اللجنة الأكاديمية للهندسة المدنية

ملخص

لاب بيئة

محمد السفاريني

ملخص لاب بيئة **شامل** :

شامل أسئلة سنوات حديثة + أسئلة الملف القديم + المانيوال

صدقه جاريه على روح **"ام مراد علان "**وأسأل الله أن يتقبلها وأن يغفر لها باذن الله ولا تنسوني من صالح الدعاء .

#لجنة_المدني

#سيفلتيي

#محمد_السفاريني

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• EXPERIMENT #1: DETERMINATION OF CHLORID

Q1- What is the **purpose** for this experiment ?

Ans : To determine the chlorides concentrations present in given water sample .

Q2- Why is the salty taste produced by chloride concentrations is **variable** ?

Ans : Dependent on the chemical composition of water .

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Q3- The **salty taste** from ?

Ans : Sodium Chloride .

Q4- What is the **limit** of chloride concentration in public water supplies ?

Ans : 250 mg/L .

Q5- Why typical salty taste **absent** and chloride concentration **1000 mg/L** ?

Ans : Because the predominant cation present in the water is not sodium but either calcium or magnesium .

Q6-Why sources containing **2000 mg/L** are used for domestic purposes without the development of adverse effect ?

Ans : 1-Water supplies are scarce .

2- Human system becomes adapted to the water .

Q7- How we can **determined** The amount of chloride present in water?

Ans : Titrating the given water sample with **silver nitrate** solution .

Q8- What is the **indicator** in this experiment ?

Ans : Potassium Chromate .

Q9- If we add Potassium Chromate what the **color** we will get ?

Ans : Yellow .

Q10- What is the **End point** ?

Ans : Changing the color from yellow to brick red .

شرح الحل فى التجربة :

Final - Initial

Sample (#)	Volume of sample (ml)	Burette Reading (ml) Initial	Final	Volume of EDTA (ml)
1	20ml	46.4	46.6	46.6-46.4 = 0.20
2	20ml	46.6	47.2	47.2-46.6 = 0.80
Blank	20ml	47.2	47.6	47.6-47.2 = 0.40

Volume of sample and the Reading (Initial and Final) are given .

Equivalent weight of chlorine

لأننا عوضنا الحجم ب ملي لتر

Chlorides $(\frac{mg}{l})$:

$$= \frac{(V_s - V_b) * Normality * 35.45 * 1000}{Volume\ of\ Sample\ taken\ (ml)}$$

$$V_s = \frac{v1+v2}{2}$$

Normality = 0.0282

For **convert** ml to L = (* 1000)

Q1.In the determination of chloride experiment, fill the burette with …… solution ?

(A) .Silver nitrate

(B).EDTA

(C). Sulphric acid

(D). Sodium thiosulphate

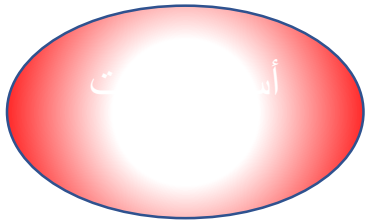
Q2. Silver nitrate is the chemical required in titration for the determination of ?

(A). Chloride

(B). Total hardness

(C). Calcium hardness

(D). Residual chlorine



Q3. In the determination of chloride experiment, when we reach the end point, the color of sample is ?

(A). Blue

(B). Brick red

(C). Yellow

(D). Black

Q4. The color of the sample became yellow color after adding ?

(A). Potassium chromate indicator

(B). Erichrome Black T

(C).EDTA

(D). Ammonia buffer

Q5- The **salty taste** from ?

Ans : Sodium Chloride.

Q6. Chlorides are estimated by titration with a standard silver nitrate solution by using ……. As indicator ?

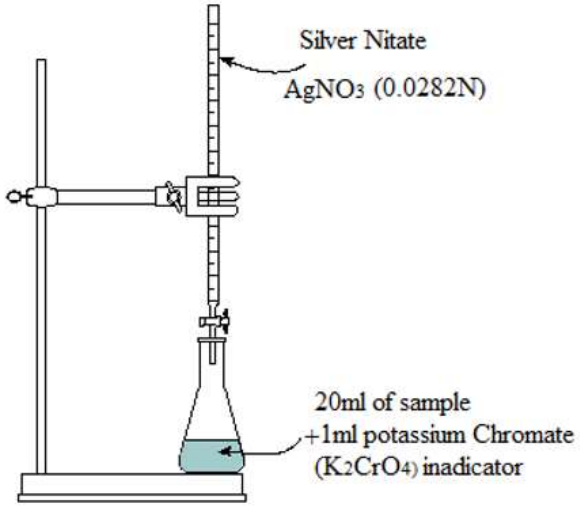
Ans : **Potassium chromate**

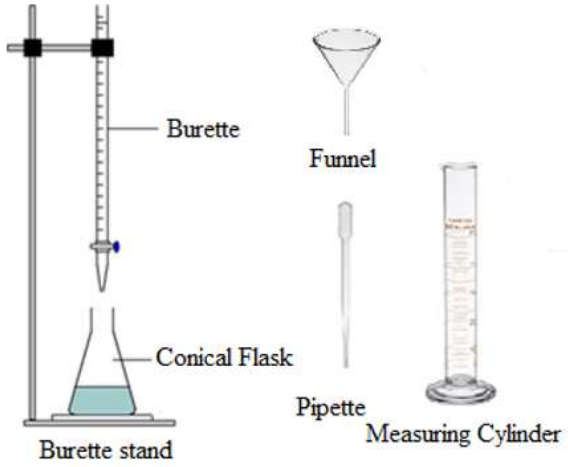
Q7. Silver chromate precipitate indicated by formation of …….. From excess silver nitrate ?

Ans. **Brick red silver chromate**

Q8. The end point for the titration of the chloride experiment was ?

Ans. **Changing the color from yellow to brick red .**





• EXPERIMENT #2: DETERMINATION OF RESIDUAL CHLORINE

Q1- What is the **purpose** for this experiment ?

Ans : Determine the amount of total residual chlorine present in the given sample of chlorinated water .

Q2- What is the **water chlorination**?

Ans : Process of adding chlorine as a gas (Cl_2) or (NaOCl) or $Ca(OCl)_2$ to water .

Q3. Why we used in **1-Tap water** **2-Public water supplies and polluted water** ?

Ans : 1- Kill certain bacteria and other microbes used .

2-Destroy disease-producing microorganism .

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Q4- What is **chlorine demand** of the water and mention the **types of chlorine** ?

Ans : Chlorine reacts first with organic materials and metals and is not available for disinfection .

Total chlorine : Remaining chlorine concentration after the chlorine demand and its divided for two types .

1-Combined chlorine : Chlorine that has reacted with nitrates and is unavailable for disinfection .

2-Free chlorine : Chlorine available to inactivate disease-causing organisms, and thus a measure to determine the potability of water.

Q6- What is the **indicator** ?

Ans : Starch.

Q7- What is the **Titrate** component ?

Ans : Standard sodium thiosulphate .

Q8- Why we add **Acetic acid** ?

Ans : To bring pH (3.0 to 4) .

Q9- What happened if we add **potassium iodide** ?

Ans : Yellow color is obtained .

Q10- What is the **End point** ?

Ans : Disappearance of blue color .

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شرح الحل في هذه التجربة :

Sample (ml)	Volume of sample (ml)	Burette Reading (ml) Initial	Final	Volume of Titrant (ml)
1	20ml	17.5	18.3	18.3-17.5 = 0.80

Volume of sample and the Reading (Initial and Final) are given .

Equivalent weight of chlorine

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$$\text{Residual Chlorine} = \frac{Volume\ of\ titrant * \mathbf{Normality} * 35.45 * \mathbf{1000}}{Volume\ of\ Sample\ taken\ (\mathbf{ml})}$$

$\mathbf{Normality}$ = 0.01

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Q1 .If there is no residual chlorine in your sample, then the color of sample when we put starch indicator is ?

(A). Blue

(B). Straw yellow

(C). Orange

(D). Colorless

Q2.Acetic Acid was added in residual chlorine experiment to carried out with ?

(A). Neutral pH

(B). pH (3-4)

(C). pH (6-7)

(D). pH (10-11)

Q3.The amount of residual chlorine in water should be ?

(A).0.2 ppm

(B). 2 ppm

(C).2.5ppm

(D).4ppm

Q4.The product of the following reaction $Ca(OCl)_2$ ⍰⍰ $Ca^{2}+ + 2OCl-$ is

(A). Hypochlorous acid (neutral)

(B). Hypochlorite ion (-ve charge)

(C). Hypochlorite ion

(D). Hypochlorous ion

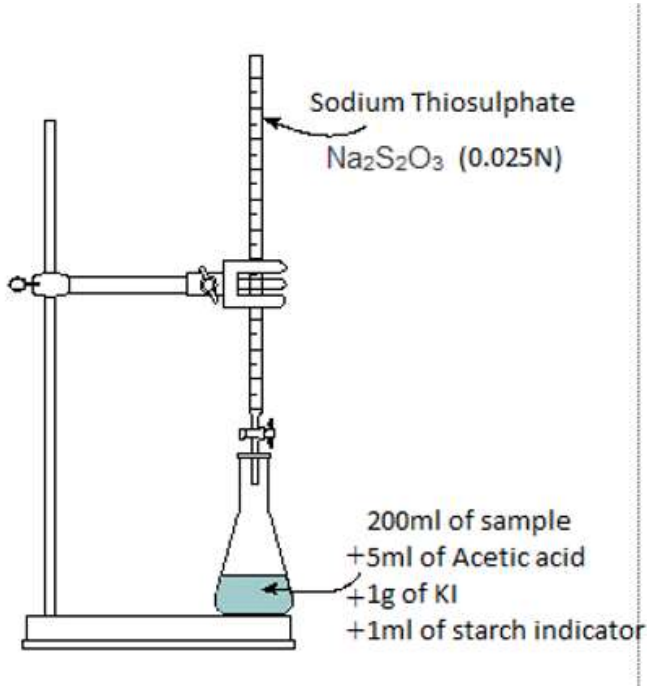
Q5. Which of the following reagents is **not used** in residual chlorine experiment ?

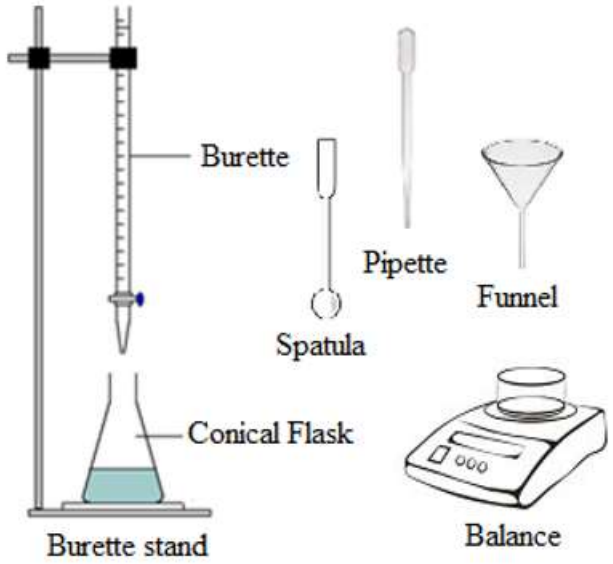
(A) Concentrated Acetic Acid

(B) Potassium Iodide

(C) Sodium thiosulphate

(D) None of the Above





• EXPERIMENT #3: DETERMINATION OF TOTAL HARDNESS

Q1- What is the **purpose** for this experiment ?

Ans : To determine the hardness of the given sample by EDTA Titrimetric method .

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Q2- What is the **hard water** ?

Ans : Water that has high mineral content .

Q3- What is the **Advantages** of hard water ?

Ans : Useful to growth of children due to the presence of calcium and magnesium .

Q4- What is the **Disadvantages** of hard water ?

Ans : A-Scaling of hot water pipes, boilers.

Q5- What is the **most common cations** present in hard water ?

Ans : Mg^{+2} and Ca^{+2}

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Q6- What is the **Total hardness** ?

Ans : The sum of the calcium and magnesium concentrations .

Q7- What is the **scale** ?

Ans : Hard water is heated, Ca^{+2} ions **react** with bicarbonate (HCO_3^-) ions to form insoluble calcium carbonate ($CaCO_3$)

Q8- What is the **effect** of the scale ?

Ans : Coats the vessels in which the water is heated, producing the mineral deposits on your cooking dishes .

Q9- What is the **indicator** ?

Ans : EBT indicator

Q10- What is the **Titrate** component ?

Ans : EDTA

Q11- What **happened** if we **add EBT** indicator ?

Ans : Sample turns to wine red in color 4 .

Q12- What is the **End point** ?

Ans : Changing color from wine red to blue .

Q1.In total hardness experiment, add 2 ml of ammonia buffer to ?

A. Make NaOH react with Mg+2 ions

B. Maintain the PH between 9 & 10

C. Make NaOH reacts with ca+2

D. Maintain the PH between 3 & 4

Q2.Scale formation caused by ?

A. Chlorination

B. Alkalinity

C. Acidity

D. Hardness

Q3.The buffer solution is used to maintain the pH of water sample between ?

A. 9-10

B. 13-14

C. 6-7

D. 7.5-9.5

Q4.Temporary hardness is due to the presence of ?

A. bicarbonates of calcium and magnesium

B. chloride of calcium and magnesium

C. sulphate of calcium and magnesium

D. sodium chloride

Q5.Add few drops of ……. indicator to the conical flask and the sample turns to wine red in color ; done

A. EBT

B. potassium chromate

C . mixed

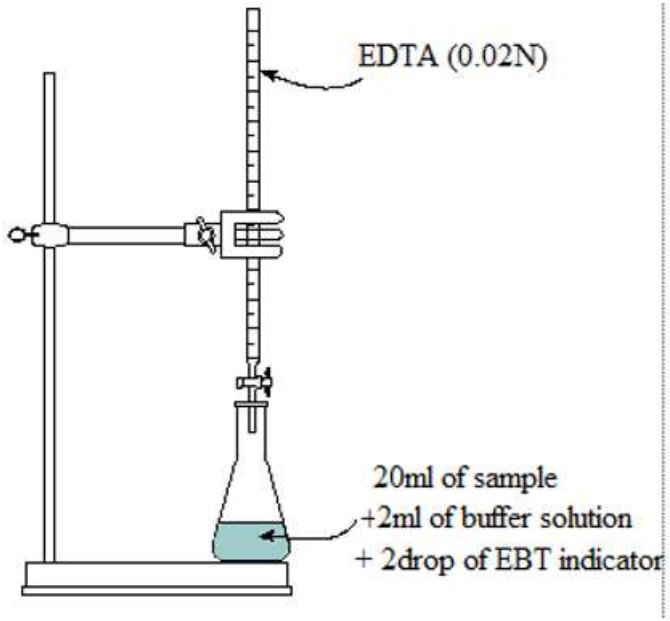
D.EDTA

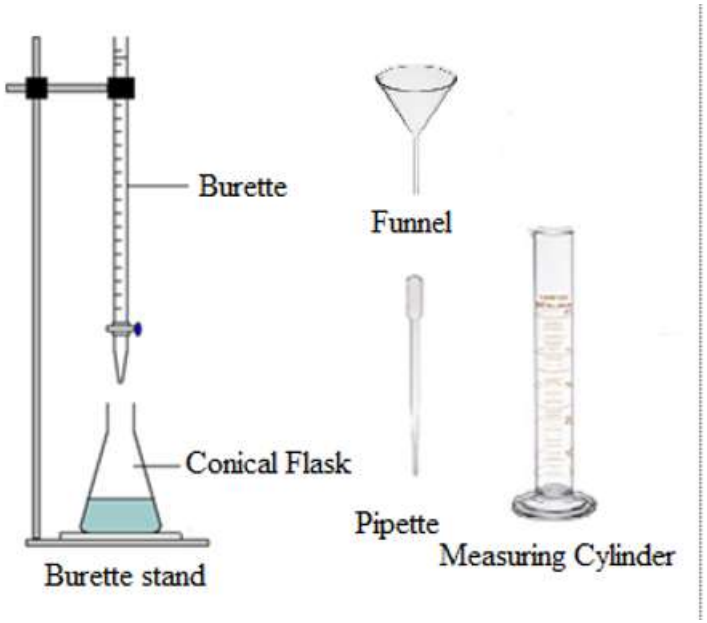
Q6. What is the indicator used in EDTA method at pH between 9 and 10 ?

Ans . **Eriochrome black T (EBT)**

Q7. EDTA was used as a titrant in ……. Experiment ?

Ans. **Hardness**





• EXPERIMENT #4: DETERMINATION OF CALCIUM HARDNESS

Q1-What is the **purpose** for this experiment ?

Ans : To determine the calcium hardness of the given sample by EDTA Titrimetric method .

Q2-What is the **Calcium hardness** ?

Ans : Estimation of hardness due to calcium in water .

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Q3- The **presence** of calcium in water ?

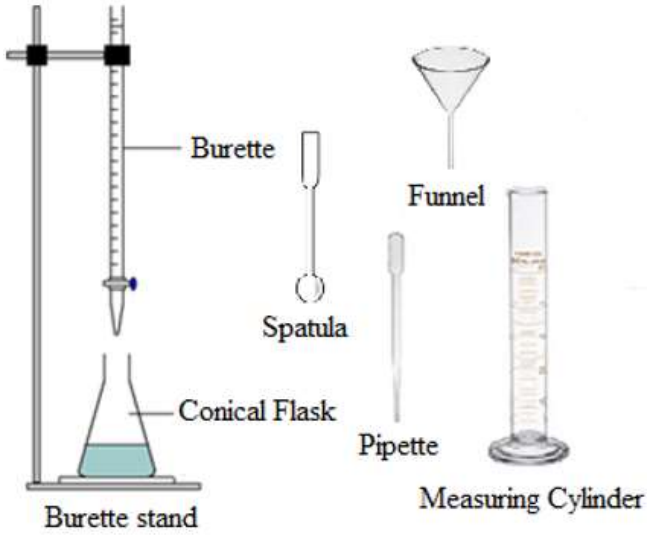
Ans : Results from deposits of lime stone, gypsum .

Q4- These cations **form** ?

Ans : Insoluble salts with soap and decrease the cleaning effectiveness of soap.

Q5- What is the **indicator** ?

Ans : Ammonium Purpurate .



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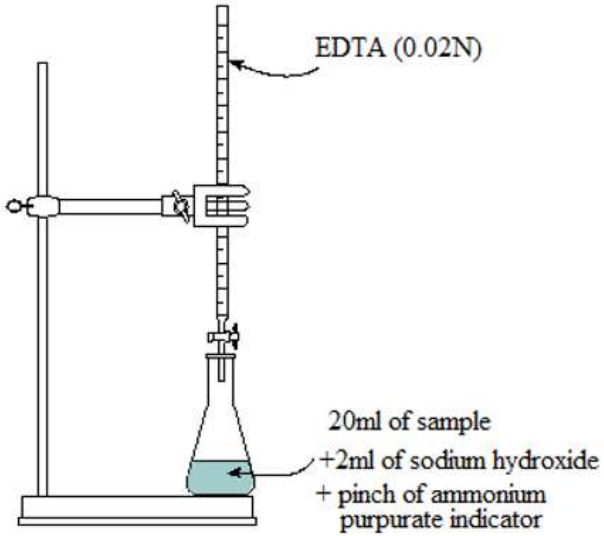
Q6-What is the **Titrate** component ?

Ans : EDTA .

Q7-Whats **happened** if we **add** EBT indicator

Ans : Sample turns into pink color .



Q8- What is the **End Point** ?

Ans : Changing color from pink red to purple .

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شرح الحل فى التجربة الثالثة والرابعة :

Sample(#)	Volume of sample (ml)	Burette Reading (ml) Initial	Final	Volume of EDTA (ml)
1	20ml	0.8	12.7	12.7- 0.8 = 11.9
2	20ml	12.7	21	21- 12.7 =8.3
Blank	20ml	21	27	27- 21 = 6

Volume of sample and the Reading (Initial and Final) are given .

$$\text{Total Hardness} = \frac{Volume\ of\ EDTA * Normality * 50 * 1000}{Volume\ of\ Sample\ taken\ (ml)}$$

Normality =0.02

- To **convert** from ml to L (*1000)

Sample(#)	Volume of sample (ml)	Burette Reading (ml)		Volume of EDTA (ml)
		Initial	Final	
1	20ml	4	5.6	5.6 – 4 = 1.6
2	20ml	6.4	9	9 - 6.4 = 2.6
Blank	20ml	9	11.3	11.3 - 9 = 2.3

Volume of sample and the Reading (Initial and Final) are given .

- Calcium Hardness = $\frac{Volume\ of\ EDTA * Normality * 50 * 1000}{Volume\ of\ Sample\ taken\ (ml)}$
- Calcium present in the sample = $\frac{Ca\ Hardness * Molecular\ weight\ of\ Ca}{Molecular\ weight\ of\ CaCO_3}$
- Magnesium Hardness = Total Hardness – Calcium Hardness
- Magnesium present in the sample = $\frac{Ma\ Hardness * Molecular\ weight\ of\ Ca}{Molecular\ weight\ of\ CaCO_3}$

Notes :

1- $\boldsymbol{Ca}\ Hardness$ and $\boldsymbol{Ma}\ Hardness$ in $\frac{\boldsymbol{mg}}{\boldsymbol{l}}$ as $CaCO_3$.

2- $Molecular\ weight\ of\ Compounds\ \boldsymbol{are\ given}$.

3- Total Hardness we found it from Experiment 3 .

Sample(#)	Volume of sample	Burette Reading (ml)		Volume of EDTA (ml)
		Initial	Final	
1	0.02L	0	5.7	

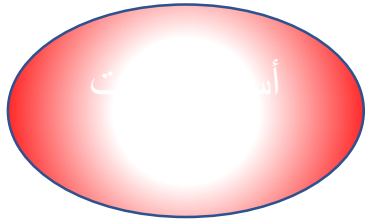
Q1. The calcium presented in the sample is ?

Normality of EDTA= 0.02
Equivalent weight of $caco_3$ = 50
Molecular weight of ca = 40.078
Molecular weight of calcium carbonate = 100.09

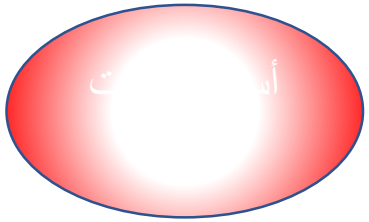
Ans : $\frac{(5.7-0)*50*0.02}{0.02}$ = 285 mg/L as CaCO3

$\frac{285*40.078}{100.09}$ = **114.1 mg/L**

تطبيق مباشر عل القوانين المذكوره سابقا



Q2.A natural water with a hardness of 150-300 mg/L is ?



(A). Soft water

(B). Moderately hard

(C). Hard

(D). Very hard

Q3.In the calcium hardness experiment, add 2 ml of ……. to maintain the pH between 12 & 13 ?

(A). Ammonia buffer

(B). Sodium hydroxide

(C). Methyl orange

(D). Phenolphthalein

Q4.In calcium hardness experiment Sodium hydroxide was added to sample to ?

(A). Precipitate out Mg(OH)2

(B). Precipitate out Ca(OH)2

(C). Adjusting pH value

(D). Reducing error

- **EXPERIMENTS #5: DETERMINATION OF ALKALINITY**

Q1- What is the **purpose** for this experiment ?

Ans : Determine phenolphthalein alkalinity and total alkalinity of given water sample .

Q2- What is the **Alkalinity** ?

Ans : Capability of water to **absorb H+** ions or to neutralized acid (ANC) without significant change of pH **Or** alkalinity is a measure of the **acid buffering capacity** of water .

Q3- Effect for Higher alkalinity levels in surface waters?

Ans : A- Buffer acid rain and other acid wastes .

B- Prevent pH changes that are harmful to aquatic life .

Q4- Alkalinity of a sample of water is **due to** ?

Ans : Presence of OH^- (Hydroxide ion), HCO_3^- (Bicarbonate ion) and CO_3^{-2} (Carbonate ion) or the mixture of two ions present in water.

Q5- The ability of natural water to act as a buffer is **controlled in** ?

Ans : The amount of calcium and carbonate ions in solution.

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Q6- What is the **unit** ?

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Ans : mg/l as CaCO3.

Q7- The possibility of OH– and HCO3– ions together is **not possible** ?

Ans : Since they combine together to form CO32– ions .

Q1. If pH>8.3 titration steps needed are:

(A)Lowering pH to 8.3 using Methyl Orange, then lowering pH to 4.5 using Phenolphthalein .

(B) Lowering pH to 8.3 using Phenolphthalein, then lowering pH to 4.5 using Methyl Orange .

(C) **Lowering pH to 8.3 using Phenolphthalein, then lowering pH to 4.5 using Mixed Indicator .**

(D) Lowering pH to 8.3 using Mixed Indicator, then lowering pH to 4.5 using Phenolphthalein .

Titrating : سيتم شرح كيفية حدوثة بالخطوات

pH	indicator	Titrate	color	ions has been neutralized.	Type alkalinity
More than 8.3	**phenolphthalein indicator**	**sulphuric acid**	**pink**	**OH-**	P (alkalinity) .
Between 8.3 and 4.5	**mixed indicator**	**sulphuric acid**	**blue**	CO_3^{-2} and HCO_3^-	T (alkalinity)

Q8. what is the **End point** in this experiment ?

Ans : **First** End point: Disappear of **pink** color .

Second End point: Changing color from **Blue** to **Red** .

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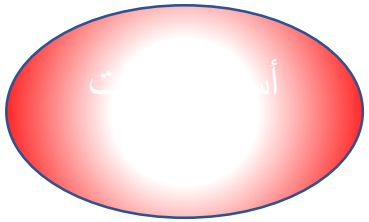
Q3.Acid neutralized capacity is definition of:

(A)Chlorination

(B) Alkalinity

(C) Acidity

(D) Hardness



Q4.Alkalinity Reacts with many metals in water resulting in precipitates which foul pipes

(A).True

(B). False

Q5. alkalinity indicates a solution's power to react ?

(A) Base and buffer its pH

(B) With acid and "buffer" its pH — that is, the power to keep its pH from changing.

(C) Ions and buffer its changes

(D) Cations and buffer its changes

شرح الحل فى التجربة الخامسة :

Phenolphthalein indicator:

Sample(#)	Volume of sample (ml)	Burette Reading (ml) Initial	Final	Volume of H2SO4(ml)
1	100ml	30.6	31.1	31.1- 30.6 = 0.5
2	100ml	31.1	31.3	21- 12.7 =0.2

$$V_p = \frac{V1+V2}{2}$$

Mixed indicator :

Sample(#)	Volume of sample (ml)	Burette Reading (ml) Initial	Final	Volume of H2SO4(ml)
1	20ml	31.1	31.1	31.1-31.1= 0
2	20ml	31.3	31.3	31.3-31.3=0

$$V_m = \frac{V1+V2}{2}$$

Phenolphthalein Alkalinity =

$$\frac{(V_p) * \boldsymbol{Normality} * 50 * 1000}{Volume\ of\ Sample\ taken\ (ml)}$$

Normality : 0.02

Total Alkalinity =

$$\frac{(V_p + V_s) * \boldsymbol{Normality} * 50 * 1000}{Volume\ of\ Sample\ taken\ (ml)}$$

Table 5.1: Combination of P and T alkalinity

Value of P and T	Alkalinity due to		
	OH^-	CO_3^{2-}	HCO_3^-
P=0	0	0	T = 83
P< ½ T	0	2P = 10	T-2P = 73
P= ½ T	0	2P =10	0
P> ½ T	2P-T = - 73	2P-T = - 73	0
P=T	T = 83	0	0

لإيجاد تركيز المُركبات

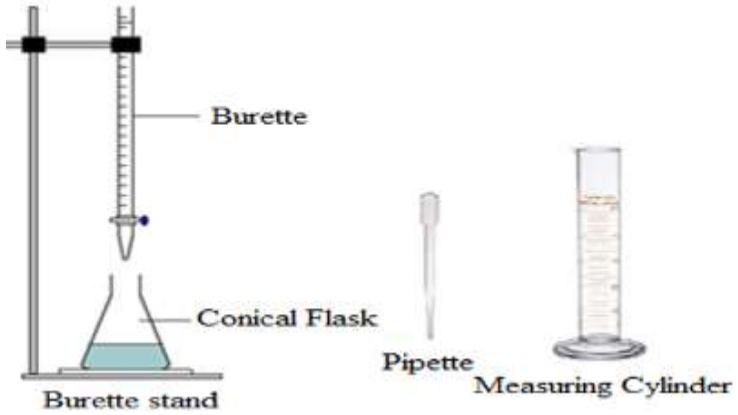
Q6. 0.02N of sulfuric acid was used to titrate 100 ml of sample . Its required 2 ml to reach pH 8.3 and 18 ml to reach pH 4.5 . What is the Phenolphthalein Alkalinity ? Equivalent weight of $CaCO_3$ is 50 .

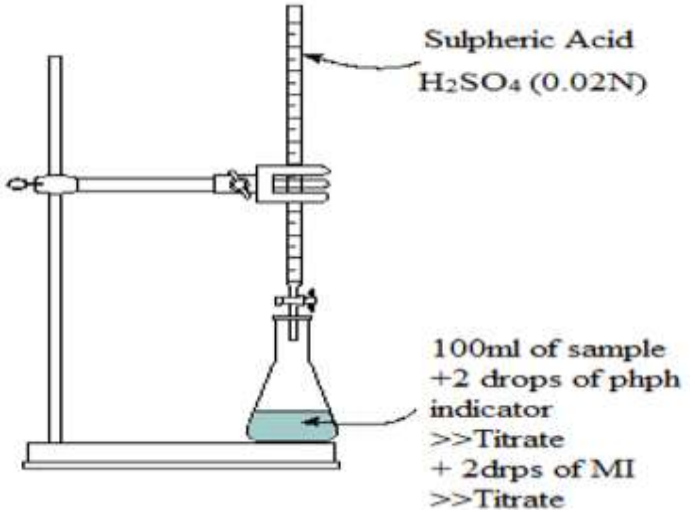
Ans. Phenolphthalein Alkalinity =

$$\frac{(V_p)*\textit{Normality}*50*1000}{Volume\ of\ Sample\ taken\ (ml)} = \frac{2*0.02*50*1000}{100} = \textbf{20 mg/l As } \mathbf{CaCO_3}$$

Q7. Determination of acidity by titration needed two steps for titration firstly use …… as indicator then use ……. As indicator ?

Ans. **Phenolphthalein, Mixed Indicator**





• EXPERIMENT #6: DETERMINATION OF ACIDITY

Q1- What is the **purpose** of this experiment ?

Ans : To determine mineral and total acidity of given water sample .

Q2- What is the **Acidity** ?

Ans : Measure of the capacity of water to neutralize bases . Acidity of water is its quantitative capacity to react with a strong base to a designated pH .

Q3- Acidity may be **caused** by mineral acids ?

Ans : Such as sulfuric acid or hydrochloric acid or by dissolved carbon dioxide .

Q4- What is the **major** acidic component present ?

Ans : Dissolved carbon dioxide (CO_2) .

Q5- What is the **Mineral acidity and Total acidity** ?

Ans : Titration of a sample to the methyl orange to a pH of about 3.5 .

Titration of a sample to the phenolphthalein of pH 8.3 .

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Q6- What is the indicator ?

Ans : Methyl orange.

Q7- What happened if we add methyl orange ?

Ans : The color changes to orange.

Q8- What is the titrate component ?

Ans : Sodium hydroxide solution.

Q9- When we stop titrating ?

Ans : Until the orange color faints.

Q10- What is the **another indicator** ?

Ans : Phenolphthalein indicator .

Q11- When we **stop** titrating ?

Ans : Until the color changes to faint pink color .

Q12- What is the **End Point** ?

Ans : First End point: Changing color from Orange to yellow .

Second End point: Changing color to Pink .

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شرح الحل فى التجربة السادسة :

Determine with Methyl orange indicator :

Sample(#)	Volume of sample (ml)	Burette Reading (ml) Initial	Final	Volume of NaOH(ml)
1	100ml	17.1	17.1	17.1-17.1= 0
2	100ml	21.6	21.6	21.6-21.6= 0

Determine with Phenolphthalein indicator :

Sample(#)	Volume of sample (ml)	Burette Reading (ml) Initial	Final	Volume of NaOH(ml)
1	100ml	17.1	21.6	21.6-17.1= 4.5
2	100ml	21.6	25.5	25.5-21.6=3.9

From **Methyl orange**

$$\text{Mineral Acidity} = \frac{(Volume\ of\ NaOH\ ) * Normality\ * 50 * 1000}{Volume\ of\ Sample\ taken\ (ml)}$$

Normality = 0.02

Total Acidity $=$

From **Phenolphthalein indicator**

$$\frac{(Volume\ of\ NaOH) * Normality\ * 50 * 1000}{Volume\ of\ Sample\ taken\ (ml)}$$

Q1. In the acidity of water experiment, the sample is titrated against;

(A). Sodium thiosulphate

(B). Sodium hydroxide

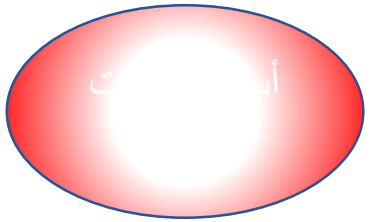
(C). Silver nitrate

(D). Ammonium purpurate

Q2.In the acidity of water experiment. After using methyl orange indicator only, you can calculate;

(A).Total acidity

(B).Mineral acidity



(C).Phenolphthalein acidity

(D).Total alkalinity

Q3.In the acidity of water experiment, the sample is titrated against;

(A). Sodium thiosulphate

(B).Sodium hydroxide

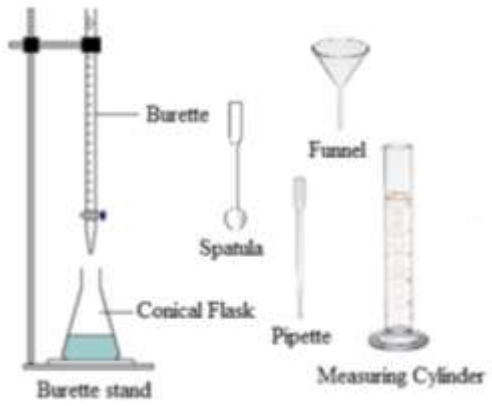
(C). Silver nitrate

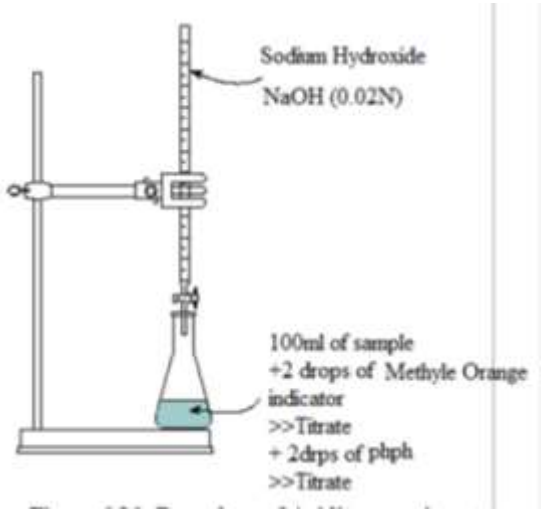
(D). Ammonium purpurate

Q4.0.02N of sodium hydroxide was used to titrate 100 ml of sample . Its required 5 ml to reach pH 8.3 . **What is the Total Acidity** ? Equivalent weight of $CaCO_3$ is 50 .

Ans : Total Acidity =

$$\frac{(Volume\ of\ NaOH)*Normality\ *50*1000}{Volume\ of\ Sample\ taken\ (ml)} = \frac{5*50*0.02*1000}{100} = \underline{\mathbf{50mg/l\ As\ CaCO_3}}$$





• EXPERIMENT #7: DETERMINATION OF CONDUCTIVITY

Q1- What is the **purpose** of the experiment ?

Ans : To determine the conductivity of given water sample.

Q2- What is the **Conductivity** ?

Ans : a substance is the ability or power to conduct or transmit heat, electricity or sound.

Q3- How we can measure Conductivity?

Ans : Probe and meter .

Q4- Why we **use** this units **mS or µS** in most water ?

Ans : he conductivity is very low .

Q5- The water Suitable for **irrigation** has conductivity?

Ans : 2 mS/c

Q6- The conductivity of a solution is proportional to its ion concentration ?

Ans : True

Q7- The total dissolved solids are about **70%** of the conductivity

Ans : True .

Q8- The meter converts the probe measurement to?

Ans : Micro mhos per centimeter .

Q9- How we can made **Calibration** of Conductivity Meter ?

Ans : 0.1N Potassium Chloride .

Q1. If we measure the conductivity of totally pure water, the closest result is…….µS/cm :

(A). 0.1

(B). 0.055

(C). 0.5

(D). 50-100

Figure 7.1: Apparatus of Conductivity experiment

Q2. The inverse of conductivity called:

(A)Mohm

(B) Mmho

(C) Resistivity

(D) Siemens/cm

Q3. Electrical conductivity can be tested using a conductivity meter. This is:

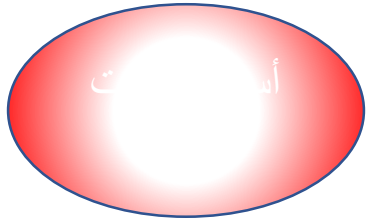
(A)-physical test

(B)-chemical test

(C)-biological test

(D)-physical & biological test

Q4. Conductivity of a substance is defined as the ability or power to conduct or transmit.



(A). heat

(B). electricity

(C). sound

(D). all of the above

Q5. The total dissolved solids are about……of the conductivity.

(A). Seventy percent

(B). seventeen percent

(C). thirty five percent

(D). twenty percent

Q6. …… the conductivity meter (at least 30 minute) before the test.

(A) Switch off

(B) Switch on

(C) Calibrate

(D) Read

Q7. Which one of chooses below is not effect to high electrical conductivity .

(A). removing deep-rooted vegetation

(B). flood irrigation of agricultural land

(C). discharge of sewage effluent into waterways.

(D). increased water temperature

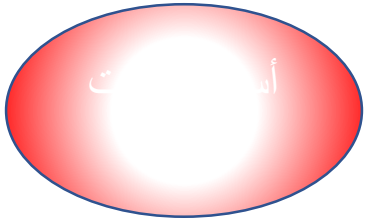
Q8.The measurement of conductivity may lead the estimation of ?

(A)-Total solids

(B)-Total dissolved solids

(C)-Total suspended solids

(D)-Total colloidal solids



Q9.Prepare 0.1 N potassium chloride solution to calibrate the ?

(A). turbidity meter

(B). conductivity meter

(C). spectrometer

(D). all of them

Q10. 0.1uμS expressed in resistivity is ?

Ans. 10M-ohm

Q11.Conductivity is the measure of the ability of water to carry ions ?

a) **True**

b) False

• EXPERIMENT #8: DETERMINATION OF TURBIDITY

Q1- What is the **purpose** of the experiment ?

Ans : To determine the turbidity of the given water sample .

Q2- What is the **Turbidity** ?

Ans : Cloudiness of a solution and it is a qualitative .

Q3- Turbidity often **indicates** ?

Ans : The presence of dispersed and suspended solids like clay .

Q4- The turbidity of the sample is measured using the?

Ans : Turbidity meter .

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Q5- Turbidity is **caused by** ? What this **do** ?

Ans : **1- Suspended materials .**

A- Absorb and scatter light.

B- Causing materials do not settle and are difficult to remove by sedimentation .

Q6- The turbidity **measured from** ?

Ans : The amount of light scattered by the sample.

Q7- Light is focused and passed through the **suspended particles ?**

Ans : True .

Q8- The amount of scattered radiation is measured generally at **90°** angle and displays ?

Ans : True .

Q9- The higher the intensity of scattered light the higher is the turbidity ?

Ans : True .

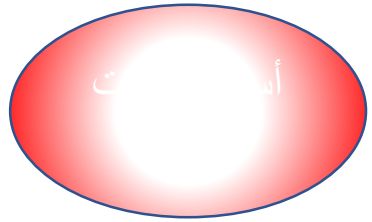
Q1 . In the turbidity experiment, light absorbing materials can cause ?

(A). High reading

(B). Low reading

(C). Constant reading

(D). Nothing



Q2. ……., is expected to have the highest turbidity ?

(A). tap water

(B). irrigation water

(C). ground water

D. sea water

Q3. The turbidity tube is rinsed with distilled water to ?

(A). To make the tube wet

(B). To remove impurities around tube

(C). To remove organism from sample

(D). To prevent transmittance of light

Q4.The turbidity affects the aquatic life in the water ?

(A).True

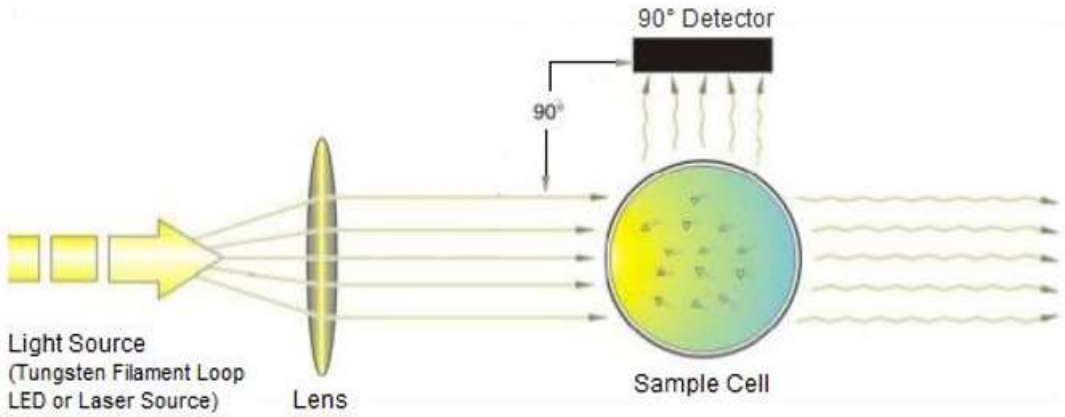
(B).False

Q5- The results in **NTU** ?

Ans : True

Q6. In a Nephelometric Turbidity Meter the light detectors are at …….. And display the result in …….. ?

Ans. **90 , NTUs**



وكانت أخر دعواهم أن الحمد الله رب العالمين

أسأل الله أن أكون قد أفدتكم بكل ما أملك و نسأل الله أن يتقبلها صدقه جاريه على روح **إم مراد علاّن** و لا تنسوني من صالح الدعاء .

محمد السفاريني

لجنة المدني_سيفلتيي

اللجنة الأكاديمية للهندسة المدنية

ملخص

لاب بيئة

محمد السفاريني

ملخص لاب بيئة لماده الفاينال

شامل الأسئلة التي وردت في ملف الورد و اسئلة أخر ثلاثة فصول

هذه ماده **مساعده** ولا يغني عن دراسه المانيوال

لا تنسوني من صالح الدعاء وأرجو لكم التوفيق والنجاح

محمد السفاريني

لجنة_سيفلتيي

• EXPERIMENT #9: DETERMINATION OF TOTAL SOLID

Q1. In the total solid experiment, we put the crucible inside the oven at ?

(A).150 °C

(B).100°C

(C).103°C

(D).210°C

Q2. In the total solid experiment, the sequences of the procedures after we put the crucible is ?

1-Find the mass of cooled dry crucible

2-Evaporate to dryness in a dust-free oven at 103 C º

3-Find the mass of a clean dry crucible

4-Add 20 ml of water sample to the crucible

5-Calculate the total solid in water sample in mg/l

(A). 1.5.3.2.4

(B). 3.4.2.1.5

(C). 1.2.3.4.5

(D). 4.3.1.2.5

Q3. Increase Total Solid in the water cause ?

(A)-Decrease Strength of wastes.

(B)-Decrease water temperature

(C)-Decrease Turbidity

(D)-Decrease photosynthesis rate

Q4. In the total solid experiment, after we put the sample in the crucible ?

A)-Note down the initial weight of the crucible

B)-Put the crucible inside the oven

C-Put the crucible inside the desiccator

D-Note down the final weight of the crucible

Q5. …… the balance meter (at least 30 minute before the test ?

A-Switch off

B-Switch on

C-Calibrate

D-read

Q10 .Measurement of total solid can be made in…… ?

a. Industrial water

b. Drinking water

c. Domestic water

d. All of them

Q11- Which of these equations is correct ?

A- DS+TS= SS

B- SS+DS=TS

C- SS+TS=DS

D-None

Q6 .In the total solid experiment, if the total solid is 555 mg/L and the weight of crucible is 35.4323 gm, weight of sample after drying is 0.0416 gm, then the volume of sample is?

A. 20 ml

B. 75 L

C.75 ml

D. 20 L

Ans. $TS=\frac{(W2-W1)*1000}{V(ml)}$ **Then** $\frac{0.0416*1000}{v}=555$ **then** **V=75 ml**

Q7.The solid in water or waste water can be isolated through **filtration** only ?

(False)

Q8.**Total solid** is a measure of the current that flows through water due to dissolved ionic solids?

(False)

Q9. Total solid are related closely to **stream flow** and not related to the velocity

(False)

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معلومات هامه لكن لم ترد من ضمن أسئلة السنوات السابقه

- TVS : Material that are **volatile** at higher temperature $550C^{\circ}$

For **organic** material .

- TFS : Material that are **not volatile** at higher temperature $550C^{\circ}$

For **inorganic** material .

- Place the evaporating dish in the hot air oven for **1 to 2 hours** .

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• القوانين المستخدمه فى هذه التجربه :

- Total solids (mg/l) = $\frac{(W2-W1)*1000000}{V(ml)}$

- TVS = $\frac{(W2-W3)*1000000}{V\ (ml)}$

- TFS = $\frac{(W1-W3)*1000000}{V\ (ml)}$

W3 : weight of the crucible + ash

صور الأدوات والاجهزة المستخدمه فى التجارب

• EXPERIMENT #10: JAR TEST EXPERIMENT

Q1.The jar test is a common laboratory procedure used to ?

(A) . determine the optimum coagulation operating conditions for water or wastewater treatment

(B). Determine the optimum disinfection operating conditions for water or wastewater treatment

(C). Determine the optimum filtration operating conditions for water or wastewater treatment

(D) . Determine the optimum sedimentation operating conditions for water or wastewater treatment

Q2.To obtain the optimum operation conditions in coagulation process ?

A). Residual turbidity vs. coagulant dose is plotted and optimal conditions are determined

(B). Residual turbidity vs. stirring speed is plotted and optimal conditions are determined

(C) . Coagulant dose vs. stirring time is plotted and optimal conditions are determined

(D) Coagulant dose vs. stirring speed is plotted and optimal conditions are determined

Q3- Pick up the correct statement from the following ?

(A)- Jar test is used for very fine and charged particles

(B)-Coagulation is the process of addition of a chemical to destabilize a stabilized particle

(C)-Determine the optimum dosage of coagulant is the aim if jar test experiment

(D)- All of the above

Q4-A batch tests are performed to evaluate the ?

(A)-Filtration operating conditions for water or wastewater treatment

(B)-Coagulation operating conditions

(C)-Settling characteristics of flocculent suspensions

(D)-Sludge growth rate

Q5.The coagulation in interparticle bridging and the formation of hydroxide floc is functions of ?

(A) . pH

(B). Temperature

(C).DO

(D).SS concentration

Q6. Suspended solids are removing by ?

(A). TS experiment

(B). Jar test experiment

(C). BOD experiment

(D). COD experiment

• معلومات هامه لكن لم ترد من ضمن أسئلة السنوات السابقه

- **Coagulation**: Addition of a chemical to de-stabilize a stabilized charged particle.

- **Flocculation**: It is a slow mixing technique which promotes agglomeration and helps the particles to settle down.

- Very fine and charged clay. These impurities do **not settle** by gravity.

charged particles, they **repel each** other and just stay .

- Measure the turbidity using a **turbidity meter** .

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- When **Coagulant** like alum solution is added to water,

the molecules **dissociate** to yield positive and negative charges like $SO4^{-2}$ and AL^{+3} in alum.

charged species **combine** with the charged colloidal particles to **neutralize** the charge of the component producing **turbidity .**

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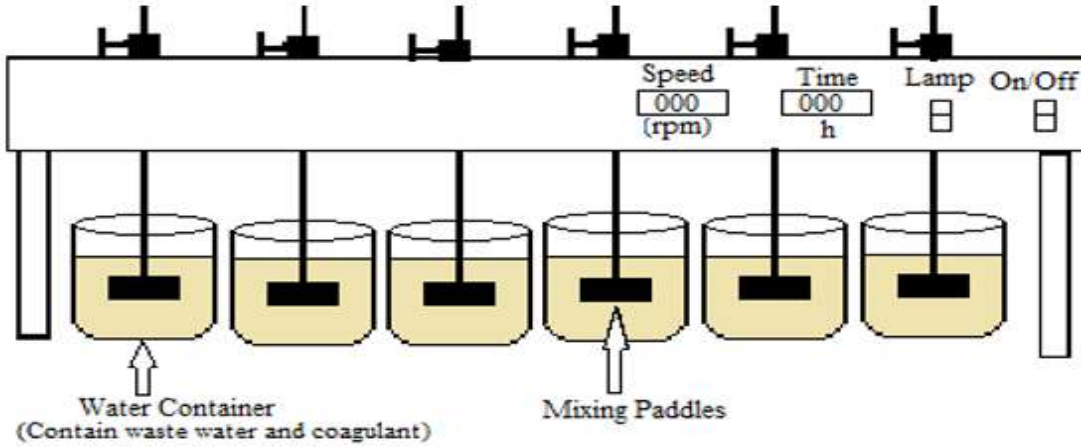
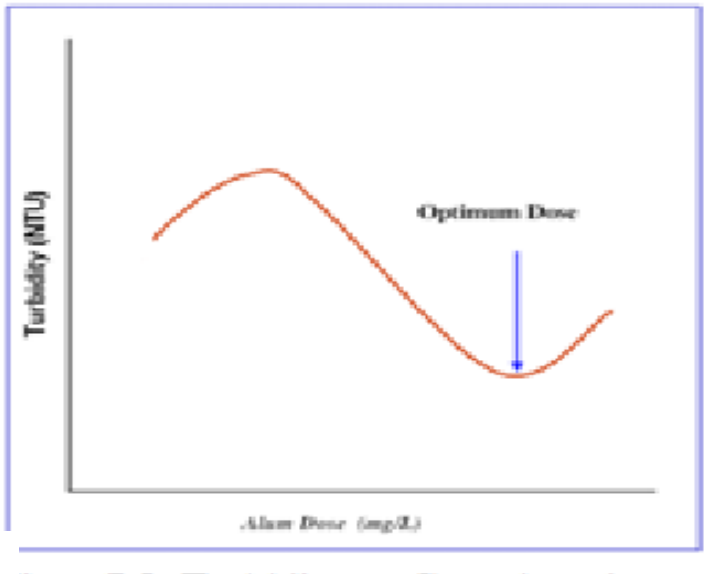
• صور الأدوات والاجهزة المستخدمه فى التجارب





سنوات سابقه

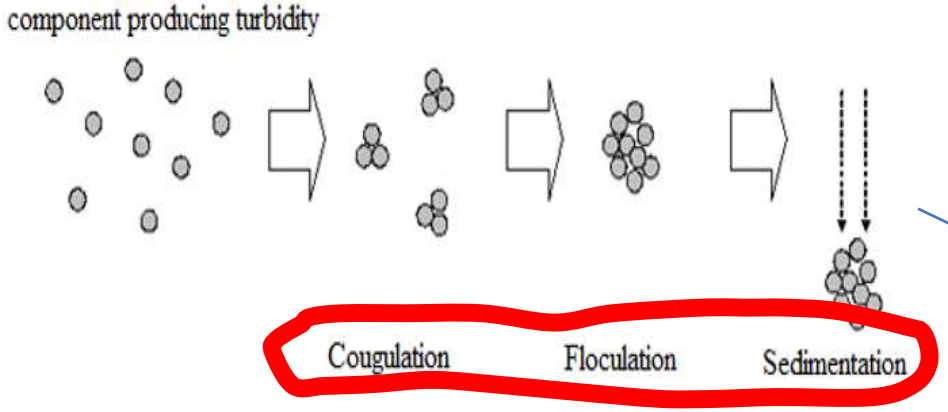


Figure 10.1: Coagulation-Sedimentation Diagram

سنوات سابقه

• EXPERIMENT #11: CHEMICAL OXYGEN DEMAND (COD)

Q1-In COD experiment, silver sulphate can be added as ?

(A)-Oxidizing agent

(B)-Reducing agent

(C)-Redox agent

(D)-Catalyst

Q2-What does the abbreviation COD stand for ?

(A)- Chemical operation demand

(B)- Chemical oxygen demand

(C)- compound of oxygen

(D)- Chemical oxygen dissolved

Q3. organic matter is oxidized by potassium dichromate in the presence of ?

(A)- Nitric acid

(B)- Sulphuric acid

(C)-Acetic acid

Q4. the COD test is considered a better test than BOD because ?

(A)-Everyone uses it

(B)-Takes less time to run the test

(C)-Results more accurate

Q5. The COD concentration in a sample is 160mg/l , find the sample volume taken in (ml) ? Factor is 8 .

Type of Sample	Volume of Sample (ml)	Burette Reading(ml)		Volume of 0.1N FAS(ml)
		Initial	Final	
Blank	?	2	10	?
Sample	?	11	18.5	?

Ans. COD= $\frac{(V_B - Vs) * N * F * 1000}{V\ (ml)}$

V_b= 10-2 = 8

V_s= 18.5-11= 7.5

160= $\frac{(8-7.5) * 0.1 * 8 * 1000}{?}$

Volume = 2.5 ml for Blank and Sample

- **معلومات هامه لكن لم ترد من ضمن أسئلة السنوات السابقه**

- COD : the amount of **organic compounds** in water .It is expressed in **(mg/L)** .
- COD under **specific conditions** : oxidizing agent ($K_2Cr_2O_7$) , temperature (150º C) and time (2hr) .
- BOD value is always **lower** than COD value.
- COD value is about **2.5** times BOD value .
- **Titrate** it with the FAS , ferroin **indicator** .
- **End point**: appearance of the reddish brown color

القوانين المستخدمه فى هذه التجربه :

$$COD = \frac{(V_B - Vs) * N * F * 1000}{V\ (ml)}$$

N=0.1

COD factor = 8

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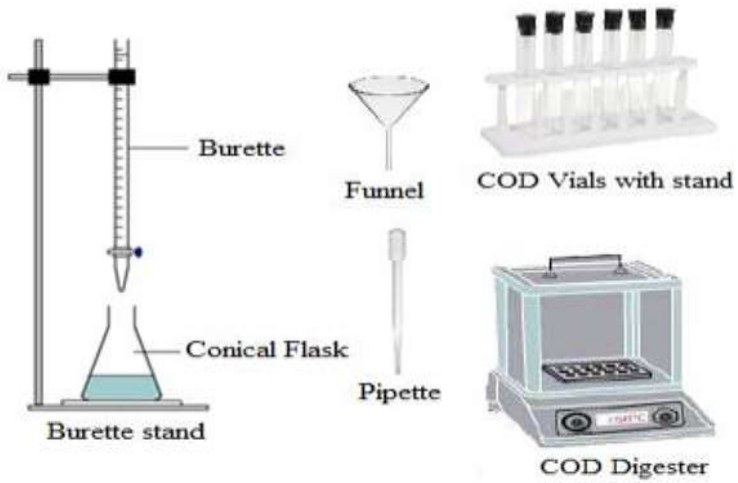

Figure 11.1: Apparatus required for COD

- **EXPERIMENT #12: DETERMINATION OF DISSOLVED OXYGEN (DO)**

Q1.Minimum DO in the fresh water for the survival of aquatic life is ?

(A)-0 mg/l

(B)-2 mg/l

(C)-8 mg/l

(D)-4 mg/l

Q2…… Reduce dissolved oxygen in water ?

(A). Photosynthesis by green plant

(B). Water mixing with air in waterfall, rapid and rain

(C). Low temperature

(D). Decay of organic matter by bacteria

Q3.Carbon dioxide is dissolved from the atmosphere and produced by decomposition of ?

(A)-Inorganic matter

(B)-Organic matter

(C)-Incineration of bio-solids

(D)-Corrosion of metals

Q4. The standard DO test for water is ?

A. Winkler Method

(B). Azide Modification

(C). Alum Flocculation

Q5. These factors increase dissolved oxygen in sample expect ?

(A)- Decrease temperature

(B)-Increase temperature

(C)- Photosynthesis rate

- **معلومات هامه لكن لم ترد من ضمن أسئلة السنوات السابقه**

- Dissolved Oxygen is used to describe the **amount of oxygen dissolved** .
- In a healthy body of water about **8** ppm.
- The diffusion current **linearly proportional** to the concentration of molecular oxygen .
- **Titrate** it against sodium thiosulphate using starch as **indicator** .
- **End point**: Disappearance of the blue color to colorless .
- The solubility of oxygen **decreases** as water temperature increases.
- Its solubility is about 14.6 mg/l for pure water at 0°C , 7 mg/l at 35°C.
- The wastes causes a **decline** in the amount of DO .

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القوانين المستخدمه فى هذه التجربه :

$$DO = \frac{(V\ ) * N * 1000}{V\ of\ sample\ (ml)}$$

N= 0.02

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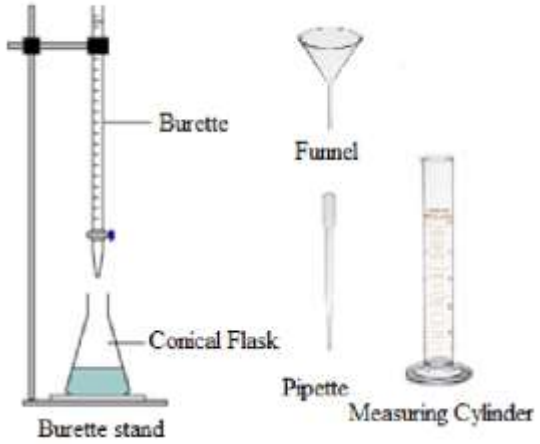
Figure 12.1: Dissolved Oxygen meter



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- **EXPERIMENT #13: DETERMINATION OF BIOCHEMICAL OXYGEN DEMAND (BOD)**

Q1.Which of the following nutrient commonly used for BOD determination ?

(A)-Calcium chloride

(B)-Calcium sulphate

(C)-Magnesium chloride

(D)-Magnesium phosphate

Q2. Amount of dissolved oxygen needed by aerobic organisms to break the organic materials present in the given water sample is ?

(A)- BOD

(B)-COD

(C)- DO

Q3. BOD dilution water should be ?

(A)-boiled to kill all bacteria

(B)- Tap water with nutrients and buffer added

(C)- Aerated distilled water with nutrients and buffer added

- **معلومات هامه لكن لم ترد من ضمن أسئلة السنوات السابقه**

- Ordinary domestic sewage BOD of **200 mg/L**.

Disposal of water BOD less than **30 mg/L.**

Drinking water BOD of less than **1 mg/L.**

BOD value reaches **5 mg/L**, the water is **doubtful in purity**.

- **BOD condition** : Temperature (20°C) , (5 days) .

- **Titrate** sodium thiosulphate solution , starch solution **indicator** .
- **End point**: Disappearance of the blue color to colorless .

• القوانين المستخدمه فى هذه التجربه :

- BOD =

$$\left((DO\ at\ 0day\ - DO\ at\ 5day\ ) - (DO\ at\ 0DAY\ - DO\ at\ 5DAY)\right) * dillution\ factor$$

Sample **Blank**

$$\frac{volume\ of\ dilluted\ sample}{volume\ of\ samole\ taken}$$

صور الأدوات والاجهزة المستخدمه فى التجارب

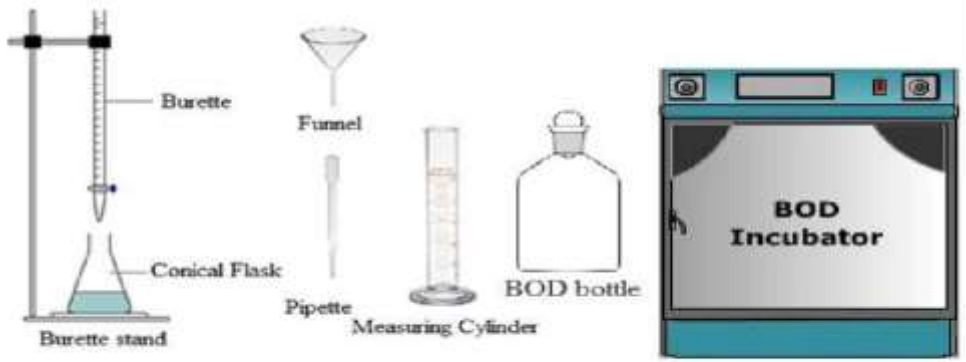

Figure 12.1: Apparatus required for BOD experiment

أسئلة سنوات جديده

Q1. If (x) is the concentration of dissolved oxygen before incubation and (y) is the concentration after incubation for 5 days at 20 , which of the following expressions is equal to BOD ?

Ans. **X-Y**

Q2. In the total solid experiment , after the sample was put in an evaporating dish ?

Ans. Evaporate to dryness in an oven at 103-105 C°

Q3. Starch Indicator used in ?

Ans. DO , BOD and COD

Q4. The COD test is considered a better operational control test than the BOD test because ?

Ans. It takes less time to run the test

Q5. 10ml of raw sewage is diluted to 300ml . The DO concentration of the diluted sample at the beginning of the test was 8 mg/l . After 5-day incubation at 20 C° , the DO concentration was 5mg/l .

The BOD of raw sewerage is ?

$$\left((DO\ at\ 0day\ - DO\ at\ 5day\ ) - (DO\ at\ 0DAY\ - DO\ at\ 5DAY)\right) * dillution\ factor$$

Ans. (8-5)*$\frac{300}{10}$ = 90mg/l

Q6. To test chemical oxygen demand COD of sewage , organic matter is oxidized by potassium dichromate in the presence of ?

Ans. **Sulphuric Acid**

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أرجو لكم النجاح والتوفيق وأسأل الله أن يتقبل هذا العمل صدقه جاريه على روح **إم مراد علاّن** و لا تنسوني من صالح الدعاء .

محمد السفاريني

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