EMBU UNIVERSITY COLLEGE

(A Constituent College of the University of Nairobi)

2015/2016 ACADEMIC YEAR

FIRST SEMESTER EXAMINATION

FOURTH YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE

SCH 403: SURFACE AND COLLOID CHEMISTRY

DATE: DECEMBER 7, 2015   TIME: 11:00-13:00

INSTRUCTIONS:

Answer Question ONE and ANY other two Questions

QUESTION ONE

a) Define the following terms:

i)	Catalyst	(2 marks)
ii)	Micelles	(2 marks)
iii)	Activation energy	(2 marks)
iv)	Adsorption	(2 marks)

b) Explain why $MgCl_2$ is a better coagulant than KCl for As_2S_3 sol.   (2 marks)

c) State three uses of colloids.   (3 marks)

d) A polymer mixture contains two polymers, one having molecular weight 100,000 and the other having molecular weight 60,000. The two components are present in equimolar concentration. Calculate;

i)	the number average	(2 marks)
ii)	The weight average molecular weights.	(2 marks)

e) Explain why a finely powdered substance is a more effective adsorbent?   (2 marks)

f) Differentiate between homogeneous and heterogeneous as applied to catalysts.

(4 marks)

g) Explain two differences between physisorption and chemisorption   (4 marks)

h) With an example explain autocatalysis   (3 marks)

QUESTION TWO

a) Explain two differences between gels and emulsions   (4 marks)

b) With the aid of a diagram describe how a sol can be purified by ultrafiltration. (8 marks)

c) Discuss any four properties of gels.   (8 marks)

QUESTION THREE

a) Define a sol and give an example.   (4 marks)

b) Peptization is one of the methods of sol preparation. Describe how ferric hydroxide sol can be prepared through peptization.   (6 marks)

c) Explain five main differences between lyophilic and lyophobic sols   (10 marks)

QUESTION FOUR

a) Draw simple energy profile to explain how the catalyst affects the activation energy of a reaction.   (6 marks)

b) Explain any four characteristics of catalytic reactions   (8 marks)

c) In the Contact process, the reaction between sulphur dioxide and oxygen is catalysed by Vanadium (V) oxide:

$$SO_2 + 1/2O_2 \longrightarrow SO_3$$

i)   What type of catalysis is this?   (1 mark)

ii)   Write equations to show the mechanism of this reaction.   (5 marks)

QUESTION FIVE

a) Explain the effect of temperature on adsorption of gases on solids? (3 marks)

b) i) State the assumptions of Langmuir adsorption isotherm (3 marks)

   ii) Derive the Langmuir adsorption equation. (6 marks)

c) In a particular experiment it is required to have a large amount of gas absorbed on the surface of a solid. Explain three factors that must be considered for this experiment to be successful.

   (6 marks)

d) Give two applications of adsorption. (2 marks)

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