Chemistry: Specific Heat Problems

Solve the following problems dealing with specific heat, \( c_p \). Use a complete set-up on each problem and show your work.

1. The specific heat of ethanol is 2.46 J/g-°C. Find the heat required to raise the temperature of 193 g of ethanol from 19°C to 35°C.

2. When a 120 g sample of aluminum (Al) absorbs 9612 J of energy, its temperature increases from 25°C to 115°C. Find the specific heat of aluminum. Be sure to include the correct unit for specific heat.

3. The specific heat of lead (Pb) is 0.129 J/g-°C. Find the amount of heat released when 2.4 mol of lead are cooled from 37.2°C to 22.5°C.

4. How many kJ of energy are needed to raise the temperature of 165 mol of water from 10.55°C to 47.32°C? (Hint: How many J are in 1 kJ?)