

**DEPARTMENT OF CHEMISTRY
SCHOOL OF NATURAL AND APPLIED SCIENCE
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
FIRST SEMESTER EXAMINATION 2012/2013 SESSION**

COURSE CODE: CHM 411

UNIT: 2

COURSE TITLE: APPLIED SURFACE AND COLLOID CHEMISTRY

INSTRUCTION: ANSWER QUESTION (1) AND ANY OTHER TWO

TIME ALLOWED: 2 HOURS

1. a. i. Enumerate five characteristic differences between chemisorption and physisorption.
ii. State the Freundlich and Langmuir adsorption equations. Are these equations theoretically or empirically derived?
iii. Show that the following data fit a Langmuir adsorption isotherm and evaluate the constants.

P (mmHg)	100	200	500	900
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Gas adsorbed (mg/g)	1.56	1.97	2.29	2.41
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- b. Suggest modifications that can be made on solid surfaces or properties of liquid or both, to improve their wettability.
ci. With the aid of a diagram, explain different types of instability in emulsion
ii. Briefly explain the classification of W. Ostwald on the aggregation of the disperse phase and the dispersion medium.
iii. Enumerate the different characteristics of colloids.

2. a. Enumerate five factors that determine the extent of adsorption of gases by solids.
b. Explain the phenomenon of molecules at the surface and interior of a homogenous solution.
c. Briefly explain the classification of colloids based on degree of dispersion.

3. a. Explain using equations why bubble does not shrink to reduce the total surface area.
b. Calculate the surface tension of water at 25 °C. If it rises 7.36 cm in a capillary of radius 0.20 mm. Assuming the contact angle is 0°, the density of water at 25°C is 997.1 kg/m³ and density of air is 0.012 kg/m³.
c. Explain different types of processes involve in the preparation of lyophobic sols.

4. a. Explain briefly any two of the properties of disperse/colloidal system.
b. What are protective colloids?
c. Enumerate different ways of purifying colloids.