

Electrolytes and the Dissolving Process

Ions in solution and energy changes on dissolving

Name _____ Class _____ Date _____

DATA

$\Delta H(\text{solution})$: CaCl_2 -82.8 kJ/mol · NH_4NO_3 $+25.7 \text{ kJ/mol}$

Molar masses (g/mol): CaCl_2 110.98 · NH_4NO_3 80.05 · $c(\text{solution}) = 4.184 \text{ J/(g}\cdot^\circ\text{C)}$

Include state symbols in equations. Show units in every calculation step.

A. Ideas

1. (a) Define solute, solvent and electrolyte. (b) Explain, in terms of particles, why salt water conducts electricity but sugar water does not.

2. Classify each as a strong electrolyte, weak electrolyte or non-electrolyte: (a) MgCl_2 (b) sucrose, $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ (c) HNO_3 (d) ethanoic acid (e) KOH (f) methanol, CH_3OH

B. Dissociation and ion concentrations

3. Write dissociation equations for: (a) K_2SO_4 (b) $\text{Ca}(\text{NO}_3)_2$ (c) $(\text{NH}_4)_3\text{PO}_4$ (d) FeCl_3

4. Give the concentration of each ion in: (a) 0.200 mol/L K_2SO_4 (b) 0.150 mol/L FeCl_3

5. Which 0.10 mol/L solution conducts best: NaCl, CaCl_2 , glucose or ethanoic acid? Explain.

6. 50.0 mL of 0.100 mol/L CaCl_2 is mixed with 50.0 mL of 0.200 mol/L KCl. Calculate the concentration of each ion in the mixture.

C. Energy changes

7. Explain why dissolving some salts makes the water warmer and others make it colder. Refer to the two energy steps.

D. Challenge

8. A hand warmer contains 5.00 g of CaCl_2 , which dissolves in 100. g of water. Calculate the temperature rise of the 105 g of solution.