electromagnet with associated power supply and current regulator. The photograph shows the apparatus with a Dings air-cooled electromagnet.

Results

The table gives the calculated and experimentally determined effective magnetic moments of compounds of elements of the first transition series containing various numbers of unpaired electrons.

The Rare Earths. It is usually not possible to determine the effective magnetic moment of certain elements using the Curie Law alone (given in equation 4). This is especially true for elements having unpaired electrons in the antepenultimate shell such as the rare earth ions, since the orbital angular momentum contribution of such electrons is not negligible or cancelled. Consequently, it is necessary to utilize the Curie-Weiss Law:

$$\chi_M = \frac{C}{T + \Delta} \tag{17}$$

for obtaining magnetic moments of such substances, and a determination of the constant Δ usually requires measurements of magnetic susceptibility at more than one temperature. The construction of an appropriate apparatus for such determinations and discussions of the techniques are available in the literature(*10, 11*) and experiments with such compounds would be valuable for additional and advanced instruction in magnetochemistry.

Acknowledgment

The authors wish to express their appreciation to the National Science Foundation for a fellowship grant and to the American Academy of Arts and Sciences for a grant of funds to purchase equipment. Both contributed significantly to the progress of this work. The authors are also indebted to Robert Kiesling, Douglas Laine, William Parker, Nicholas Hansen, and Ernest Styloglu for their help with sample preparations and magnetic measurements.

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Use of Magnesium Sulfate in the Preparation of Anhydrous Ether

In many laboratories today, commercially available "anhydrous" diethyl ether is economically purchased in 55-gallon drums and is conveniently dispensed in quantities of one gallon or less. This grade of ether usually contains virtually no alcohol; but once the container is opened, the absorption of atmospheric water soon renders it unfit for direct use in Grignard and similar reactions requiring a high grade of anhydrous ether. Customarily, such bulk ether is "redried" over sodium wire just before use; but frequently this operation is slow, inefficient, and dangerous, particularly when the ether has become quite wet from repeated exposure to moist air.

As a simple but effective means to remove accumulated water, we routinely dry as much as four liters of our "anhydrous" bulk ether briefly (5–10 minutes) over magnetically-stirred anhydrous magnesium sulfate (*ca.* one heaping tablespoon per liter) in a stoppered container. The anhydrous ether is then recovered either by direct decantation into the reaction vessel or by rapid vacuum filtration through a layer of anhydrous magnesium sulfate (*ca.* one heaping tablespoon per liter) in a stoppered container. The anhydrous ether is then recovered either by direct decantation into the reaction vessel or by rapid vacuum filtration through a layer of anhydrous magnesium sufate.

Magnesium sulfate is, of course, widely used as a drying agent for ether *solutions*, but it does not appear to have been recommended for use in the manner described here. Use of calcium chloride after various washing operations is widely practiced, but in its usual granular form, this reagent is far less efficient than magnesium sulfate for redrying "anhydrous ether." Furthermore, unless the period of drying is greatly extended, ether dried over calcium chloride still reacts fairly rapidly with sodium, while ether dried with magnesium sulfate shows almost no visible reaction with freshly cut sodium and, moreover, can be used directly in the preparation of Grignard reagents. In addition, ether so dried can be maintained in an anhydrous condition by storage over magnesium sulfate rather than sodium. Thus a considerable saving of time and effort as well as a corresponding decrease in fire hazard is offered by this procedure.

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