

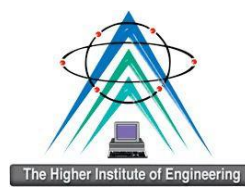
المحتويات:

- كلمة أ.م. د مدير البرنامج
- معامل البرنامج:
- 1 - معمل الهندسة الكيميائية (١١٣ ب)..... ٤
- 2 - معمل الكيمياء العضوية والصناعات العضوية (١٣ ب)..... ١٣
- 3 - معمل الكيمياء الفيزيائية (١٠ ب)..... ٢٣
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◆ كلمة مدير البرنامج:



برنامج الهندسة الكيميائية هو فرع من فروع الهندسة التي تستخدم مبادئ العلوم الأساسية المتمثلة في الكيمياء والفيزياء والرياضيات والأحياء من أجل استخدام وتصميم وتطوير العمليات الصناعية الكيميائية. يتوافر بقسم الهندسة الكيميائية مجموعة من المعامل الكيميائية التي تخدم لائحة البرنامج والعملية التعليمية والبحثية. ولقد تم إعداد هذا الدليل للتعرف على المعامل والأجهزة العلمية الموجودة بها والتجارب التي تجري فيها.



معمل الهندسة الكيميائية (113 ب)

◆ مقدمة

يتواجد معمل الهندسة الكيميائية بمبنى (ب) غرفة رقم (113 ب) ويخدم المعمل طلاب الفرقة الرابعة بقسم الهندسة الكيميائية وكذلك يخدم أيضا طلاب المشاريع وأبحاث أعضاء هيئة التدريس والهيئة المعاونة.

◆ الأجهزة والزجاجيات الموجودة بالمعمل

1- Agitated vessel

The unit consists of a vessel with glass wool insulation around. A helical coil made of copper is fixed inside the vessel. A motorized agitator is fixed at the center of the coil. The vessel is provided with an electric heater and a controller is also provided for vessel. Heater heats water in the jacket while cold water is circulated through coil. Temperature of circulated water and water in vessel is measured and thus heat transfer coefficient at various agitator speeds can be determined.



2- Packed bed

Packed bed reactors can be used in chemical reactions in chemical industries. These reactors are tubular and are filled with solid catalyst particles, most often used to catalyze gas reactions. The chemical reaction takes place on the surface of the catalyst.



3- Double pipe heat exchanger

Double-pipe heat exchangers are used in different industries, They are mainly used for sensible heating or cooling of process fluids in applications of small heat transfer areas of up to 50 m².



4- Water Distillation

In water distillation water is boiled into vapor and condensed back into liquid in a separate container. Impurities in the original water that do not boil below or near the boiling point of water remain in the original container. Thus, distilled water is a type of purified water.



5- Tubular flow reactor

Tubular reactors are continuous flow vessels in steady state that you can use to mix different types of chemicals. It depends on the function of the reactants position rather than the function of time to compete the chemical reactions.



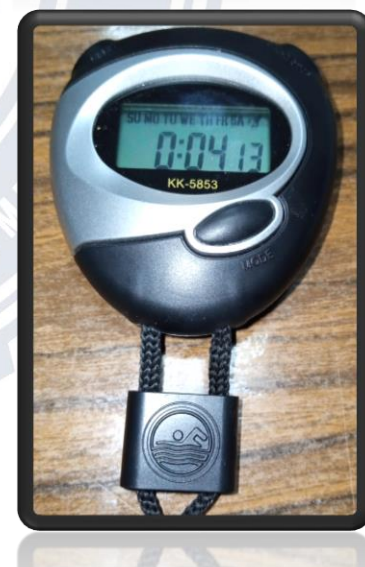


6- Digital balance

The digital balances are very sensitive instruments used for weighing substances to the milligram (0.0001 g) level.

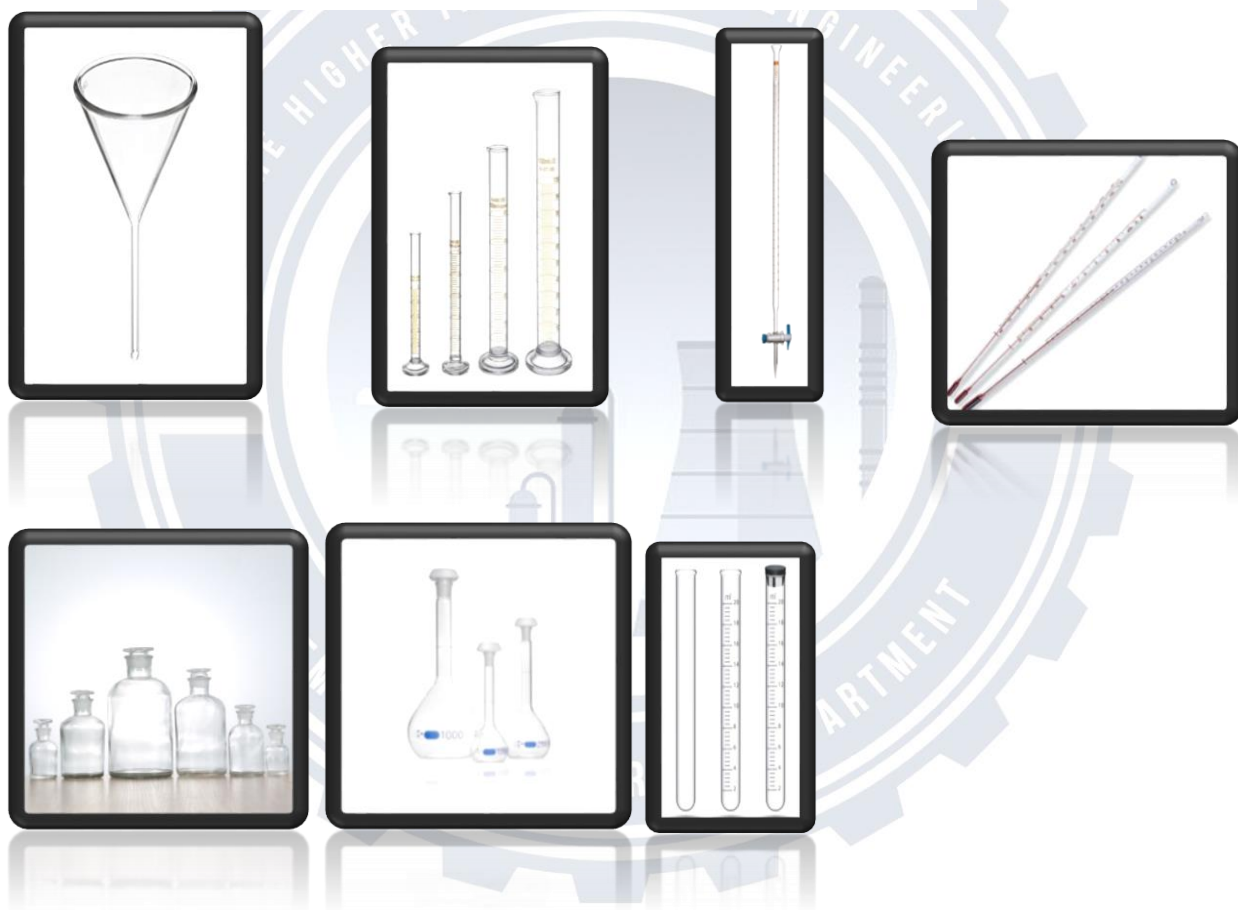


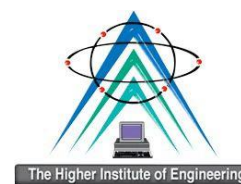
7- Stop watch



8- Glasses

Funnels, measuring cylinders, burettes, thermometer, reagent bottles, pipettes, beakers, measuring flasks, test tubes.





♦ التجارب التي تتم بالمعمل

Chemical Engineering Laboratory
1. Settling of solids
2. Drying process and determination of rate of drying
3. Determination of total dissolved solids
4. Adsorption and the determination of the adsorption isotherm of acetic acid by activated charcoal.
5. Determination of the solubility of the given substance in water at three different temperatures and calculating enthalpy of solution.
6. Kinetic study of pyrolysis of waste agriculture material
7. Determination of Fe^{+2} in a given sample
8. Determination of Chemical Oxygen Demand (COD) of waste water
9. Introduction of different types of chromatographic techniques
10. Determination of the ion exchange capacity
11. Separation of CO^{+2} and Ni^{+2} using an anion exchanger and their estimation
12. Determination of overall heat transfer coefficient.
13. Thermal conductivity of solids.
14. Efflux time for a tank through a hole aside Or in the bottom.
15. Determination of flow rate through venturimeter.
16. Determination of flow through an orifice meter.
17. Determination of viscosity of certain liquids and show if it is Newtonian or non-Newtonian.
18. Determination of viscosity of mixture of water and clays.
19. Determination of diffusivity.
20. Determination of rate of drying for a ceramic body takes into account mass transfer.
21. Time lag.
22. Experiments for a thermometer response.



معمل الكيمياء العضوية والصناعات العضوية (013 ب)

مقدمة

يتواجد معمل الكيمياء العضوية والصناعات العضوية بمبنى (ب) غرفة رقم (013 ب) ويخدم المعمل طلاب الفرقة الأولى والثانية والثالثة بقسم الهندسة الكيميائية في مادة العضوية والصناعات العضوية بالإضافة إلى طلاب الفرقة الإعدادية وكذلك أيضا طلاب المشاريع وأبحاث أعضاء هيئة التدريس والهيئة المعاونة.

الأجهزة والزجاجيات الموجودة بالمعمل

1- Reflux system

Reflux is a technique involving the condensation of vapors and the return of this condensate to the system from which it originated. It is used in industrial and laboratory distillations. It is also used in chemistry to supply energy to reactions over a long period of time.



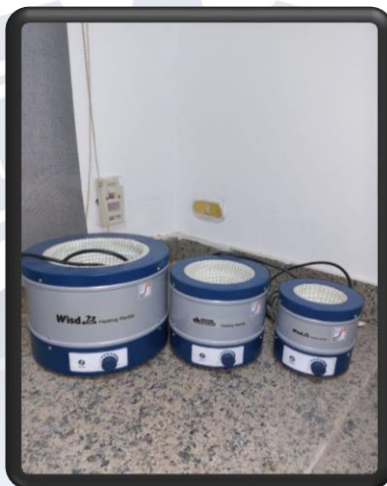
2- Water column

In water distillation water is boiled into vapor and condensed back into liquid in a separate container. Impurities in the original water that do not boil below or near the boiling point of water remain in the original container. Thus, distilled water is a type of purified water.



3- Heating mantles

Heating mantles are used for heating or tempering organic liquids placed in reaction kettles, round-bottomed flasks, or relevant reaction vessels required for the boiling, evaporation, distillation, or extraction process.



4- Separating funnels

Separatory funnels are used in the lab for liquid-liquid extractions, separating a mixture's components into two solvent phases of different densities. The higher density liquid sinks to the bottom and can then be drained from a valve, leaving the less dense



5- Digital balance

The digital balances are very sensitive instruments used for weighing substances to the milligram (0.0001 g) level.



6- Mechanical stirrer

A magnetic stirrer is a device widely used in laboratories and consists of a rotating magnet or a stationary electromagnet that creates a rotating magnetic field. This device is used for mixing a solution.



7- Hot plate:

Hot plates are frequently used in the laboratory to perform chemical reactions, to heat samples, and for numerous other activities. Hot plates are simple of flat surface with heating elements. They do not produce open flames and are well suited for oil or sand bath use.



8- Furnace

Laboratory furnaces use radiant heat transfer to heat an item placed inside the furnace chamber. They generally provide uniform temperatures throughout and can be used for many functions, such as sintering or melting.



9- Glasses

Funnels, measuring cylinders, burettes, thermometer, reagent bottles, pipettes, beakers, measuring flasks, test tubes.





التجارب التي تتم بالمعمل ◆

Organic chemistry (1)
1. Qualitative analysis of Aliphatic Alcohol (Methanol and Ethanol)
2. Qualitative analysis of Aliphatic Alcohol (Glycerol)
3. Qualitative analysis of Aliphatic Aldehyde (Formaldehyde- Acetaldehyde)
4. Qualitative analysis of Aliphatic ketone (Acetone)
5. Qualitative analysis of Aliphatic carboxylic acid (Formic and Acetic acid)
6. Qualitative analysis of Aliphatic carboxylic acid (tartaric acid+ oxalic acid and citric acid)
7. Qualitative analysis of Aromatic carboxylic acid (Benzoic acid)
8. Qualitative analysis of Aromatic carboxylic acid (Salicylic acid)
9. Qualitative analysis of Amide (Urea)
10. Qualitative analysis of Aromatic Alcohol (phenol)
11. Study of general scheme and applications

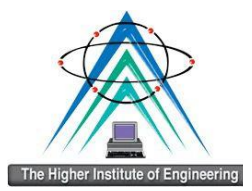
Organic chemistry 2
1. General manipulation (purification of solid – liquid substance)
2. Oxidation of Benzene
3. Nitration of Benzene
4. Sulphonation of Benzene
5. Synthesis of Acetanilide and illustrate the separation and purification methods
6. Synthesis of Azo- dye and illustrate the separation and purification methods
7. preparation of banana oil includes the following process (esterification -heat under reflux-extraction-simple distillation)
8. Synthesis of Dimethylphthalate and illustrate the separation and purification methods
9. Synthesis of Hippuric acid and illustrate the separation and purification methods
10. Preparation of oxalic acid and illustrate the separation and purification methods
11. Isolation of caffeine from tea includes the following process (isolation of natural product-heat under reflux-filtration -extraction-crystallization)
12. Isolation of caffeine from tea include the following process (isolation of natural product-heat under reflux-filtration -extraction-crystallization)



Organic and Biochemistry
1. FTIR spectroscopy application
2. Introduction to carbohydrates
3. Qualitative analysis of monosaccharide carbohydrates (Glucose and Fructose)
4. Qualitative analysis of disaccharide carbohydrates, reducing (lactose and maltose) non reducing (sucrose) and poly saccharide carbohydrates (starch)
5. Study general scheme and application
6. Determination of Glycose concentration
7. Preparation of Glucosazone
8. Qualitative analysis of Aromatic Alcohol
9. Study the properties of edible oil (Acid value of oil)
10. Saponification value of oil
11. Peroxide value of oil
12. Preparation of soap



Organic chemical industries	
1.	Identification of different types of fibers
2.	Preparation of cotton fiber for dyeing include the following process (Alkali boiling- bleaching with hydrogen peroxide- bleaching with sodium hypochlorite)
3.	Solve dying problem
4.	Dyeing of cotton fiber with different types of dyes include
5.	Dyeing with Azoic dyes
6.	Dyeing of cotton fiber with different types of dyes include
7.	Dyeing with Direct dyes
8.	Dyeing of cotton fiber with different types of dyes include
9.	Dyeing with Sulphur dyes
10.	Preparation of novolac and bakelite resin
11.	Preparation of polyacrylamide and determine the heat of formation
12.	Solve problems of determination molecular weight
13.	Determination molecular weight of prepared polymer
14.	(polyacrylamide)
15.	Kinetic of thermal pyrolysis of agricultural waste



معمل الكيمياء الفيزيائية (110 ب)

◆ مقدمة

يتواجد معمل الكيمياء الفيزيائية بمبنى (ب) غرفة رقم (110 ب) ويخدم المعمل طلاب الفرقة الإعدادية والفرقة الأولى بقسم الهندسة الكيميائية وكذلك يخدم أيضا طلاب المشاريع وأبحاث أعضاء هيئة التدريس والهيئة المعاونة.

◆ الأجهزة والزجاجيات الموجودة بالمعمل

10- Heater

Hot plates are frequently used in the laboratory to perform chemical reactions, to heat samples, and for numerous uses. Hot plates are conceptually simple a flat surface with heating elements. They do not produce open flames and are well suited for oil or sand bath use.



11- Dissolved Oxygen meter

Dissolved oxygen meters use an electrochemical, polarographic, amperometric, galvanic, or optical sensor to measure the amount of gaseous oxygen dissolved in a water sample. DO is an important water quality parameter that effects marine life, the taste of drinking water, and the corrosiveness of a water sample.



12- Viscometers

Viscometers are instruments that measure the fluid flow and viscosity of liquids. The viscosity of a liquid can affect its performance, whether this is pumping or piping it, or how it performs for dipping and coating.



13- balance

The digital balances are very sensitive instruments used for weighing substances to the milligram (0.0001 g) level.



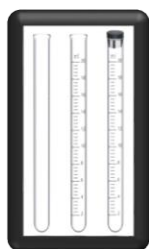
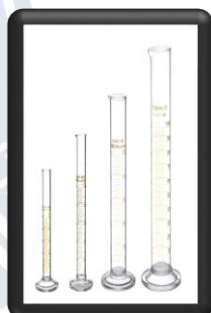
14- Pench top PH meter

A benchtop pH meter is an electronic instrument used to measure the acidity and alkalinity of liquid or semi-solid samples across many industries with applications in waste water, drinking water, food and beverage, chemical and pharmaceutical testing.



15- Glasses

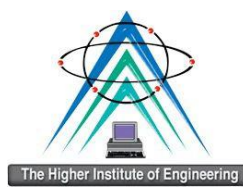
Funnels, measuring cylinders, burettes, thermometer, reagent bottles, pipettes, beakers, measuring flasks, test tubes.





التجارب التي تتم بالمعمل ♦

Physical chemistry and phase equilibrium Lab contents
1. To determine a rough phase diagram of the Pb-Sn alloy system.
2. To measure cooling curve of a Pb-Sn eutectic alloy using thermocouple
3. To determine the partition coefficient of iodine between water and carbon tetrachloride
4. To determine the dimerization constant of benzoic acid in benzene medium by partition method
5. Critical solution temperature of phenol-water system
6. Effect of adding NaCl on Critical solution temperature of phenol-water system
7. Phase diagram of the naphthalene –biphenyl system
8. To determine the composition of the given mixture of naphthalene–biphenyl from the phase diagram of simple eutectic system
9. Determination of Phase diagram for Ethanol/Toluene/water system theory
10. Determination of Phase diagram for chloroform/ acetic acid/ water system
11. Investigate the relationship between the vapor pressure of a liquid and its temperature.
12. Compare the vapor pressure of two different liquids at the same temperature.
13. Use pressure-temperature data and the Clausius-Clapeyron equation to determine the heat of vaporization for two liquids.



معمل الكيمياء الغير عضوية والصناعات
الغير عضوية
(011 ب)

◆ مقدمة

يتواجد معمل الكيمياء الغير عضوية والصناعات الغير عضوية بمبنى (ب) غرفة رقم (011 ب) ويخدم المعمل طلاب الإعدادية و الفرقة الأولى والثالثة بقسم الهندسة الكيميائية في مادة الغير عضوية والصناعات الغير عضوية وكذلك يخدم أيضا طلاب المشاريع وأبحاث أعضاء هيئة التدريس والهيئة المعاونة.

◆ الأجهزة والزجاجيات الموجودة بالمعمل

1- Mechanical stirrer

A magnetic stirrer is a device widely used in laboratories and consists of a rotating magnet or a stationary electromagnet that creates a rotating magnetic field. This device is used to mix a solution.



2- Hot plate:

Hot plates are frequently used in the laboratory to perform chemical reactions, to heat samples, and for numerous other activities. Hot plates are conceptually simple a flat surface with heating elements. They do not produce open flames and are well suited for oil or sand bath use.



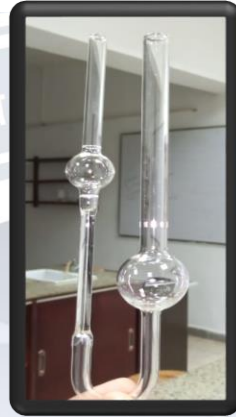
3- Furnace

Laboratory furnaces use radiant heat transfer to heat an item placed inside the furnace chamber. They generally provide uniform temperatures throughout and can be used for many functions, such as sintering or melting.



4- Viscometers

Viscometers are instruments that measure the fluid flow and viscosity of liquids. The viscosity of a liquid can affect its performance, whether this is pumping or piping it, or how it performs for dipping and coating.



5- Pfefferkorn test

Instrument for evaluating the workability of ceramic materials (plasticity) . The measurement is based on a calibrated plate falling onto an underlying test body which is shaped by a special tool. The plasticity tester has two reading scales: one measures deformation in mm, while the other determines deformation of the test body according to Pfefferkorn tests.



6- Glasses

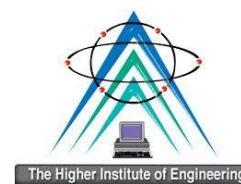
Funnels, measuring cylinders, burettes, thermometer, reagent bottles, pipettes, beakers, measuring flasks, test tubes.





♦ التجارب التي تتم بالمعمل

Inorganic Chemistry
1. Introduction to volumetric analysis
2. Determination normality and strength of HCl
3. Determination normality and strength of weak acetic acid using standard NaOH
4. Standardization of HCl using standard Na_2CO_3
5. Determination normality and strength of mixture of $(\text{OH}^-, \text{CO}_3^{--})$
6. Titration of weak base NH_4OH with strong acid HCl
7. Standardization of KMnO_4 using standard Oxalic acid
8. Determination of ferrous ion in ferrous sulfate solution using (0.1M) KMnO_4
9. Standardization of iodine solution using standard $\text{Na}_2\text{S}_2\text{O}_3$
10. Determination normality and strength of AgNO_3 (sol.) with standard NaCl
11. Complex metric titration (Determination of Cu^{2+} of water sample)
12. Complex metric titration (determination of total hardness of water using EBT indicator)

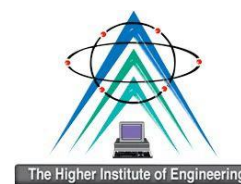


Inorganic and Analytical Chemistry

1. Introduction to volumetric, gravimetric analysis
2. Determination normality and strength of phosphoric acid using 0.1N NaOH
3. Determination normality and strength of mixture of (H_2SO_4 , H_3PO_4) using 0.1N NaOH
4. Determination normality and strength of mixture of (HCO_3^- , CO_3^{2-})
5. Determination normality and strength of ammonium in ammonium salt
6. Analysis of H_2O_2 using (0.1M) KMnO_4
7. Analysis of mixture of sod. Oxalate & oxalic acid using (0.1M) KMnO_4
8. Determination of ferrous ion in ferrous sulfate solution using (0.1N) $\text{K}_2\text{Cr}_2\text{O}_7$
9. Determination of water of hydration in crystallized BaCl_2
10. Determination of calcium as oxalate
11. Determination of lead as chromate
12. Determination of sulfate in water sample
13. Introduction Spectrophotometry (determination of Fe^{2+} in water sample)

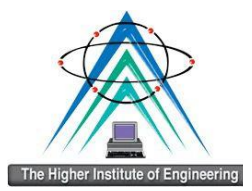


Silicates Industries
1. Rate of drying of ceramic bodies
2. Effect of water addition on clay bodies shrinkage
3. Effect of particle size on clay bodies shrinkage
4. Effect of grog addition on clay bodies shrinkage
5. Viscosity of clay water mixture
6. Standard method to determine apparent porosity and bulk density of refractory brick
7. Cold crushing strength and modulus rupture of refractory brick
8. Powder properties
9. Preparation of gypsum stick
10. Permeability of gypsum stick
11. Evaluation of the water retention of glazed ware
12. Determination of the plasticity of clay-water mixture



Mechanical unit operations

1. Estimation of shape factor for some materials (spherical – cube and cylindrical shapes)
2. Estimation of specific surface area for: kaolin – grog
3. Determination of angle of repose for: kaolin – sand – grog and other
4. Filtration and rate of filtration
5. -Determination of R_m, α for constant pressure filtration.
6. -Case study for determination of terminal velocity of solids in fluids.
7. Case study for Dorrthickner
8. Case study for mixer



معمل تكرير البترول (012 ب)

مقدمة

يتواجد معمل الكيمياء الهندسة الكيميائية بمبنى (ب) غرفة رقم (012 ب) ويخدم المعمل طلاب الفرقة الرابعة بقسم الهندسة الكيميائية وكذلك يخدم أيضا طلاب المشاريع وأعضاء هيئة التدريس والهيئة المعاونة.

الأجهزة والزجاجيات الموجودة بالمعمل

1- Front view distillation apparatus

The standard front view distillation apparatus is used for distillation of groups 1,2 and 3 category products including motor and aviation gasolines, aviation turbine fuels, naphtha, kerosene, distillate fuels, natural gasoline, hydrocarbon mixtures and other petroleum products.



2- Flash point tester pensky martens closed cup testers

Flash point testing is a procedure designed to determine whether a sampled mixture of vapour and air is flammable. It can also determine the temperature at which flammability occurs in a sample. The lowest temperature at which its vapours ignite from an ignition source is the flash point of a material.



3- Carbon residue apparatus Conradson

Conradson Carbon Residue Apparatus is used to test petroleum products to determine the amount of carbon residue left after evaporation and pyrolysis of an oil and to indicate relative coke-forming propensities. Carbon residue is a measure of the amount of coke residue left when a hydrocarbon stream is completely distilled. CCR is used as an indicator of the asphaltene content of a stream and a predictor of the coke yield when the stream is fed to a coker or FCC.



4- Cloud point and pour point test

Cloud and Pour Point Testing allow for an adequate reference for determining whether certain oil products will succeed in different environmental conditions concerning temperature. The Pour Point Tells The Temperature Below Which Oil Cannot Be Used As Lubricant. Cloud Point Indicates The Tendency Of Oil To Plug Filters Or Small Orifices At Cold Operating Temperature. So, Cloud And Pour Point Also Tells Us The Suitability Of Lubricating Oils In Cold Condition.



5- Heater

Hot plates are frequently used in the laboratory to perform chemical reactions, to heat samples, and for numerous other activities. Hot plates are conceptually simple a flat surface with heating elements. They do not produce open flames and are well suited for oil or sand bath use.



6- Hydrometer

A hydrometer is specifically used for measuring low-density liquids such as gasoline, alcohol and kerosene as well as high-density ones such as acids, brine and milk. The only difference is that it will go deeper in high-density whereas it will not be less deep in low-density.



7- balance

The digital balances are very sensitive instruments used for weighing substances to the milligram (0.0001 g) level.





♦ التجارب التي تتم بالمعمل

Petroleum Refining Engineering Lab. Contents	
1.	API gravity testing
2.	ASTM Distillation
3.	ASTM Distillation curve to TBP curve
4.	TBP Curve to ASTM curve
5.	EFV curve from ASTM or TBP
6.	Flash point by Pensky- Martins Apparatus
7.	Pour point of gas oil
8.	Conradson carbon residue CCR
9.	Viscosities of Blends
10.	Flash point & pour point of blends
11.	Net Heating value of fuels
12.	Solid & water content
13.	Sulfur content



معمل تطبيقات الحاسب والنمذجة (٢٠٢١)

مقدمة

يتواجد معمل تطبيقات الحاسب والنمذجة بمبنى (د) غرفة رقم (٢٠٢ د) ويخدم المعمل طلاب الفرقة الثالثة بقسم الهندسة الكيميائية.

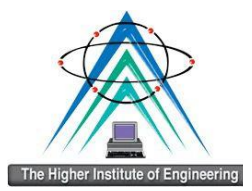
الأجهزة المتوفرة بالمعمل

الأجهزة	البرامج التي تخدم مقررات البرنامج
٢٩ جهاز كمبيوتر	Primavera Aspen Hysis
Core i5-3470 inlet	
١ جهاز كمبيوتر	
Core i5 3.2-4460 intel	
عدد ٢ طابعة	



♦ التجارب التي تتم بالمعمل

Modeling & Simulation
1. Introduction to nature of chemical processes design
2. Theory and numerical analysis in engineering process.
3. Process design and simulation basis, tool and procedure
4. Heat exchanger network and heat recovery
5. Heat exchanger network design (HEN program)
6. Multi -effect evaporator model
7. Separation system & Estimated mass load
8. Short cut method program (SCM program)
9. Entrance of simulation using Aspen Hysys
10. Distillation tower design and calculations
11. Distillation tower design in Aspen Hysys
12. Chemical reaction in Hysys
13. Chemical plant simulation using Aspen Hysys



معامل الفرقة الإعدادية

مقدمة

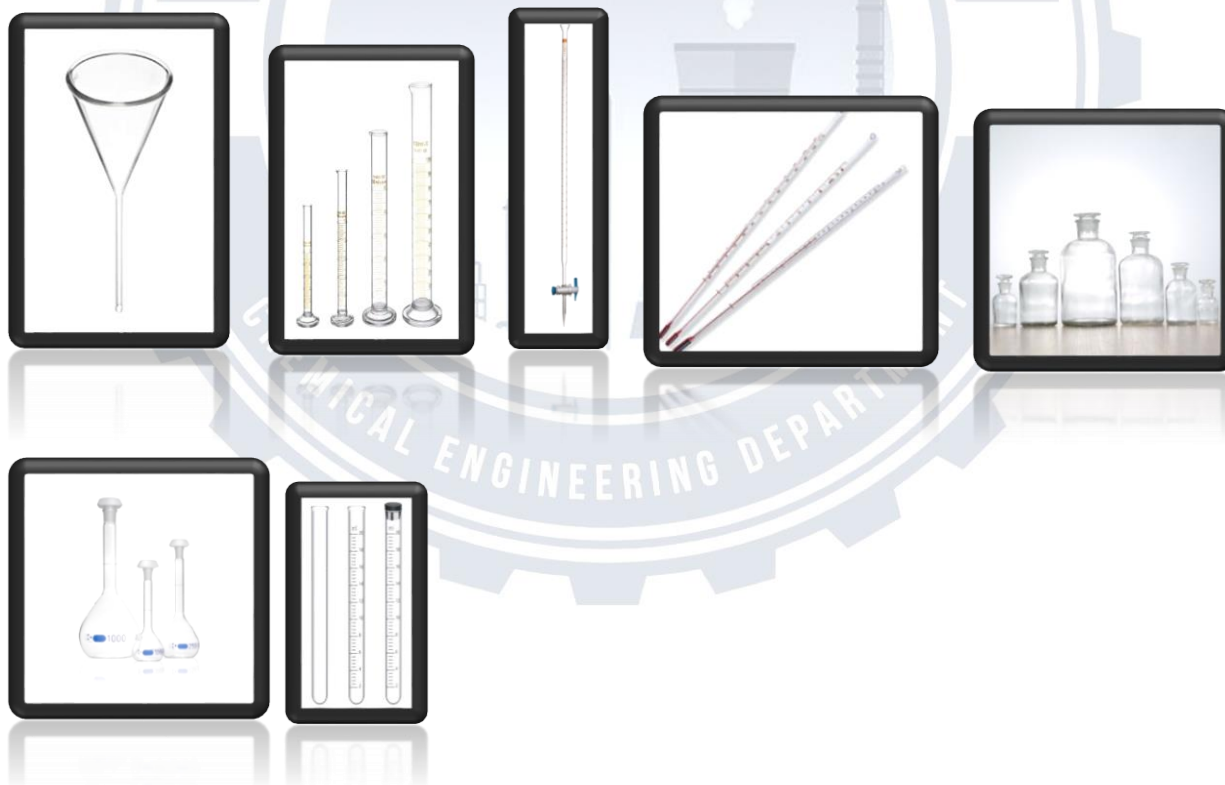
تخدم ثلاث معامل من معامل برنامج الهندسة الكيميائية الفرقة الإعدادية.

- معمل (١٣٠ب) معمل الكيمياء العضوية والصناعات العضوية.
- معمل (١١٠ب) معمل الكيمياء الفيزيائية.
- معمل (١١٠ب) معمل الكيمياء غير العضوية والصناعات غير العضوية.

الأجهزة والزجاجيات الموجودة بالمعمل

1- Glasses

Funnels, measuring cylinders, burettes, thermometer, reagent bottles, pipettes, beakers, measuring flasks, test tubes.





♦ التجارب التي تتم بالمعمل

Lab contents
1. INTRODUCTION OF PRACTICAL COURSE (CHEMICAL ANALYSIS, QUALITATIVE ANALYSIS)
2. DILUTE HYDROCHLORIC ACID GROUP (CO_3^{--} , $\text{S}_2\text{O}_3^{--}$)
3. CONCENTRATED SULPHURIC ACID GROUP (Cl^- & I^-)
4. ISCELLANEOUS GROUP (SO_4^{--} & PO_4^{--})
5. BASIC RADICALS (Fifth and miscellaneous group)
6. BASIC RADICALS (Third and fourth group)
7. ACID-BASE TITRATION