



Q1/Fill the following blanks in suitable phrases

- 1- Ion exchange
and it has two typesand
- 2- Depending on classical classification soil chemistry hasclass,
while in modern classification hasclass.
- 3- Increase incauses increasingcharge while decreasing incauses
increasing in charge.
- 4-called the heart of the soil.
- 5- The mechanism of ion entry into the soil solution includes,
....., and
- 6- Soil chemistry had two branches which are and..... but strict
separation between them is
- 7- replace in a tetrahedral sheet leaves a net of charge.
- 8- The modern soil chemistry involves,
..... and.....
- 9- When the positive and negative charges equal at a certain pH, this point is called
.....
- 10- The highest negative charge exists in.....which equals to
.....
- 11- In determining CEC the number of ions does not matter but the number of
..... is important.
- 12- Total carbon divided to and
- 13- The methods of solving (P) problems are, and
- 14- Th CaCO_3 represent of carbonate minerals
- 15- Mole fraction of phosphorus affected by only but mole fraction of
carbonate affected by and
- 16- pH molar ratio of (CO_3) to (HCO_3) is unity.
- 17-The charge of ion pairs may be, and

Q2/A/Define soil chemistry and explain its relationship with other sciences.

B/ What are the sources of negative charge? which one is the most important? then explain one of them

Q3/ A/ Enumerate the chemical properties of the soil, which one is the best and, why?

B/ What are the goals of studying soil chemistry

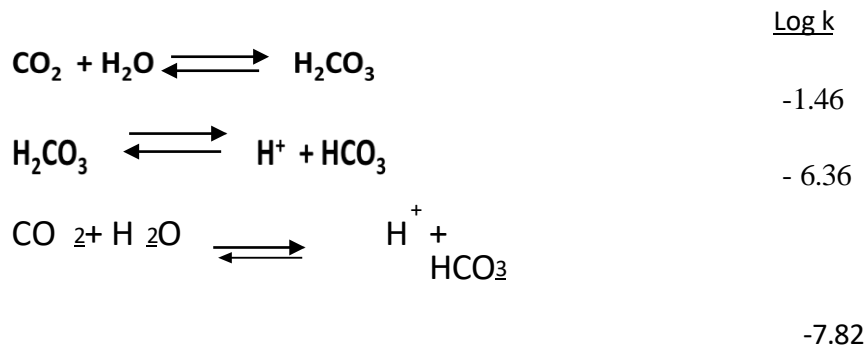
Q4/ What are the main soil phases? and, what is the most important phase that was not mentioned in scientific references? Why? explain your answer in a graph depending on volume then convert to weight

Q5 /Answer the following:

- 1- What is the application of ion pair?
- 2- What is the difference Ion pair and Ion complex?
- 3- What are the categories of phosphorus reaction?
- 4- What is lyotropic series? and explain its application.
- 5- What is the difference between polymorphism and isomorphism?
- 6- Pyroxenes and Amphiboles, are called Ferro magnesium minerals. why?
- 7- What are the methods for identifying clay minerals?
- 8- What are the Characteristics of cation exchange?
- 9- What is CEC? Why is ion exchange so an important process in soil?

Q6/ What are the nutrient problems in calcareous soil?

Q7/ Improve that the mole fraction of H₂CO₃ depend on CO₂ only if you know the following equations.



Q8/ Calculate activity of Mg²⁺ if concentration of Mg²⁺ = 20 meq/L and ionic strength = 0.040(mol/L) .

Q9/ What are the methods of solving (P) problem?

Q10/ Write the differences between (3) of them:

- 1- Active CaCO₃ and non-active CaCO₃.
- 2- Carbonate and Phosphorus system.
- 3- Ion pair and salts.
- 4- Chemical and physical fixation of phosphorus.

Q11/ From the following data calculate ionic strength:

Ions	Con. meq/l
Ca ²⁺	20
Mg ²⁺	10
Na ⁺	2
K ⁺	2
SO ₄ ²⁻	12
HCO ₃ ⁻	16
CO ₃ ²⁻	0
Cl ⁻	6

Q12 /Draw two distinct structural units of clay mineral.

Q13 /What are the differences between Kaolinite and Montmorillonite? explain your answer by figure.

Q14 /The value of CEC for Grderesh field = 45 meq/100g soil, From the following information, calculate percentage base cation saturation (% BS):-

Exchangeable ions	Ca ⁺²	Mg ⁺²	K ⁺	SO ₄ ⁻²	Na ⁺	Fe ⁺²	Cl ⁻	Al ⁺³	HCO ₃ ⁻	H ⁺
Concentration meq/100 gm soil	10	8	2	10	2	4	3	5	8	4

Lecturer

Dr. Kazhin Sarbaz Rajab