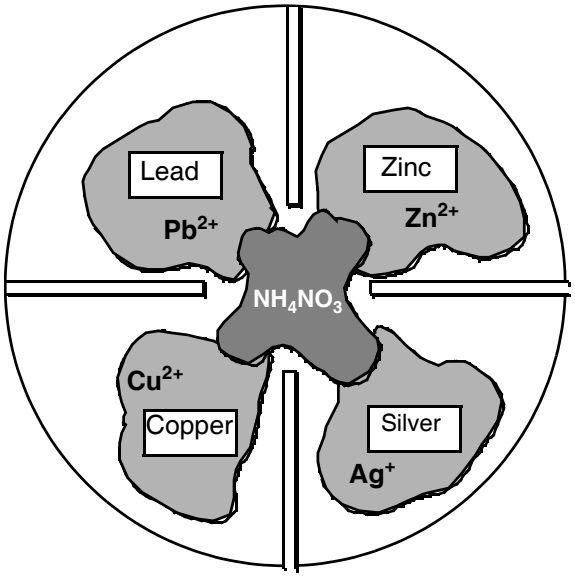
**EXPERIMENT 8**

# *Electrochemical Cells (B)*

## *Procedure*

1. Cut 3-5 mm slits in as stack of three filter papers as shown and place the papers on a clean glass plate. Polish small strips of copper, lead, silver and zinc with steel wool or sand paper to produce a shiny, clean surface. The zinc strip should be amalgamated with a drop of mercuric nitrate solution to insure a clean surface (mercury salts are extremely poisonous so take extra care). Place one of the metal electrode strips on each of the filter paper sectors. Place a few drops of the 1.0 *M* metal ion solutions next to (not on) each of the metal strips, thoroughly wetting the filter paper (caution, avoid contact with silver nitrate!). At the center of the paper add a few drops of 1.0 *M* $NH_4NO_3$ to serve as a salt bridge for the cells.

**FIGURE 8.1**



2. Place the black (-) lead from the voltmeter firmly on the lead electrode and the red (+) lead on the copper electrode. This should result in a positive voltage. A positive voltage indicates that the red lead is at the cathode and the black lead is at the anode of a galvanic (spontaneous) cell. Electrons flow into the ree lead and out of the black. A negative voltage indicates the reverse. With the black lead still on lead, proceed with the red to silver and to zinc, recording voltage and sign. Calculate the voltages for the remaining cells on the data page before proceeding to measure them. Calculate the standard potentials from the literature values and write the cell reactions for each cell.

**TABLE 8.1 Sample Data Table**

| **Electrodes** (black on first electrode) | **Meas. V** | **Calc. V** | **Lit. V** | **Cell Reaction** |
|---|---|---|---|---|
| Pb-Cu | | | | |
| Pb-Ag | | | | |
| Pb-Zn | | | | |
| Cu-Ag | | | | |
| Cu-Zn | | | | |
| Cu-Pb | | | | |
| Ag-Zn | | | | |
| Ag-Pb | | | | |
| Ag-Cu | | | | |
| Zn-Pb | | | | |
| Zn-Cu | | | | |
| Zn-Ag | | | | |