Department of Soil &Water

College of Agriculture

University of Salahaddin

Subject: Soil Physical chemistry

Course Book – *For example* (class 3)

Lecturer's name: Mc. Dedawan khursheed rahman

Academic Year: 2016/2017

Course Book

1. Course name	**Soil Physical Chemistry**
2. Lecturer in charge	**Dedawan khursheed Rahman**
3. Department/ College	**Soil and water Dept./ college of Agriculture**
4. Contact	**e-mail: dedawan.rahman@su.edu.krd** **Tel: (optional)**
5. Time (in hours) per week	**For example practical: 2* 3**
6. Office hours	**Sat. 9:00-1:00 off** **Su. 8.5.-2.5 Office hours** **Mo. 9:00-1:00 Office hours** **Tu. 10.30-12.30 student seminar** **We. 8:30 – 5:00 student project research** **Th. soil physical Chemistry Group (A, B)**
7. Course code	
8. Teacher's acadqaq.m,,eemic profile	**High School:2003** **BSc at 2007** **Master degree at 2014**
9. Keywords	**Soil physical Chemistry, Principle of soil science**

The general aim of this course is to equip students with knowledge and skills to develop and understand principle of soil physical chemistry and the methods which use in practical chemistry.
- It is important to learn what are the application of chemistry and its relation to their live.
-they will understanding the principle of participle of chemistry and the general information of soil physical chemistry and many other simple information in chemistry like electrochemistry and they will take Sufficient knowledge and understanding about soil chemical reactions which they use in their future work.

11. Course objective:

After this course and Upon completing this course, students should understand the basic concepts and the principle of soil physical chemistry and the general information of soil , what is solution and how to prepare the solution concentrations . In physical chemistry what is Ph enthalpy and free energy ……and many other simple information in chemistry like electrochemistry. A successful student will learn how to prepare reports in the style of a chemical journal, and have some lectures in chemical techniques that would be expected of a student applying to quantities and qualitative experiments in lab.

12. Student's obligation

Lack of attendance and tardiness to class are unacceptable in lecture courses. Obviously unforeseen events can lead to absenteeism and/or tardiness, but those instances are expected to be rare. So, please report to class on time! Due to limitations in support personnel, opportunities to make up missed lecture will not be feasible. If a student is absent for any reason, he/she should email or contacted to departments and the teaching assistant as soon. On as possible. Late assignments will only be accepted at the discretion of the instructor. Typically prompt written documentation will be

required to justify the acceptance of late assignments as a result of absenteeism.

13. Forms of teaching

We use data show and white board

14. Assessment scheme

The overall grading is 35% and distribute as in this scheme for this course is as follows:
5% Reports, Homework and quiz
10% 1st exam
20% Final Examinations

15. Student learning outcome:

Students should understand the basic concepts and the principle of soil chemistry and the general information . what is solution and how to prepare the solution concentrations inorganic and what is complex , In physical chemistry what is PH enthalpy and free energy ……and many other simple information in chemistry like electrochemistry. A successful student will learn how to prepare reports in the style of a chemical journal, and have some lectures in chemical techniques that would be expected of a student applying to quantities and qualitative experiments in lab.

16. Course Reading List and References:

- Fundamental of soil science
-Principle of soil physical chemistry
- (internet):

17. The Topics:	**Lecturer's name**
18. Practical Topics (If there is any)	
1- **a- Introduction of soil physical chemistry** **b- The role and equations** **c- How to prepare a report about the experiments.** **2- determination of ionic strength in soil** **3- Measurement the density of liquid**	

4- Measurement the viscosity of a liquid **5- determination of adsorption in soil by Langmuir equation** **6- Determination of molecular weight by evolution of boiling point** **7- Determination of molecular weight by freezing point depression** **8- Determination of heat of reaction of exothermic and endothermic** **9- Determination of heat of dissolution by solubility** **10- Monthly exam** **11- Determination the concentration of an unknown sample using spectrophotometer.** **12- Some examples, equation and solvent about experiments. With a daily quiz** **13- Monthly exam(2)** **14- Determination of Heat of solution from solubility** **15- Some examples, equation and solvent.** **16- Review of all**	

19. Examinations:

Q1- A / define the following? (only five) **(15) Mark**

1- **Adsorbate**: The substance whose molecules get adsorbed on the surface of the adsorbent
2- **Density**: is defined as the ratio of its mass m to its volume
3- **Activity**: is a unit that defines the reactivity of an ion within the solution.
4- **enthalpy** the amount of heat to increase the temperature of one gram of the water one degree centigrade
5- **Concentration**:The mass of a species per unit volume of the solution.
6- **Sorption** : A process involving both Adsorption and Absorption at the same time

Q1- B / Fill the blanks **(20) Mark**

1- **the relative density** defined as density of a liquid substance to density of a standard substance like water in the same temperature.
1- **adsorption** Is accumulation or concentration of constituents (adsorbate) at the colloidal surfaces The reverse process is called **desorption**. The curve relating the concentration of materials adsorbed at a fixed temperature is called the **adsorption isotherm** .
2- **Partition coefficient** Can be defined as the concentration of the solute in the organic layer divided by its molar concentration in the aqueous layer
the Units are **no units**
3- Strong base and strong acid dissolution totally in their dilute solution to their ions, forming **neutral salt** and **aqua medium with H_2O**
4- **Solubility** is the amount of solute that dissolves in a given amount of solvent to produce a saturated solution

Q2/ find the following/ **(15) Mark**

1- Calculate the ionic strength of the solution containing 0.02 M ($CaCl^2$) using this equation?

$CaCl_2 \longrightarrow Ca^{+2} + 2Cl^-$

0.02 0.02 2(0.02)

$$= \frac{1}{2} \sum 0.02 * (2)^2 + 0.04 * (-1)^2 = \frac{1}{2}(12) = 0.06 \text{ M / L}$$

2- Calculate the volume of 42.0 g of tin (density 7.29g/ml) ?
D=mass/volume =7.29 =42.0/volume
Volume =42/7.29 = 5.76 ml or cm^3
3- Calculate the partition coefficient of butanoic acid between ether and water if 60gm botanoic acid ($C_4H_8O_2$) in 50cm^3 ether solution and 10 gm butanoic acid ($C_4H_8O_2$) in 25cm^3 aqua solution ?

$$D = \frac{[Solute]org}{[\text{Solute}]aq} = (no\ unit)$$

D=(60/50) /(10/25) = 3

Q3/ **(25) Mark**

100ml of 1mol/l Hydrochloric acid HCl was mixed with 100ml of 1mole/l Sodium Hydroxide NaOH

the temperature rose by 6.2C if you now Specific capacity of water =4.18 KJ/Kg^{-1}. C^{-1}

=-4.18 *0.2 *6.2

= -5.18KJ

The equation for the reaction is HCl +NaOH $\longrightarrow$ NaCl +H_2O

Number of moles of acid = number of moles of alkali

= C * V (in liters) = 1* 0.1 = 0.1

So number of moles of water formed =0.1

Use proportion to find the amount of heat given out when 1

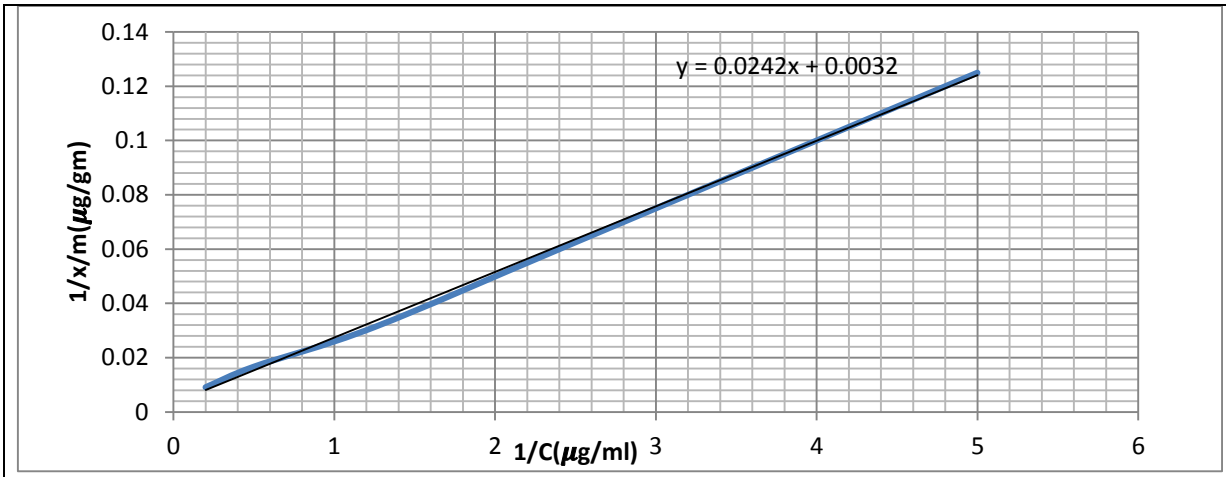
0.1 mole $\longrightarrow$ -5.18kj So 1 mole = 1/0.1 * -5.18 KJ =-51.8KJ/mole

Q4/ **25) Mark**

Calculate the adsorption of phosphor by using the Langmuir equation if you do an experiment about phosphorus and add KH2PO4by different concentration (10, 20, 40, 80 and 160 ppm (µg/gm) after a period taken 1gm and dilute to 10ml solution determined phosphor concentration is (0.2, 0.4, 0.8, 2 and 5 µg P /ml) respectively?

$$\frac{1}{x/m(\frac{\mu g}{ml})} = \frac{1}{Kb}.\frac{1}{C(\frac{\mu g}{gm})} + \frac{1}{b}$$

P Add	Initial P C (μg/ml)	P C(μg/gm)	P adsorbed x/m(μg/gm)	1/C (μg/ml)	1/x/m (μg/gm)
10	0.2	2	8	**5**	**0.125**
20	0.4	4	16	**2.5**	**0.0625**
40	0.8	8	32	**1.25**	**0.03125**
80	2	20	60	**0.5**	**0.016667**
160	5	50	110	**0.2**	**0.009091**



Intercept= 1/b = 0.0032= 1/b b=1/0.0032 = 312.5

Slope= 1/kb = 0.0242 =1/ k * 312.5 k= 0.132

20. Extra notes:

The Academic Honor System of Iraqi is based on the premise that each student has the responsibility (1) to uphold the highest standards of academic integrity in the student's own work,
(2) to refuse to tolerate violations of academic integrity in the University community, and
(3) to foster a high sense of integrity and social responsibility on the part of the University community. This means that you will not give or receive information during an examination, nor will you consult unauthorized sources of information during an examination. Students should review the Academic Honor System outlined in the (الوقائع العراقية) Student Handbook. Violations of the Honor Code will not be tolerated and will result in zero points being awarded for the course work in question.

21. Peer review پێداچوونەوەی هاوەڵ

This course book has to be reviewed and signed by a peer. The peer approves the contents of your course book by writing few sentences in this section.

(A peer is person who has enough knowledge about the subject you are teaching, he/she has to be a professor, assistant professor, a lecturer or an expert in the field of your subject).

ئەم کۆرسبووکە دەبێت لەلایەن هاوەڵێکی ئەکادیمیەوە سەیر بکرێت و ناوەڕۆکی بابەتەکانی کۆرسەکە پەسەند بکات و جەند ووشەیەک بنووسێت لەسەر شیاوی ناوەڕۆکی کۆرسەکە و واژووی لەسەر بکات.
هاوەڵ ئەو کەسەیە کە زانیاری هەبێت لەسەر کۆرسەکە و دەبیت پلەی زانستی لە مامۆستا کەمتر نەبێت.