

Basic Laboratory Skills and Equipment

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A. Analytical Balance

Analytical balances (Fig. 1) are used for very precise measurements of mass to the nearest 0.0001 g. However, this accuracy comes at a price. Not only are they expensive (at least \$3000 each) but also sensitive to environmental conditions that can affect the mass reading. Table 1 lists sources of error and how to prevent them.



Figure 1. Analytical balance

To Weigh a Chemical

Place a container (e.g. weighing boat) gently on the balance pan. Close the drafts shields and press ZERO or TARE to reset the balance's display to zero¹. The display should read 0.0000 g. Open the draft shield and remove the tared container. Add the chemical (Fig. 2) and place the container back on the balance. Close the draft shields. Repeat this process until the target mass is reached. Record the mass on the display. The first stable weight displayed will be the most accurate reading.

Remember the target mass is just a target. If you obtain a little bit more, either retain it or put it into the waste container. Do not put the excess chemical back into the reagent bottle.

Dispose of the used weighing boat in the hazardous waste box.

Note: Containers, glassware and pieces of metal can be placed directly on the balance pan.

¹ Some of our balances have separate ZERO and TARE buttons, some have only one ZERO/TARE button. The difference between these two buttons is that the TARE button has an extra feature that



Figure 2. Adding small amounts of a solid to a weighing boat

Table 1. Sources of Error

Source of Error	Solution
Leaning on balance table causing vibrations that are transmitted to the balance.	Don't lean on the balance table.
Air currents lifting the balance pan.	Close the draft shields.
Wet samples becoming lighter as moisture evaporates off.	Make sure that the sample is dry before it is weighed.
Weighing warm objects creates a convection current that lifts the balance pan.	Wait 5 min for the object to cool down.
Handling glassware with bare fingers deposits oil on them and increases their mass.	Wear gloves.

Weighing by Difference

The most accurate method to weigh a chemical is weighing by difference. It accounts for the small amount of chemical that remains in the weighing boat after the transfer. To weigh by difference, start by weighing the chemical in a weighing boat. Record the mass of the weighing boat with reagent. Transfer the chemical to the target container. Weigh the

we do not use in the General Chemistry Lab. Therefore, it does not matter which button you press to zero the balance.

Laboratory And Skills Manual Key

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Table of Contents Laboratory And Skills Manual Key

1. Understanding the eBook Laboratory And Skills Manual Key
 - The Rise of Digital Reading Laboratory And Skills Manual Key
 - Advantages of eBooks Over Traditional Books
2. Identifying Laboratory And Skills Manual Key
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Laboratory And Skills Manual Key
 - User-Friendly Interface
4. Exploring eBook Recommendations from Laboratory And Skills Manual Key
 - Personalized Recommendations
 - Laboratory And Skills Manual Key User Reviews and Ratings
 - Laboratory And Skills Manual Key and Bestseller Lists

5. Accessing Laboratory And Skills Manual Key Free and Paid eBooks
 - Laboratory And Skills Manual Key Public Domain eBooks
 - Laboratory And Skills Manual Key eBook Subscription Services
 - Laboratory And Skills Manual Key Budget-Friendly Options
6. Navigating Laboratory And Skills Manual Key eBook Formats
 - ePub, PDF, MOBI, and More
 - Laboratory And Skills Manual Key Compatibility with Devices
 - Laboratory And Skills Manual Key Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Laboratory And Skills Manual Key
 - Highlighting and Note-Taking Laboratory And Skills Manual Key
 - Interactive Elements Laboratory And Skills Manual Key
8. Staying Engaged with Laboratory And Skills Manual Key
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Laboratory And Skills Manual Key
9. Balancing eBooks and Physical Books Laboratory And Skills Manual Key
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Laboratory And Skills Manual Key
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Laboratory And Skills Manual Key
 - Setting Reading Goals Laboratory And Skills Manual Key
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Laboratory And Skills Manual Key
 - Fact-Checking eBook Content of Laboratory And Skills Manual Key
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning

- Utilizing eBooks for Skill Development
- Exploring Educational eBooks

14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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