoja.

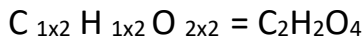
Zadano je: $w(\text{C}) = 26,65\% = 0,2665$ $w(\text{O}) = 71,11\% = 0,7111$ $w(\text{H}) = 2,24\% = 0,0224$ $Mr(\text{spoja}) = 90$	Traži se: Molekulaska formula = ?
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$$\begin{aligned} N(\text{C}) : N(\text{H}) &= \frac{w(\text{C})}{Ar(\text{C})} : \frac{w(\text{H})}{Ar(\text{H})} : \frac{w(\text{O})}{Ar(\text{O})} = \frac{0,2665}{12,01} : \frac{0,0224}{1,008} : \frac{0,7111}{16} \\ &= 0,02219 : 0,0222 : 0,04444 / : 0,02219 \\ &= 1 : 1 : 2 \end{aligned}$$

Empirijska formula: CHO₂

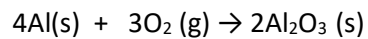
$$Er(\text{CHO}_2) = Ar(\text{C}) + Ar(\text{H}) + 2 \cdot Ar(\text{O}) = 12,01 + 1,008 + 2 \cdot 16 = 45,018$$

$$\frac{Mr(\text{spojā})}{Er(\text{CHO}_2)} = \frac{90}{45,018} = 1,99 = 2$$



Molekulska formula: C₂H₂O₄

9. Odredite masu aluminija koja je potrebna za nastanak 4 mola aluminijeva oksida?



Zadano je: $n(\text{Al}_2\text{O}_3) = 4 \text{ mol}$	Traži se: $m(\text{Al}) = ?$
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Račun:

$$\frac{n(\text{Al})}{n(\text{Al}_2\text{O}_3)} = \frac{4}{2}$$

$$2n(\text{Al}) = 4 n(\text{Al}_2\text{O}_3) \quad /:2$$

$$n(\text{Al}) = \frac{4}{2} n(\text{Al}_2\text{O}_3) = 2 n(\text{Al}_2\text{O}_3) = 2 \cdot 4 \text{ mol} = 8 \text{ mol}$$

$$m(\text{Al}) = M(\text{Al}) \cdot n(\text{Al}) = 26,98 \text{ g/mol} \cdot 8 \text{ mol} = 215,84 \text{ g}$$