Kafr El-Sheikh University
Faculty of Aquatic and Fisheries Sciences
Winter semester of the academic year 2019/2020

Suggested research topics
Winter semester of the academic year 2019/2020

Course name in Arabic:	الكيمياء التحليلية
Course name in English:	**Analytical Chemistry**
Professor Dr.:	**Abd Al-Motaleb Mosad Ramadan**
Level:	**Third**
Department:	**Manufacturing and biotechnology program**

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1	**Methods of expressing the concentration of solutions**	**1**- Define some relevant terms such as: Concentration, Solute, True solution, Analyte, Mole, The unite of mass **2-** *Percent composition* (%): (%W/W %W/V %V/V) **3-** Molar solution (M), Normality, define, explain, give examples based on your studied course **4-** 1 milliliter (ml) = cm^3; and one liter = …… cm^3 =……….. ml **5-** How many grams of NaCl are required to prepare 80 grams of solution of NaCl its concentration is 5%? **6-** If 280 ml of a 3M sodium hydroxide solution is diluted to give 0.7M solution; What is the volume of the resulting diluted solution? What is the volume of distilled water added to the original solution? 7- Hydrolysis of salts
2	**The relation between the concentrations of solutions**	**1-** Normal solution (N), molarity, mole fraction **2-** Write the mathematical relationship in which the methods of concentrations changed to another and give examples and define its terms **3-** Determine the molarity (M) and normality (N) of 62% of sulfuric acid (H_2SO_4), the density is 1.52 g/cm^3? **4-** Dilution of solutions **5-** Mixing law, explain and give examples **6-** Calculate the amounts of 90% and 10% solutions of H_2SO_4 required for preparing 1600g of 40% solution? 7- Standard Solution Requirements

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3	**Standard Solution**	1-Primary Standard solution; 2-Features of a primary standard substances; 3- Standard Solution Requirements; 4- Secondary Standard solution; 5- Ionization of Water and the pH Scale; 6- Electrolytic Dissociation 7- Write the mathematical relationship in which the methods of concentrations changed to another and give examples and define its terms How many grams of 90% solution of H2SO4 must be added to 500 grams of 10% solution to prepare 70% solution?
4	**Acids and Bases**	1- Arrhenius definition 2 - The Bronsted- Lowry theory 3- Amphoteric substances 4 -Lewis definition of acid and bases 5- Strength of Acids and Bases **6-** Calculate the amounts of 90% and 10% solutions of H_2SO_4 required for preparing 1600g of 40% solution? **7-** Mineral acid, Alkalinity of acid, Organic acid, Alkali, Acidity of alkali 8- Acid-Base Indicators
5	**Some General Aspects of Volumetric Analysis**	Volumetric analysis, Equivalence point End point, Titrant, Standardization, Indicator Titration, Titration error, Types of Titrations Direct Titration, Back titration; Back titration is necessary when Classification of reactions in volumetric analysis

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6	**Acid Base Titrations**	Neutralization reaction; Neutralization point Neutralization (Titration) Curves; Titration Curve of Strong Acid and Strong Base Titration Curve of weak acid and strong base Titration Curve of weak base and strong acid Titration Curve of weak base and weak acid Neutralization curve of polyprotic acid with strong base; Displacement Titrations; Titration of carbonate ion with a strong acid; Acid-Base Indicators; The pH range of indicators; Indicator range
7	**Buffer Solutions**	Acidic buffer solution Mechanism of Buffering Buffer Capacity Alkaline buffer solution Buffer mechanism Hydrolysis of salts
8	**Precipitation Titrations**	Solubility Product Formation of a colored precipitate (Mohr method) Volhard method Formation of a soluble colored compound Fajan's method (Adsorption indicators)
9	**Oxidation Reduction Titrations**	Oxidation process Reduction process The oxidizing agent The reducing agent Detection of the end point in oxidation – reduction titrations Oxidation-Reduction Indicator Oxidation with potassium permanganate $KMnO_4$ Equivalent weight of oxidizing or reducing agent Determination the equivalent weight of $KMnO_4$ in an acidic medium

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