

## Unit 7 - Week 6

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## Assignment 6

The due date for submitting this assignment has passed.  
As per our records you have not submitted this assignment.

**Due on 2020-10-28, 23:59 IST.**

A schematic of a charged particles and the structure of the electrical double layer around it is shown in Fig. 1.

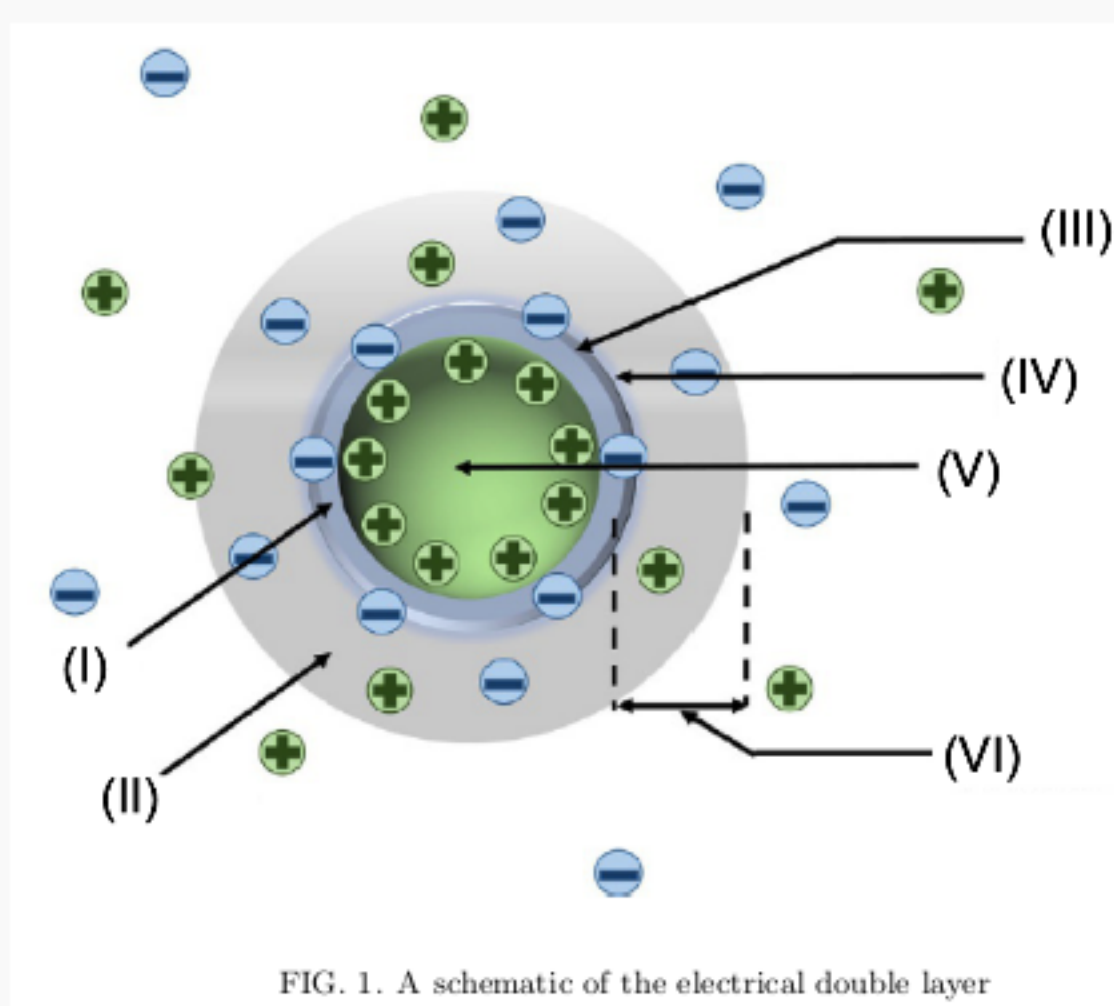


FIG. 1. A schematic of the electrical double layer

Column A	Column B
(a) I	(a) Diffuse layer
(b) II	(b) Stern plane
(c) III	(c) Stern layer
(d) IV	(d) Positively charged particle
(e) V	(e) Surface of shear
(f) VI	(f) Electrical Double layer thickness

1) I

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: String) c

0 points

2) II

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: String) a

0 points

3) III

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: String) b

0 points

4) IV

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: String) e

0 points

5) V

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: String) d

0 points

6) VI

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: String) f

0 points

Choose the correct answer

7) The unit of thermal energy,  $k_B T$ , where  $k_B$  is the Boltzmann constant and  $T$  is the absolute temperature is:

- Joule per Kelvin  
 Joule  
 Newton  
 Newton per Kelvin

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
Joule

0.5 points

8) The unit of Debye Huckel parameter parameter  $\kappa$  is:

- $m^2$   
  $m^1$   
  $m^{-2}$   
  $m^{-1}$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $m^{-1}$

0.5 points

9) The surface potential, usually designated as  $\psi_0$  has the following unit:

- Volt  
 Volt per meter  
 Poise  
 Debye

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
Volt

0.5 points

10) The unit of surface charge density is :

- Coulomb  
 Coulomb per metre square  
 Coulomb per metre cube  
 Coulomb per metre

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
Coulomb per metre square

0.5 points

On the surface of a certain material, there is one ionized group per  $(4\pi m)^2$ . This surface is immersed in an aqueous solution containing 10mM NaCl.

[Hint: Assume low potential limit]

Useful quantities: Charge on electron,  $e = 1.6 \times 10^{-19} C$ ,  $\epsilon_0 = 8.85 \times 10^{-12} C^2 N^{-1} m^{-2}$ , the dielectric constant to be 78.4, assume the temperature to be 25°C, and Boltzmann constant is  $1.3807 \times 10^{-23} J/K$

11) What is the screening length in nm?

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Range) 2.94,3.14

4 points

12) What is the surface potential ( $\psi_0$ ) in Volts?

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Range) 0.040,0.048

4 points

A 400 ml of 0.01M sodium chloride solution is mixed with 600 ml of 0.001 M sodium sulfate.

Useful quantities: Charge on electron,  $e = 1.6 \times 10^{-19} C$ ,  $\epsilon_0 = 8.85 \times 10^{-12} C^2 N^{-1} m^{-2}$ , the dielectric constant to be 78.53, assume the temperature to be 2298 K, Boltzmann constant is  $1.381 \times 10^{-23} J/K$  and the Avogadro's number is  $6.022 \times 10^{23}$

13) What is the molarity of sodium chloride upon mixing?

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Range) 0.0035,0.0045

2 points

14) What is the molarity of sodium sulfate upon mixing?

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Range) 0.00055,0.00065

2 points

15) What is the Debye length for this electrolyte solution. Report you answer in nm (nanometer)?

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Range) 3.9,4.1

5 points