



普通高等教育“十一五”国家级规划教材配套教材

全国高等学校医学规划教材配套用书

(供临床·基础·检验·预防·护理·口腔·药学·临床药学·中药学·医药营销等专业用)

基础化学实验

(双语教材)

第2版

主编 胡 琴 祁嘉义

高等教育出版社



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基础化学实验 (双语教材)

EXPERIMENT FOR FUNDAMENTAL CHEMISTRY

第2版

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内容提要

本书是普通高等教育“十一五”国家级规划教材胡琴、祁嘉义主编《基础化学（第3版）》的配套实验（双语版）教材，根据基础化学课程的要求和各医学院校基础化学实验教学的实践编写而成，注重培养学生的动手能力，创新意识和分析问题、解决问题的能力。

全书精选了21个实验，分别属于基本操作实验、基础理论实验、综合性实验和设计性实验。全书采用中英文对照，能满足双语教学的要求；配有“数字课程”基础版，内容包括各实验教学PPT及部分重要实验的教学视频，利于学生掌握实验操作。

本书使用对象为高等医学院校各专业本、专科学生及留学生。

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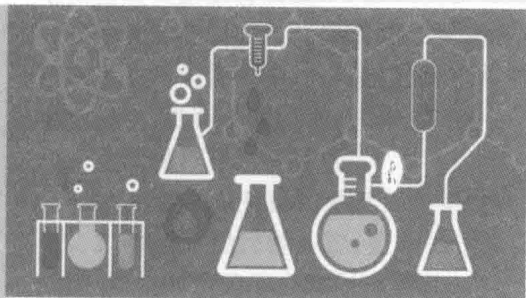
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基础化学实验 (双语教材) (第2版)

基础化学实验数字课程与纸质教材一体化设计, 紧密配合。数字课程包括各实验的教学PPT和部分实验的教学视频。充分运用多种形式媒体资源, 极大地丰富了知识的呈现形式, 拓展了教材内容。在提升课程教学效果的同时, 为学生学习提供思维与探索的空间。

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前 言

基础化学实验是基础化学的重要组成部分,也是培养医学人才不可缺少的环节。

本书在祁嘉义主编《基础化学实验》(双语版)的基础上进行了修改和调整。基于实验教学的特点,该教材扼要介绍了基础化学实验的基础知识、仪器及操作。实验包括四个部分:基本操作实验、基础理论实验、综合性实验和设计性实验。将原教材中所附的每一个实验报告模板这部分内容删除,代之以性质实验和滴定实验的实验报告模板;考虑到实验课课时较短,保留了实验十五碘量法的应用中的直接碘量法测定维生素 C 的含量,删除了间接碘量法测定葡萄糖的含量;并对设计性实验进行了更改,使之更易操作;更新了附录中相关的数据。

本教材具有以下特点:

1. 对各学校开设的基础化学实验内容进行精选。
2. 调整了设计性实验,更加易于操作,有利于提高学生分析问题、解决问题的能力 and 创新意识。
3. 采用中、英文编写。

参加本书编写的有胡琴(前言、实验室规则和安全要求、实验十四、附录),祁嘉义(实验室规则和安全要求),宋慧(实验一、五),欧阳燕(实验二、四、九),许贯虹(实验三、六、十二),谢夏丰(实验七、二十),刘娜(实验八、十三),李发胜(实验十、十五),贺艳斌(实验十一、十九),周丹(实验十六、十八),肖锡林(实验十七、二十一)。

本书供高等医学院校基础化学实验教学使用,实验内容可根据教学需要选做,同时也可供医学工作人员参考。

本教材中的错误敬请读者批评指正。

胡 琴

2016 年 4 月

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实验室规则和安全要求

一、实验要求

1. 实验前

充分预习实验教材是保证做好实验的一个重要环节。实验之前学生应认真看实验教材,查阅相关文献,明确实验目的、原理、方法和步骤。初步估计实验结果。认真写出预习报告并回答思考题。

2. 实验过程中

学生应遵守实验室规则,接受教师指导,按照实验教材上所指导的方法、步骤、要求及药品的用量进行实验;并细心观察现象,如实记录于实验报告中。同时,应深入思考,分析产生现象的原因。如果遇到意外情况需要改变实验步骤,先和指导教师商量,得到同意后再改。

3. 实验报告

实验完毕后,学生应当堂(或在指定时间内)做好实验报告。本书附有实验报告的模板,供学生书写实验报告时参考。实验报告是对实验的总结,报告中计算实验结果并作出相关解释。实验报告要记录清楚、结论明确、文字简练、书写整洁。

二、实验规则

1. 进实验室应穿白大褂,若有长发应扎起来。

实验前要清点仪器,如果发现有破损或缺少,应立即报告教师,按规定手续到实验预备室补领。

实验时仪器若有损坏,也应按规定手续到实验预备室换取新仪器。未经教师同意,不得挪用其他位置上的仪器。

实验过程中应严格按照教师的指导,不做教师没有授权的实验。

2. 实验时应保持安静,注意力集中,认真操作,仔细观察现象,如实记录结果,积极思考问题。

3. 实验时要爱护仪器,注意节约水、电、药品。

所有试剂都应贴上标签,包括实验台上的试剂和自己手边的试剂。取试剂前应先检查标签。药品自瓶中取出后,不能放回原瓶。瓶塞不可以朝下放在桌面,以免沾上杂质,取样后尽

快盖上瓶塞,以免盖错瓶塞。不要把不干净的药匙或移液管插到试剂瓶内。如果只取少量溶液,可先将适量溶液倒入干净烧杯中,然后从烧杯中取,取完后立即将试剂瓶放回原处。

4. 实验时应保持实验室和桌面清洁整齐。

固体废弃物倒入垃圾桶,废液倒入指定回收瓶内,严禁将其倒入水槽内以防止堵塞、腐蚀和污染。

5. 使用精密仪器时,应严格按照操作规程进行,要谨慎细致。如果发现仪器有故障,应立即停止使用,及时报告指导教师。分析天平用完后应立即将残留的固体清理干净。

6. 实验时要求按正确操作方法进行,注意安全。不要用湿手触摸电源。

7. 实验完毕后应将玻璃仪器洗涤洁净,放回原处。值日生负责打扫整个实验室。清洁并整理好桌面,打扫干净水槽和地面。实验室内的一切物品(仪器、药品和实验产物等)不得带离实验室。离开实验室前应洗净双手并检查电源、水龙头、窗户是否关好。

三、安全守则

化学药品中有很多是易燃、易爆、有腐蚀性或有毒的。使用化学试剂和操作特殊的实验仪器设备时,如果使用或操作不当会有危险。只有充分了解安全注意事项,在思想上高度重视安全问题,集中注意力,遵守操作规程,才能有效避免事故的发生。

1. 火灾和爆炸的预防

(1) 易燃材料要远离明火,实验室常用的易燃材料有:苯、钠、乙醚、二硫化碳、磷、硫磺、丙酮等。明火不用时要及时熄灭,不能离开无人看管的明火。

(2) 乙醚、乙醇、丙酮、苯等有机易燃物质,安放和使用时必须远离明火,取用完毕后应立即盖紧瓶塞和瓶盖。不能用明火直接对易燃液体加热,可使用电热套或水浴加热。

(3) 尽量避免易燃气体和空气进行混合,如需混合,容器要用布围住或在有隔离罩处混合。

(4) 化学反应或加热产生气体时,要注意压力的调节。避免对封闭的容器加热,以免引起爆炸。

(5) 强氧化剂与强还原剂要分开存放。

(6) 使用酒精灯时,应随用随点燃,不用时盖上灯罩。不要用已点燃的酒精灯去点燃别的酒精灯,以免酒精溢出而失火。

(7) 实验室禁止吸烟。

2. 预防中毒

(1) 由于试剂瓶上的标签有可能误标,所以要避免任何试剂入口,以防中毒。

(2) 不要让试剂药品与皮肤接触,可以利用实验室的移液管、吸量管、漏斗、药匙等工具移取化学试剂药品。

(3) 闻试剂的气味时,不能直接用鼻子闻,可使用招气入鼻法。

(4) 要特别注意有强腐蚀性或剧毒药品,实验室常用的有毒试剂如下:浓酸,浓碱,硫化物,四氯化碳和其他的氯化物,铬化合物,碘,溴,氰化物,银盐,铅、汞、砷及其化合物。这些试剂不可以入口或接触伤口,也不能将有毒药品随便倒入下水管道。

(5) 使用移液管转移溶液时,不要用嘴吸,应该用洗耳球。

(6) 任何有毒、有刺激性的气体或有恶臭的气体的实验都应在通风橱内或通风处进行。

(7) 有些有毒试剂通过沾在手上后可入口或直接渗透皮肤被吸收,所以要养成离开实验室前洗手的习惯。

(8) 禁止将食物带到实验室。

3. 防止化学灼伤

(1) 浓酸和碱是危险的,严重灼伤皮肤和眼睛后有可能无法治愈。移取这些试剂时要加倍小心。在不能确定是否安全的情况下,不要把这些试剂加入其他的化学试剂中。避免所有这些化学试剂与皮肤的直接接触。

(2) 用塞子堵住试管和烧瓶振摇,不可以用手或拇指塞堵瓶口。

(3) 白磷、溴、氟化氢是有慢灼烧性的,处理这些试剂时要做适当的保护。

(4) 浓硫酸的稀释过程产生大量的热,容易引起喷溅而灼伤,注意要将浓酸缓慢加入水中而不要将水加入酸中。

(5) 加热试管时,不要将试管口指向自己或别人,不要俯视正在加热的液体,以免液体溅出,受到伤害。

四、实验室意外事故的处理

1. 着火

(1) 衣服起火,寻求帮助的同时,躺在地上滚动使火熄灭。

(2) 溶剂或化合物起火,应快速用湿布或沙土将其扑灭。

(3) 若遇电气设备着火,必须先切断电源,再用泡沫式灭火器或四氯化碳这类灭火器灭火(实验室应有灭火设备)。

(4) 有机化合物起火不要用水灭火,因为这样只会使火蔓延。

(5) 如果火势很大无法控制,立即撤出实验室并与教师取得联系,或在一个安全的地方拨打 119。

(6) 听到火警铃响起应立即离开实验室。

2. 中毒

(1) 如果怀疑自己吸入有害的气体,要离开实验区域,呼吸新鲜空气,情况严重的,要立即进行急救。若吸入氯、氯化氢等气体,可立即吸入少量酒精和乙醚的混合蒸气以解毒;若吸入硫化氢气体,会感到不适或头昏,应立即到室外呼吸新鲜空气。

(2) 如果有毒物质不慎入口,首先应用大量水漱口,用手指插入咽喉处催吐,然后送医院治疗。

3. 割伤

如果割伤,应立即挤出污血,用消毒镊子夹出碎玻璃,用大量冷水冲洗伤口。然后涂上碘酒,用绷带包扎。

4. 化学灼伤

(1) 如果腐蚀性试剂如浓酸或碱溅到衣服或皮肤上,应立即脱下衣服,用大量水冲洗至少 10 min,然后通报指导教师处理。

(2) 眼睛被酸或碱灼伤时,应立即用大量水冲洗,然后送往医院治疗,不能加任何中和试剂。

(3) 如果皮肤被溴烧伤了,应立即把溴擦掉,用乙醇或石油醚洗,然后用 2% $\text{Na}_2\text{S}_2\text{O}_3$ 溶液清洗。

(4) 遇有烫伤事故,可用高锰酸钾溶液或苦味酸溶液揩洗灼伤处,再搽上凡士林或烫伤油膏。

遇有触电事故,首先应立即切断电源,然后在必要时进行人工呼吸。对伤势较重者,应立即送医院医治,任何延误都可能使治疗复杂和困难。

(胡 琴 祁嘉义)

Rules and Safety Requirements for Laboratory

I. Requirements of experiment

1. Before experiment

Preparation before experiment is a very important process. Before the experiment students should read the teaching materials seriously and know the purpose, content, principle, operation method and experiment notice, and estimate the results of every step. Prepare the pre-lab report according to different experiments and the request of the instructor. Seriously think about the questions before experiment.

2. During experiment

Students should do experiment according to the experiment textbook and obey the rules of the lab. Record faithfully the exact phenomenon and data you observe. Deeply think what you see and analyze the reason for producing the phenomena. If you meet some incidents and want to change the procedure, ask for the instructor first and make the changes after permission.

3. Experimental report

Experimental report should be finished in class or in a specified period of time and handed in to the teacher. The examples of experiment report can be found in this book. The report is the summarization of the experiment. In the section of the report you evaluate and interpret your experimental results. Reports should be written orderly with actual results and conclusion. The report should be recorded clearly, and with definite results, simple and clean writing.

II. Rules for laboratory

1. You should wear a laboratory coat and if you have long hair, tie it back as long as you are in the laboratory.

Check all the apparatus before the experiment. If there are any questions, report to the instructor. If there is a lack of equipment or some experiment apparatus are broken, you should tell the instructor. If the equipment apparatus does not work, you can change a new one according to the rules of preparation room. You should not use the equipment from other place without agreement of the instructor. Whenever you are in the chemistry laboratory, follow the directions of the instructor strictly. Do not attempt to do experiments without the permission of the instructor.

2. During the experiment you should keep quiet, pay attention, operate accurately, watch carefully, make the exact record and think positively.

3. In the experiment, use the equipment carefully and skillfully, and save power, water and chemicals. All chemicals, including not only the bottles on the shelves and chemicals on or in your desk in the laboratory must be clearly labeled. Check the labels before using chemicals. Never return chemicals to bottles of their origins. Put the stopper upside down on the bench to prevent the stopper being contaminated. Cover the container with its stopper immediately after use to avoid mismatching the stopper and its container. Never insert an unclean spatula or pipette into a reagent bottle. If you need a few drops of solution, pour a little into a beaker and then take what you need from the beaker. Place the container to original position.

4. Keep the laboratory tidy all the time during the experiment. All the wastes especially the poisonous chemicals should be pour into the assigned recycling bottle, not sewerage.

5. When using specific instruments you should strictly follow operation processes. If the instrument is broken, stop using it and report to the instructor. After using the analytic balance, clean up any spills at once.

6. In the experiment, operate with the experimental procedures and safety consciously. Don't touch the electrical equipments as your hands are wet.

7. After finishing the experiment, clean all the apparatus and place them back. Students on duty should clean the whole laboratory. Clean table, sink and floor. All stuffs that belong to the lab should not been taken away. Before leaving the laboratory, wash your hands thoroughly. Check whether the electricity, all the water taps and windows are switched off safely.

III. Safety regulations

Chemicals are hazardous because of their flammable, explosive, corrosive and toxic properties. As part of laboratory experiences you will handle many chemical substances and operate specialized laboratory equipments. Many of these substances pose a health risk if handled improperly, while some of the laboratory equipments can cause severe injury if used improperly. You should completely know the safety regulations. In the experiment, you should attach importance to the safety, keep concentrated and adhere to experimental procedures to avoid dangerous accident.

1. Prevention of fires and explosions

(1) Keep flammable materials away from flames. Flammable chemicals commonly encountered in the laboratory are: benzene, sodium, ether, carbon disulfide, phosphorus, sulfur, acetone. Extinguish all flames when you do not use it anymore. Never leave a flame unattended.

(2) Flammable organic chemicals such as ether, ethanol, acetone and benzene should be kept away from an open flame. Cover the stopper of container immediately after use. Use an electric heater or a water bath for heating flammable liquids. Never heat them over a direct flame.

(3) Avoid, wherever possible, mixing air with flammable gases or volatile liquids. If the mixture is needed, wrap the container with a cloth or place it behind a shield.

(4) When gases or vapors are generated by heat or chemical reaction, pay attention to pressure adjustment. Never heat a sealed vessel to avoid explosion.

(5) Keep strong oxidizing agents away from strong reducing agents.

(6) During using an alcohol lamp, light it up when you use it and extinguish it after use. You should not light an alcohol lamp with a litten alcohol lamp. Otherwise the alcohol will come out and cause fire.

(7) Smoking is not permitted in the laboratory.

2. Prevention of poisoning

(1) Regard all chemicals in the laboratory as poisonous and never eat, drink, or taste anything while in the chemistry laboratory. It is always possible that the bottle is mislabeled.

(2) When you handle chemicals, do not contact them with your skin. Utilize the tools of the laboratory; transfer pipette, measuring pipette, funnel, spoon, and so on.

(3) When it is necessary to sniff the odor of a substance, waft the fumes gently with your hand toward your nose. Never directly smell concentrated fumes.

(4) Pay special attention to highly corrosive or toxic reagents. Some particularly poisonous chemicals commonly used in the laboratory are as follows: concentrated acids, strong alkalies (such as NaOH and KOH), sulfides, carbon tetrachloride (CCl_4) and other chlorinated hydrocarbon, chromium compounds (such as $\text{K}_2\text{Cr}_2\text{O}_7$), iodine (I_2), bromine (Br_2), cyanides (such as HCN, KCN, and NaCN), silver salts (such as AgNO_3), lead (Pb) and its compounds, mercury (Hg) and its compounds, arsenic (AS) and its compounds. Keep them away from your mouth or cut, and never pour them into sewers.

(5) Use mechanical devices for applying suction in pipetting. Never use your mouth for this purpose.

(6) Carry out all experiments involving poisonous, irritating, or objectionable gases in a ventilating hood or in a well-ventilated circumstance.

(7) A possible poisoning hazard, frequently overlooked, is contamination through the hands. Some poisons are rapidly absorbed through the skin and eventually end up in the mouth. Form the habit of always washing your hands before leaving the laboratory.

(8) Food should not be brought into the laboratory.

3. Prevention of chemical burns

(1) Concentrated acids and alkalies are particularly dangerous and can produce painful burns on skin and eyes, which may not be healed. These reagents should be dispensed with great care, never add them directly to other chemicals unless you are certain that it is safe to do so. Avoid all contact of the skin with these materials.

(2) Use the corks to stopper all test tubes or flasks when shaking them, do not use your hand or thumb as a stopper.

(3) White (yellow) phosphorus, bromine, and hydrofluoric acid produce very painful, slow-healing burns. Handle them only with your hands properly protected.

(4) When diluting concentrated sulfuric acid, add the acid slowly to the water. Never add water to the concentrated sulfuric acid. The considerable heat evolved can cause the acid to spatter and result in serious burns.

(5) When you heat test tube, you should not make the test tube mouth point to yourself or others. Do not look down the boiling liquid lest you are hurt by spilling liquid.

IV. Ways of dealing with laboratory accidents

1. Fire

(1) If your clothing catches fire, immediately drop to the floor and roll to smother the flames and call for help.

(2) If a compound or solvent catches fire, cover the flames with a piece of wet cloth or sand as quickly as possible.

(3) If the fire is caused by electrical appliances, first of all, cut off the power, and put the fire out with a fire extinguisher.

(4) Do not put water on an organic chemical fire because it will only spread the fire.

(5) If the fire is out of control, evacuate the lab and the building immediately and tell the instructor or call 119 from a safe phone.

(6) If the fire alarm sounds for any reason, leave the room immediately and exit the building.

2. Poisoning

(1) If you inhale vapors, leave the area immediately — at least into the hallway. Tell the instructor or the coordinator, they will take you outside into the fresh air, and if necessary provide first aid or take you to get medical attention. If chlorine or HCl gas is inhaled, you should immediately breathe a little of mixed steam of alcohol and ether for detoxification; If H_2S gas is inhaled and feel dizziness during experiment you should leave the laboratory area and move to an area where you can breathe fresh air.

(2) In case some poison being taken, first gargle with large amount of water, touch your finger deep into the throat to vomit, then go to hospital for treatment.

3. Cuts

If you cut yourself, extrude the dirty blood immediately, nip out the broken glasses with disinfected forceps, wash the wound with large amount of cool water. Then daub the wound with iodine tincture and bind with bandages.

4. Chemical burns

(1) If you accidentally spill a corrosive chemical, such as a concentrated acid or base, on yourself, quickly remove any contaminated clothing, flush the affected skin for at least 10 min with water, and notify your instructor.

(2) If the eyes are burnt by any acid or base, wash the eyes immediately with large amount of water, then hurry to hospital for treatment. Don't use any solution for neutralization.

(3) If the skin is burnt by bromine, first wipe the bromine up and wash the wound with ethanol or ligroin, then wash the skin with 2% $\text{Na}_2\text{S}_2\text{O}_3$ solution.

(4) If someone is scalded, wash the burning wound with potassium permanganate solution or picric acid and smear some vaseline or scald ointment.

In case of electric shock accidents, cut off the power immediately and make artificial respiration if necessary. In case an injury is severe, you should receive medical treatment. Any delay will result in more complicated therapy.

(Qin Hu Jiayi Qi)

基础化学实验基本操作

要求学生熟练掌握的基础化学实验基本操作包括玻璃仪器的洗涤与干燥、称量、试剂取用、加热、过滤、蒸发等,现介绍如下。

一、玻璃仪器洗涤

化学实验中经常使用各种玻璃仪器。这些仪器是否干净,直接影响到实验结果的准确性。为了得到准确的实验结果,每次实验前后,必须把实验仪器洗涤干净。

玻璃仪器的洗涤一般先用洗涤剂刷洗,再用自来水冲洗,最后用少量蒸馏水或去离子水润洗三次。

对于沾有较难清洗的油污的玻璃仪器,首先用热水或热碱液浸泡,然后用毛刷沾上洗涤剂刷洗,再用清水连续冲洗,最后用蒸馏水或去离子水润洗三次。

对于用以上方法后仍有附着污物的,可用铬酸洗液^[1]浸泡一段时间,或用烧杯或烧瓶加热洗液,然后转移到仪器中,操作洗液时要特别小心。再用清水连续冲洗,最后用蒸馏水或去离子水润洗三次。

已洗净的玻璃仪器应该清洁透明,当把玻璃仪器倒置时,器壁上只留下一层既薄又均匀的水膜,而器壁不挂水珠。

一般洗涤干净的玻璃仪器可以自然晾干。玻璃仪器开口向下,敞开仪器开口,让水分自然流出、挥发。需要尽快使用的玻璃仪器可用烤干、吹干、烘干、有机溶剂挥发干等方法干燥。

二、称量

称量是实验室必不可少的基本操作。根据称量所要求的准确度不同,可分别使用台天平(托盘天平)、扭力天平和分析天平。现介绍台天平和扭力天平,分析天平将在“称量基本操作”中专门介绍。

台天平(图0-1)和扭力天平(图0-2)是实验室里常用于称量物质质量的仪器,一般能称准到 $\pm(0.1 \sim 0.001)$ g。使用时要注意以下几点:

[1] 铬酸洗液的配制:取10 g工业用 $K_2Cr_2O_7$,置于烧杯中。先用少量水溶解,在不断搅拌下缓慢加入200 mL工业用浓硫酸,待溶解并冷却后,即可保存于试剂瓶中待用。

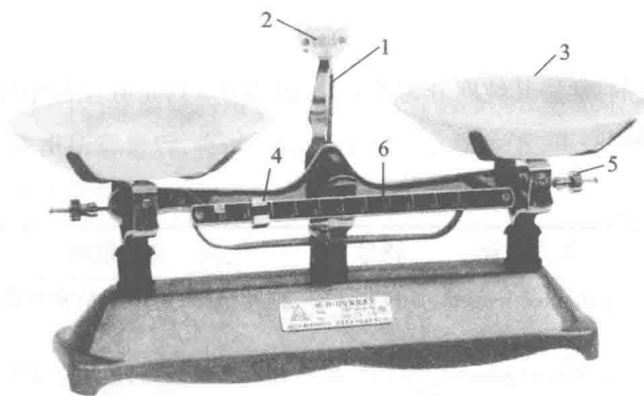


图 0-1 台天平

1. 指针;2. 标尺;3. 托盘;4. 游码;5. 零点调节螺丝;6. 刻度尺

Fig. 0-1 Platform balance

1. pointer;2. scale;3. tray;4. rider;5. zero adjustment screw;6. measuring scale

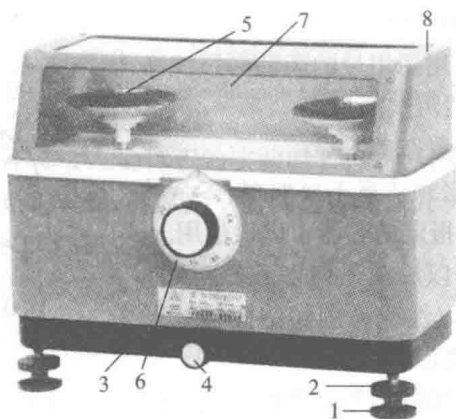


图 0-2 扭力天平

1. 垫脚 2. 水平调节螺丝 3. 底板 4. 开关旋钮 5. 秤盘
6. 刻度盘 7. 指针观察窗 8. 保护罩

Fig. 0-2 Torsion balance

1. mat;2. level adjusting screw;3. basal plane;4. switch;5. the pan of a steelyard;
6. dial indicator;7. window for observing pointer;8. protecting cover

(1) 检查零点。调节托盘下面的平衡螺旋,使指针在刻度板的中心等距离摆动,则此时天平处于零点状态。

(2) 称量物不能直接放在托盘上,可在两个托盘上各放一张大小相同的同种纸,然后把要称量的药品放在纸上称量。潮湿的或具有腐蚀性的药品必须放在玻璃器皿(如表面皿、烧杯)中称量。

(3) 称量时,把称量物放在左盘,砝码放在右盘,先加质量大的砝码,后加质量小的砝码,最后移动游码。取用砝码应使用镊子。若称量指定质量的物质时,应先将该质量的砝码放在右盘上,游码移动至所取质量的位置,然后往左盘上加被称物质,当被称物质的质量接近所需质量时,可左手拿药匙,右手轻拍左手,用振动药匙的方法使少量物质散落下来至天平平衡。

(4) 称量完毕,应把砝码和镊子放回砝码盒,把游码移回零处,两托盘叠放于一边,以防天平摆动。

三、 试剂取用

实验室所用的试剂,常按其纯度分为若干等级(表 0-1)。在实验中应根据工作的具体要求,选择适当等级的试剂。

表 0-1 试剂的规格和适用范围

等级	名称	英文名称	符号	适用范围	标签颜色
一级品	优级纯 (保证试剂)	guarantee reagent	G R	纯度很高,适用于精密分析工作	绿色
二级品	分析纯 (分析试剂)	analytical reagent	A R	纯度仅次于一级品,适用于多数分析工作	红色
三级品	化学纯	chemically pure	C P	纯度次于二级品,适用于一般化学实验	蓝色
四级品	实验试剂 (医用)	laboratorial reagent	L R	纯度较低,适用于做实验辅助试剂	棕色或其他颜色

1. 固体试剂的取用(图 0-3)

- (1) 要用干净的药匙取用。用过的药匙必须洗净和擦干后才能再使用,以免沾污试剂。
- (2) 取用试剂后立即盖紧瓶盖。
- (3) 称量固体试剂时,必须注意不要取多,多余的药品,不能倒回原瓶,可放在指定的容器中以供他用。
- (4) 一般的固体试剂可以放在干净的纸或表面皿上称量。具有腐蚀性、强氧化性或易潮解的固体试剂不能在纸上称量,应放在玻璃容器内称量。
- (5) 有毒的药品要在教师的指导下处理。



图 0-3 固体试剂的取用
Fig. 0-3 The access of the solid reagent

2. 液体试剂的取用

- (1) 从滴瓶中取液体试剂时,要用滴瓶中的滴管,滴管绝不能伸入所用的容器中(图 0-4),以免接触器壁而沾污药品。从试剂瓶中取少量液体试剂时,则需要专用滴管。装有药品的滴

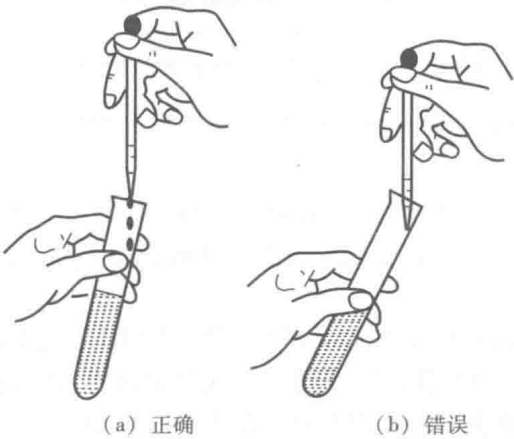


图 0-4 液滴法转移溶液
Fig. 0-4 Transferring solutions by dropping method
(a) right (b) wrong