

Periodic Table

PERIODIC TABLE OF THE ELEMENTS

<http://www.periodni.com>

RELATIVE ATOMIC MASS (1)

GROUP IUPAC

ATOMIC NUMBER

SYMBOL

ELEMENT NAME

Standard State (25 °C; 101 kPa)

Ne - gas Fe - solid

Hg - liquid Tc - synthetic

PERIOD	GROUP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1	IA	H 1.0079 HYDROGEN																		He 4.0026 HELIUM
2	IIA	Li 6.941 LITHIUM	Be 9.0122 BERYLLIUM																	Ne 20.180 NEON
3		Na 22.990 SODIUM	Mg 24.305 MAGNESIUM																	Ar 39.948 ARGON
4		K 39.098 POTASSIUM	Ca 40.078 CALCIUM	Sc 44.956 SCANDIUM	Ti 47.867 TITANIUM	V 50.942 VANADIUM	Cr 51.996 CHROMIUM	Mn 54.938 MANGANESE	Fe 55.845 IRON	Co 58.933 COBALT	Ni 58.693 NICKEL	Cu 63.546 COPPER	Zn 65.38 ZINC		Ge 72.64 GERMANIUM	As 74.922 ARSENIC	Se 78.96 SELENIUM	Br 79.904 BROMINE	Kr 83.798 KRYPTON	
5		Rb 85.468 RUBIDIUM	Sr 87.62 STRONTIUM	Y 88.906 YTRIUM	Zr 91.224 ZIRCONIUM	Nb 92.906 NIObIUM	Mo 95.96 MOLYBDENUM	Tc 98 TECHNETIUM	Ru 101.07 RUTHENIUM	Rh 102.91 RHODIUM	Pd 106.42 PALLADIUM	Ag 107.87 SILVER	Cd 112.41 CADMIUM		Sn 118.71 TIN	Sb 121.76 ANTIMONY	Te 127.60 TELLURIUM	I 126.90 IODINE	Xe 131.29 XENON	
6		Cs 132.91 CAESIUM	Ba 137.33 BARIUM	La-Lu 57-71 Lanthanide	Hf 178.49 HAFNIUM	Ta 180.95 TANTALUM	W 183.84 TUNGSTEN	Re 186.21 RHENIUM	Os 190.23 OSMIUM	Ir 192.22 IRIDIUM	Pt 195.08 PLATINUM	Au 196.97 GOLD	Hg 200.59 MERCURY		Pb 207.2 LEAD	Bi 208.98 BISMUTH	Po 209 POLONIUM	At 210 ASTATINE	Rn 222 RADON	
7		Fr 223 FRANCIUM	Ra 226 RADIUM	Ac-Lr 89-103 Actinide	Rf 104 RUTHERFORDIUM	Db 105 DUBNIUM	Sg 106 SEABORGIUM	Bh 107 BOHRIUM	Hs 108 HASSIUM	Mt 109 MEITNERIUM	Ds 110 DARMSTADTIUM	Rg 111 ROENTGENIUM	Cn 112 COPECNIUM		Fl 114 FLEROVIUM	Uup 115 UNUNPENTIUM	Lv 116 LIVERMORIUM	Uus 117 UNUNSEPTIUM	Uuo 118 UNUNOCTIUM	
LANTHANIDE																				
		La 138.91 LANTHANUM	Ce 140.12 CERIUM	Pr 140.91 PRASEODYMIUM	Nd 144.24 NEODYMIUM	Pm 145 PROMETHIUM	Sm 150.36 SAMARIUM	Eu 151.96 EUROPIUM	Gd 157.25 GADOLINIUM	Tb 158.93 TERBIUM	Dy 162.50 DYSPROSIUM	Ho 164.93 HOLMIUM	Er 167.26 ERBIUM	Tm 168.93 THULIUM	Yb 173.05 YTTERIUM	Lu 174.97 LUTETIUM				
ACTINIDE																				
		Ac 227 ACTINIUM	Th 232.04 THORIUM	Pa 231.04 PROTACTINIUM	U 238.03 URANIUM	Np 237 NEPTUNIUM	Pu 244 PLUTONIUM	Am 243 AMERICIUM	Cm 247 CURIUM	Bk 247 BERKELIUM	Cf 251 CALIFORNIUM	Es 252 EINSTEINIUM	Fm 257 FERMIUM	Md 258 MENDELEVIUM	No 259 NOBELIUM	Lr 262 LAWRENCIUM				

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(1) Pure Appl. Chem., 81, No. 11, 2131-2156 (2009)
 Relative atomic masses are expressed with five significant figures. For elements that have no stable nuclides, the value enclosed in brackets indicates the mass number of the longest-lived isotope of the element. However three such elements (Th, Pa and U) do have a characteristic terrestrial isotopic composition, and for these an atomic weight is tabulated.

General instructions

ان منهج السلامة في المختبر يتضمن رغبة الشخص العامل لانجاز عمله بطريقة صحيحة, وهناك بعض الارشادات العامة للعاملين في المختبرات ومنها الالمام بطريقة العمل في الحالات الاضطرارية او الفجائية مثل اجهزة اخماد الحريق وصندوق الاسعافات الاولية , ويمنع العمل الفردي في الاعمال المحذورة , ويمنع التعامل مع مواد او اجهزة لم يتم الاطلاع على كيفية عملها, يجب ارتداء صدرية المختبر و النظارات الزجاجية بصورة دائمية مع توفير منشفة و اسفنجة و صابونة, ويمنع التدخين و الاكل و الشرب داخل المختبر . يجب ان يتجنب العامل في المختبر اضافة الماء الى الحامض او القاعدة لان ذلك يؤدي الى حدوث حرائق ولاكن يمكن اضافة الحامض او القاعدة الى الماء

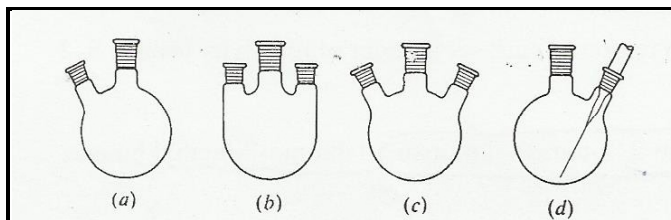
ان تسجيلا كاملا ودقيقا لنتائج العمل المختبري مهم جدا لكل طالب في المختبر ويجب ان يحتفظ الطالب بسجل لعمله في المختبر يحتوي على وصف كامل و دقيق لكل تجربة قام بها. ان التفصيل في الكتابة يجب ان يكون كافيا حتى يتمكن باحث اخر من اعادة العمل و معرفة نتيجة التجربة بصورة مضبوطة. في ادناه مقترحات تنظيمية لسجل مختبري لتسجيل اية تجربة:

1. ابدأ بتسجيل كل تجربة على صفحة جديدة مدونا في السطر الاول تاريخ وعنوان ورقم التجربة المراد القيام بها.
2. اكتب المعادلة الكيميائية الموزونة للتفاعل و المصدر المتبع في التجربة
3. يمكنك كتابة كميات المواد الكيميائية المستعملة في جدول او ادراجها في وصف التجربة ويجب ذكر اوزان المواد الكيميائية و عدد المولات و حجوم المذيبات المستعملة.
4. يجب ان تحتوي الطريقة العملية على:
أ- وصف لكل جهاز غريب و جديد, واذا كانت هناك طريق تبريد معينة او خاصة فيجب وصفها او ذكرها.
ب- التسلسل في اضافة الكواشف و اوقات الاضافة و مدد التفاعل.
ت- درجات الحرارة و خروج الغازات و تغيرات الالوان
ث- طريقة العمل و بضمنها المذيبات المستعملة.
ج- وزن منتج المادة الخام و كذلك المادة النقية و درجات انصهار المواد الصلبة.

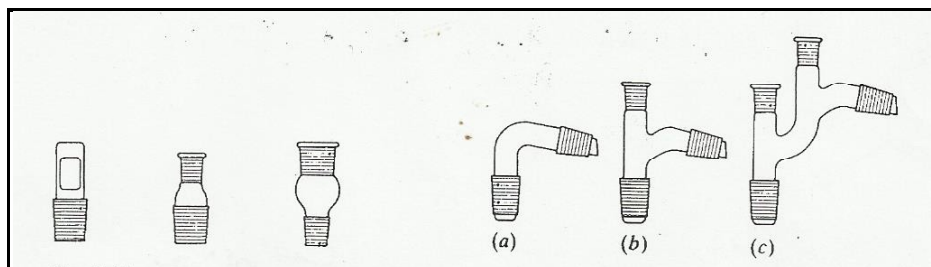
ينظم تقرير كل تجربة حسب الترتيب التالي

The names of participating students	اسماء الطلبة المشاركين:
Name of experimental	اسم التجربة :
Data of experimental	تاريخ اجراء التجربة:
Purpose of experimental	الغرض من التجربة:
Chemical and apparatus	الادوات و المواد المستخدمة:
Discussion	المناقشة (متضمنة المعادلات ان وجدت او التركيب):
	الحسابات و النتائج (متضمنا القوانين وجداول الكشوفات):
Results and calculations	

Classes and Apparatus

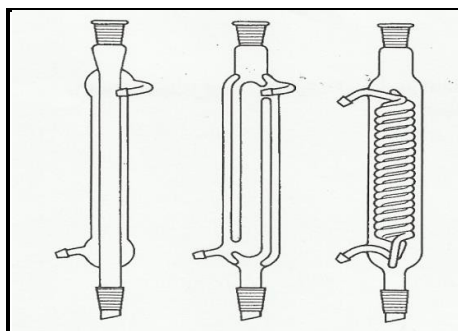


Round – bottomed flasks

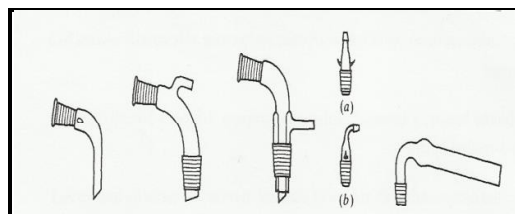


Joint

adapters distillation heads



Condenser



(1)

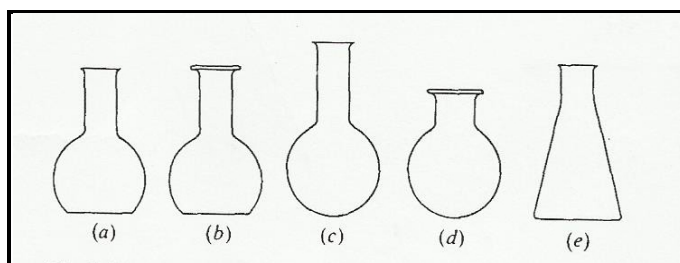
(2)

(3)

(1): receiver adapters or connectors ;

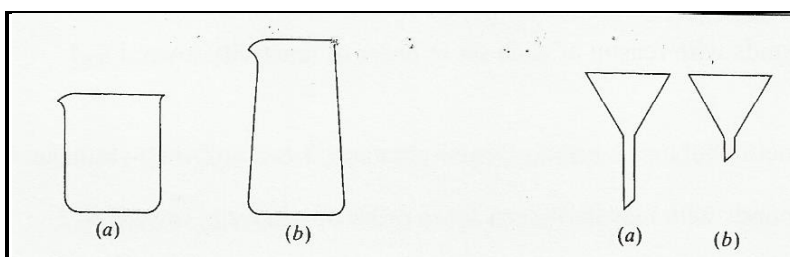
(2): a,b, rubber tubing adapters ;

(3) calcium chloride guard – tube



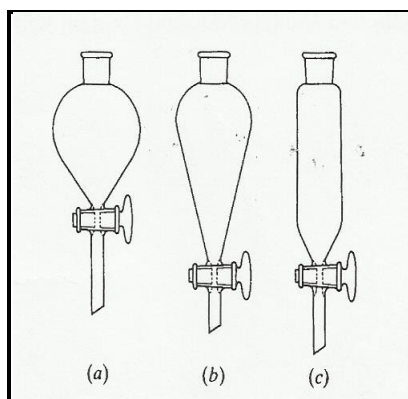
a,b : flat bottomed flasks ; c, d: round bottomed flasks

e: short – necked boiling flask



a : beaker ; b : conical beaker /

a: long funnel ; b: short funnel



Separatory funnels

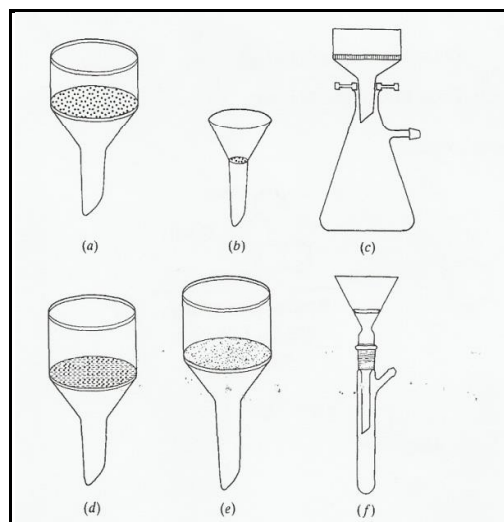
a: Buchner funnel; b : Hirsch funnel;

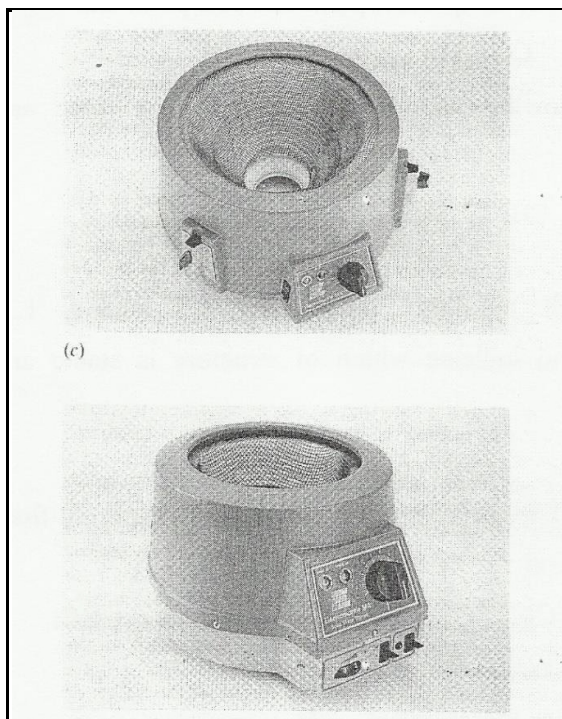
c: Buchner funnel and flask

d: slit sieve funnel;

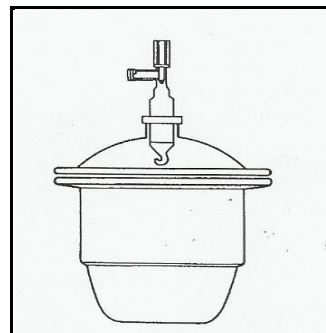
e : sintered glass funnel ;

f: Buchner funnel or Hirsch funnel with glass joints

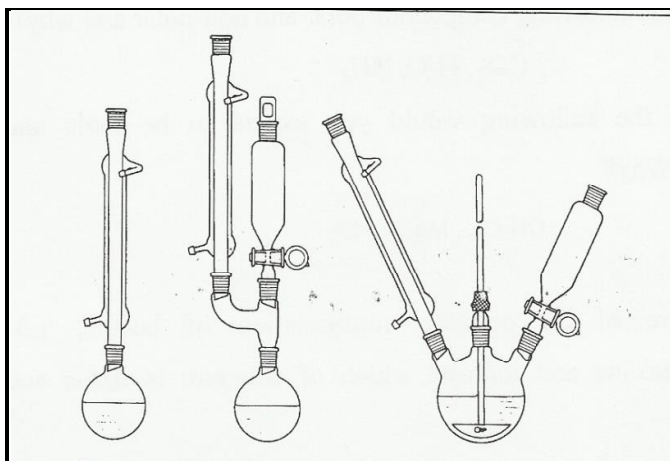




Heating mental



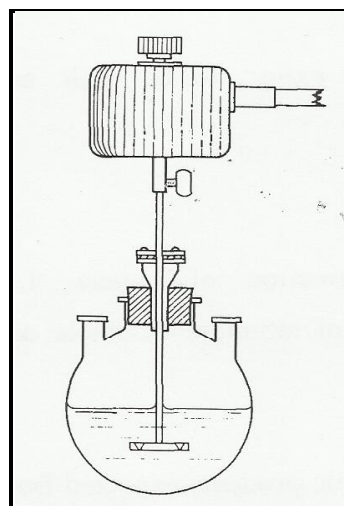
Desiccators



(a)

(b)

(c)

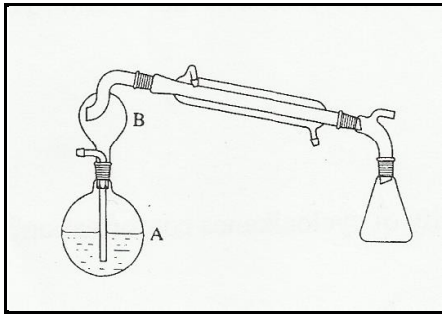


Mechanical shaking

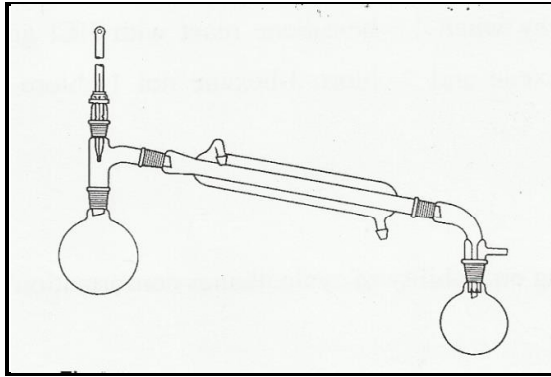
a : Heating a reaction mixture under reflux with addition of liquid

b: Heating a reaction mixture under reflux with addition of liquid

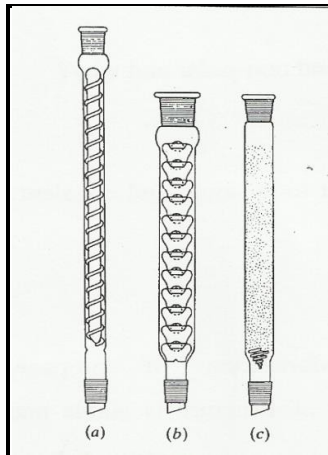
c: Heating a reaction mixture under reflux with addition of liquid and with stirring



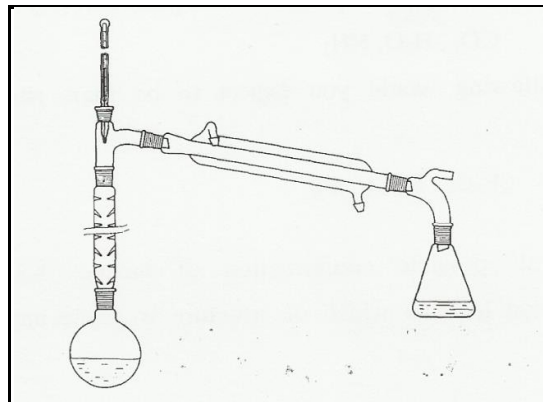
Steam distillation



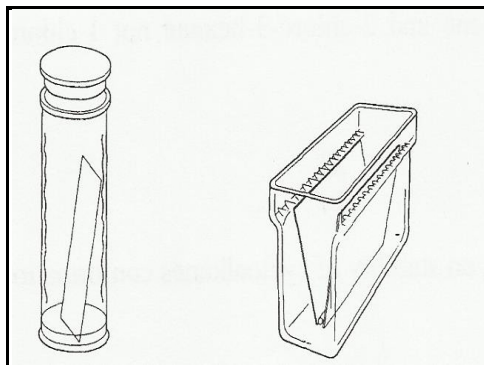
simple distillation at atmosphere pressure



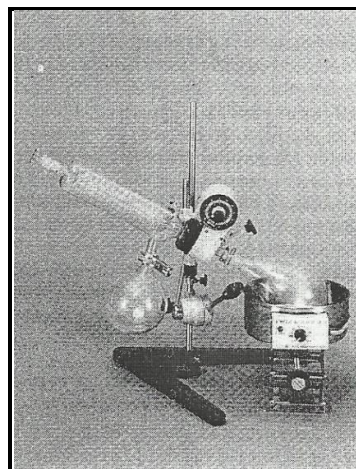
Fractional columns



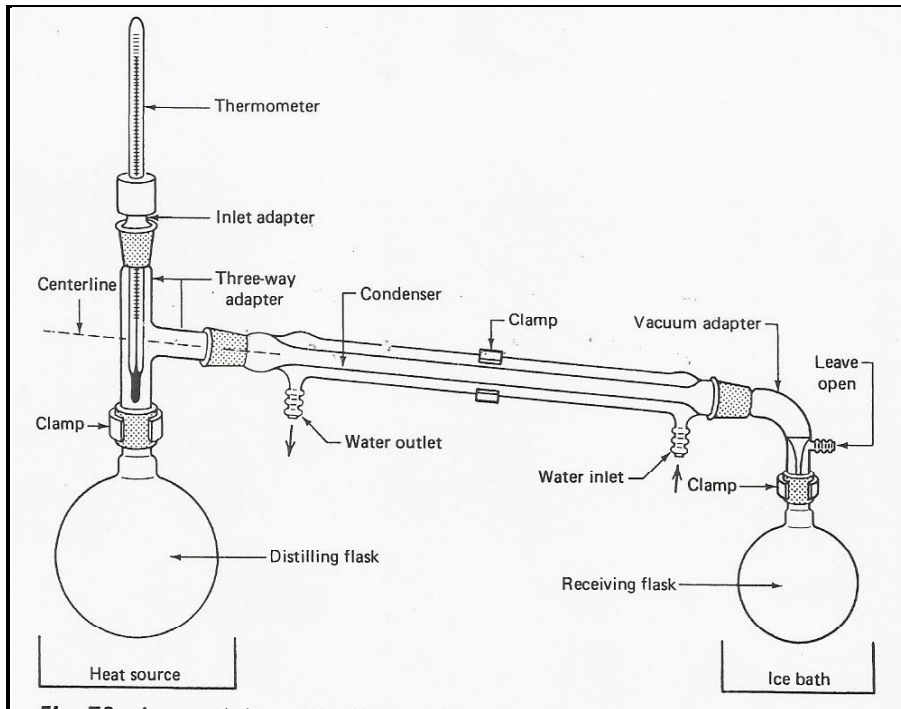
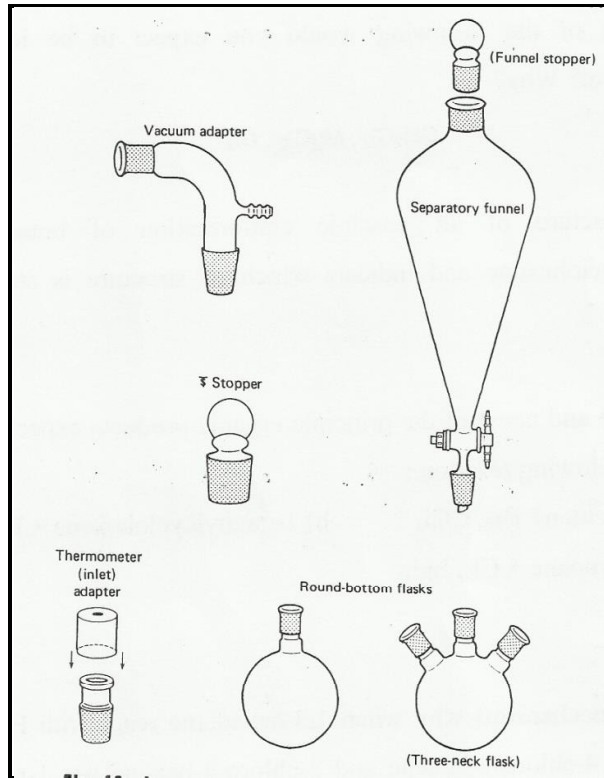
fractional distillation at atmospheric pressure



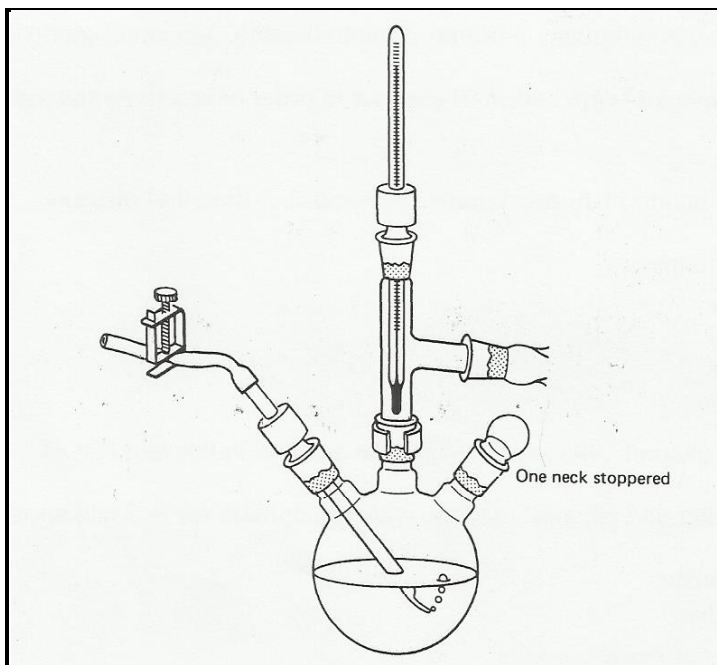
Cylindrical glass jar



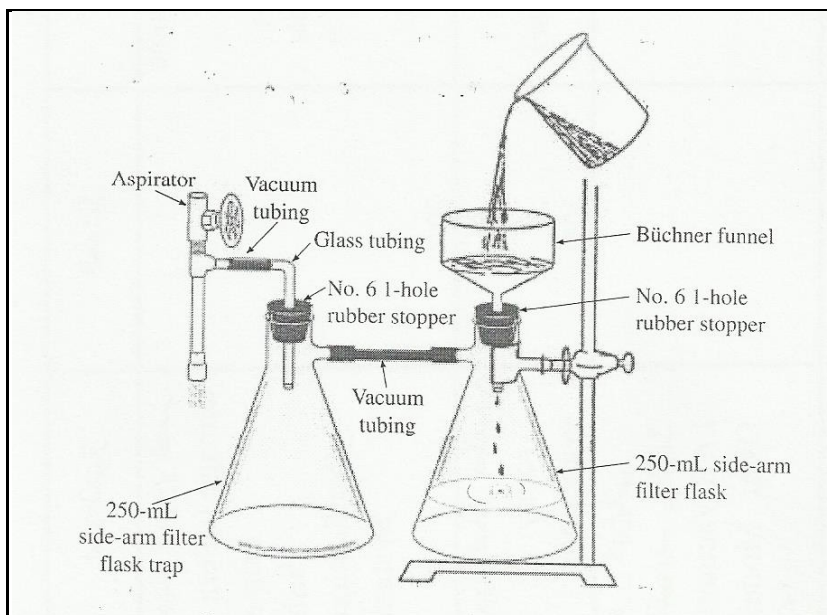
Vacuum distillation



Simple distillation at atmosphere pressure

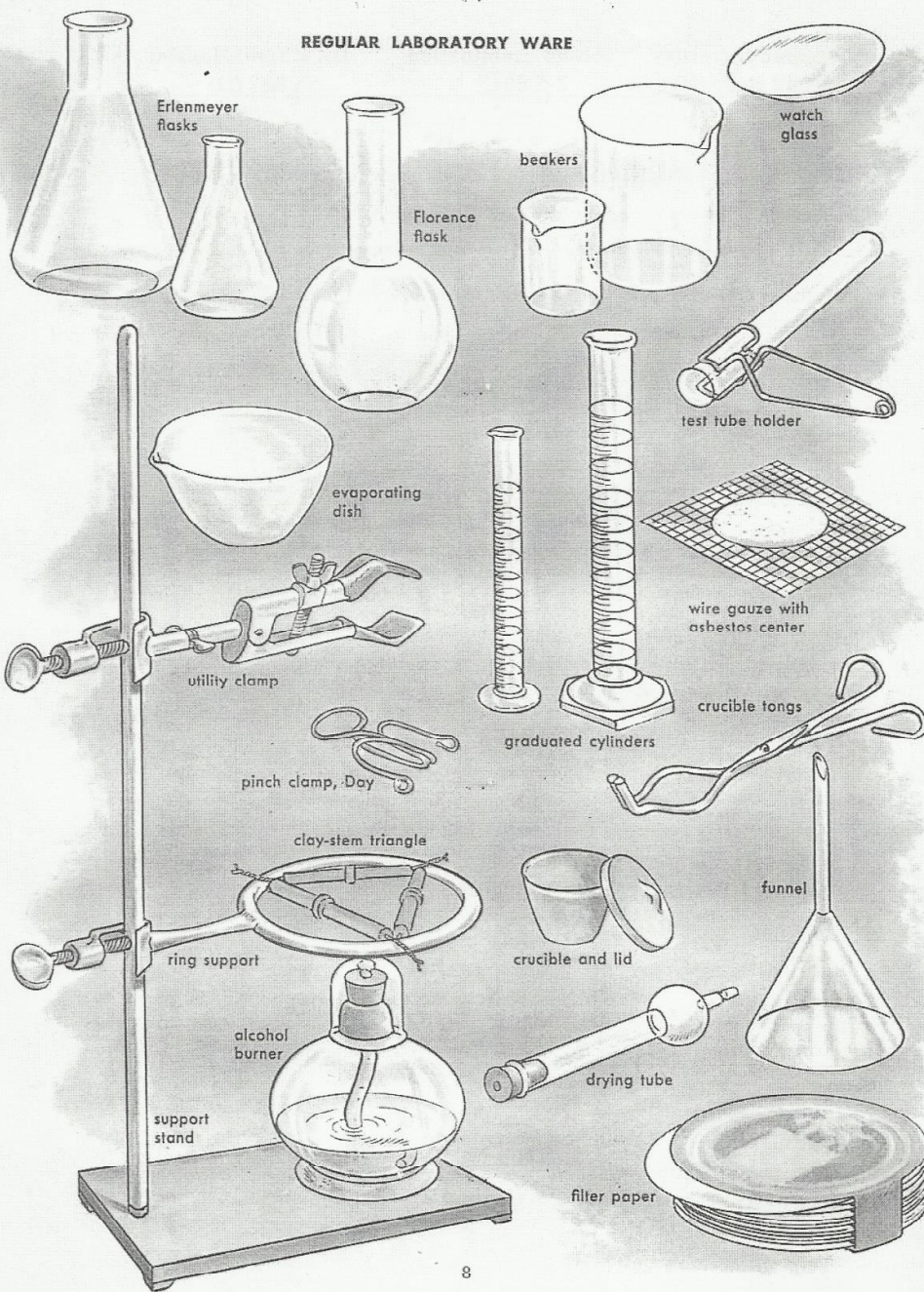


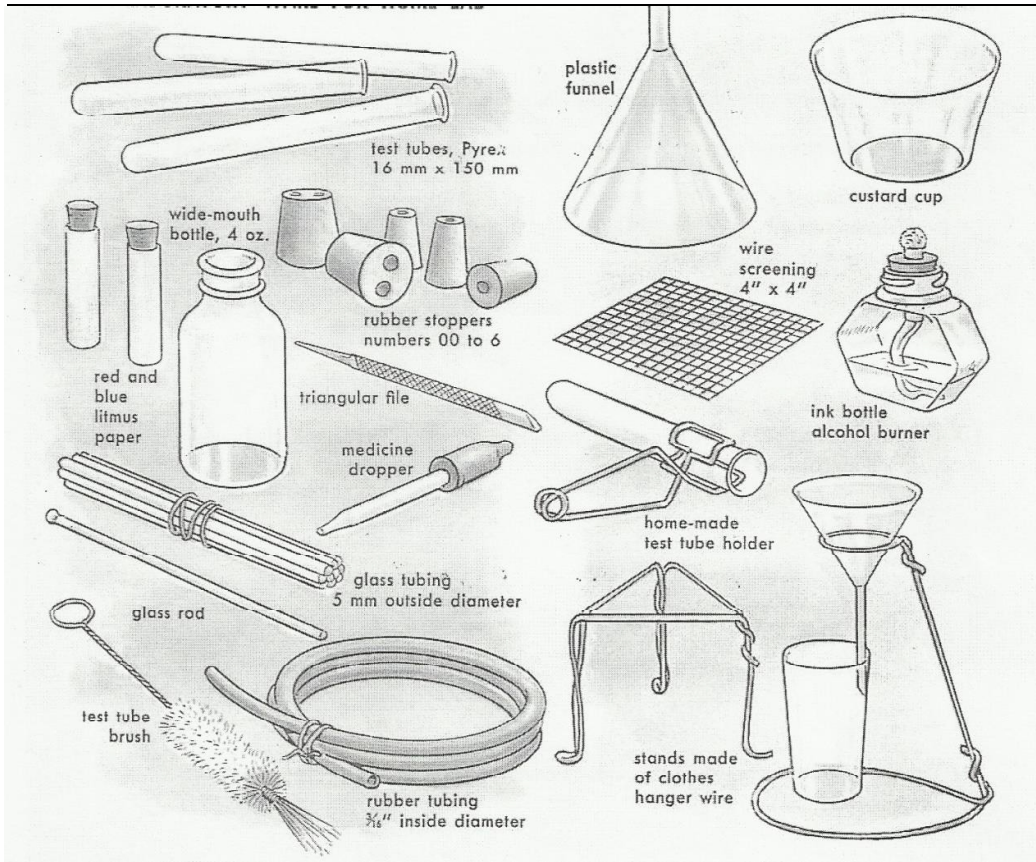
Steam distillation



Vacuum filtration setup using the Buchner funnel

REGULAR LABORATORY WARE





Melting Point**Purpose of experimental**

- 1) To determine melting point of unknown compounds.
- 2) To identify a solid unknown.
- 3) To determine the purity of organic compound.

Theory part of experimental

The melting point of a compound is the temperature at which the solid phase is in equilibrium with the liquid phase. A solid compound changes to a liquid when the molecules acquire enough energy to overcome the forces holding them together in an orderly crystalline lattice. For most organic compounds, these intermolecular forces are relatively weak. **The melting point range** is defined as the span of temperature from the point at which the crystals first begin to liquefy to the point at which the entire sample is liquid. Most pure organic compounds melt over a narrow temperature range of 1-2 °C. The presence of a soluble impurity almost always causes a decrease in the melting point expected for the pure compound and a broadening of the melting point range.

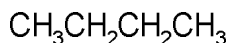
Melting points can also be used to assess compound purity. Purification of the compound causes the melting point range to narrow and the melting point to increase.

The branched chain compounds have lower melting points than the corresponding straight chain isomers. For example, n- butane has a melting points of (- 138 °C) and isobutene (- 159 °C), This is due to the fact that branching of the chain makes the molecule more compact and

Experimental No. (1)

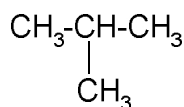
Melting Point

thereby decreases the surface area. Therefore, the intermolecular attractive forces which depend upon the surface area, also become small in magnitude on account of branching. Consequently, *the boiling points of the branched chain alkanes are less than the straight chain isomers.*



n- butane , M.P. = (- 138 °C)

B.P. = (0 °C)



isobutane , M.P. = (- 159 °C)

B.P. = (- 12 °C)

Properties of oil bath:

- 1) Oil must have a high temperature (> 300 °C)
- 2) Oil vapor is not toxic
- 3) Oil must be transparent

Factors affecting the melting point

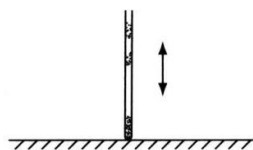
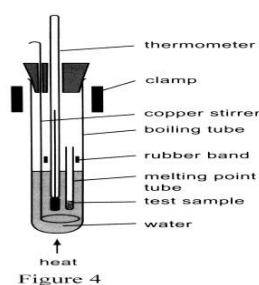
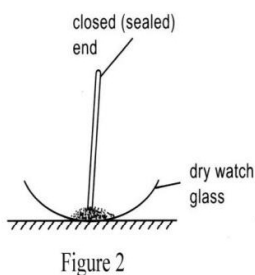
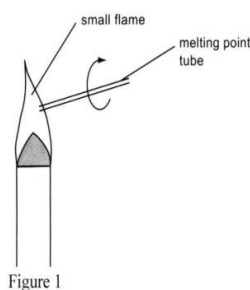
- 1) The nature of the organic compound (aliphatic or aromatic or salt)
- 2) Molecular weight organic compound
- 3) Geometric shape of the organic compound (branched chain or straight chain)
- 4) Composite purity

Chemical and Apparatus

Capillary tubes (about 1 mm bore, about 8 cm length), thermometer (-10 - 110° C), rubber band, glass rod, stand and clamp, burner, 250 cm³ beaker, food oil or paraffin oil , chemical compound (powder).

Procedure of Experimental

- 1) Obtain a sample from your instructor. Record sample ID.
- 2) Put the sample into a capillary tube (about 1-2 mm in height).
- 3) Measure the melting point using the apparatus as shown in Figure 4. Attach the capillary tube to a thermometer with sewing thread. Place 25-30 mL of paraffin oil or glycerol in a 50 mL beaker.
- 4) Turn on the hotplate and observe the melting point. Use a clean glass rod to stir the oil to ensure a uniform heat distribution.
- 5) Record the melting point range (for example 70-73°C)

**Question for discussion**

1. What is the melting point range of pure compound?
2. Is the melting point sharp?
3. How is the melting point of a solid defined?
4. How is the melting point of a solid used to identify the solid?
5. How is the melting point of a solid used to assess the purity of the solid?