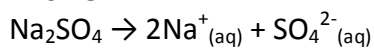


Question: How many moles of ions are present in a solution containing 0.10mol Na₂SO₄ assuming complete dissociation into Na⁺ and SO₄²⁻ ions? Estimate the van't Hoff factor.

Answer



$$n(\text{Na}^+) = 2n(\text{Na}_2\text{SO}_4) = 2 \cdot 0.10 \text{ mol} = 0.20 \text{ mol}$$

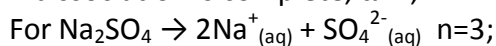
$$n(\text{SO}_4^{2-}) = n(\text{Na}_2\text{SO}_4) = 0.10 \text{ mol}$$

$$\text{Total chemical amount of ions} = 0.10 + 0.20 = 0.30 \text{ mol}$$

The van't Hoff factor *i* is the ratio between the actual concentration of particles produced when the substance is dissolved and the concentration of a substance as calculated from its mass and it describes the effect of a solute upon colligative properties such as osmotic pressure, relative lowering in vapor pressure, boiling-point elevation and freezing-point depression.

$i = 1 + \alpha(n - 1)$, where α is the degree of dissociation, n is the number of ions produced in dissociation.

If dissociation is complete, $\alpha=1$;



$$\text{So } i = 1 + 1(3-1) = 3.$$