Uva Wellassa University of Sri Lanka
End Semester Examination – September/ October 2012
SCT 431 -1 Surface & Colloidal Chemistry

Uva Wellassa University

Time: One (01) hour

Total **three (03)** questions
Answer **two (02)** questions only

Universal gas constant, $R = 8.314\ J\ K^{-1}\ mol^{-1}$

Plank's constant, $h = 6.626 \times 10^{-34}\ m^2\ kg\ s^{-1}$

Acceleration due to gravity = $9.81\ m\ s^{-2}$

Density of water = $1\ g\ cm^{-3}$

Surface tension of water = $0.072\ N\ m^{-1}$

1 atm = 101.325 kPa

01) a. State Young – Laplace equation and Identify all the terms there in.

b. State **three** implications of Young – Laplace equation.

c. What is surface tension?

d. State **three** methods to find surface tension of liquid gas interface.

e. State an expression for the height of a liquid column in a capillary, if the capillary is lowered into a liquid. Identify all the terms there in.

f. Water in trees rises in capillaries which are called xylem. They are typically 5-170 μm in radius and are completely wetted ($\theta = 0$). What is the maximum height that water can rise in such capillaries?

(50 marks)

02) a. State the conditions where BET isotherm is applicable?

b. State the BET isotherm and identify the terms there in.

c. State the three main assumptions of Langmuir isotherm.

d. State Freundlich isotherm.

e. Define the term "extent of coverage"

f. M.G. Oliver and R. Jadot studied the adsorption of butane on silica gel. They reported the following amounts of adsorption at 303 K:

P / kPa	31.00	53.03	101.97	165.06	205.75
n / mol kg^{-1}	1.00	1.17	2.49	3.22	3.36

i. Fit these data to Langmuir isotherm.
ii. Determine the value of **n** that corresponds to complete coverage.
iii. Determine the constant K.

(50 marks)

03) a. Define the term "Colloid"?

b. i. State an expression for the surfactant parameter and identify the terms there in.

ii. Polar head group of $C_{14}H_{29}OSO_3Na$ in water is 0.65 nm^2 in the absence of a back ground salt. Calculate surfactant parameter. Hence, deduce the shape of the aggregate forms.

c. i. State the DLVO theory and identify the terms there in.

ii. State the main assumption of this theory?

iii. State the DLVO theory when, $r_D << a$

d. i. State an expression for the molar Gibbs energy of emulsification and identify all the terms there in.

ii. State **two** factors influencing the structure of micro emulsions.

e. Compare and contrast "flocculation" and "coagulation".

f. Write short accounts on any **two** of the following

i. Foams
ii. Micelles
iii. Emulsifiers

(50 marks)