

**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

- 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.