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# **IOP** Conference Series

## Earth and Environmental Science

### The 4th International Seminar on Sciences



187

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19 - 20 Oktober 2017

IPB International Convention Center  
Baranangsiang, Bogor, Indonesia

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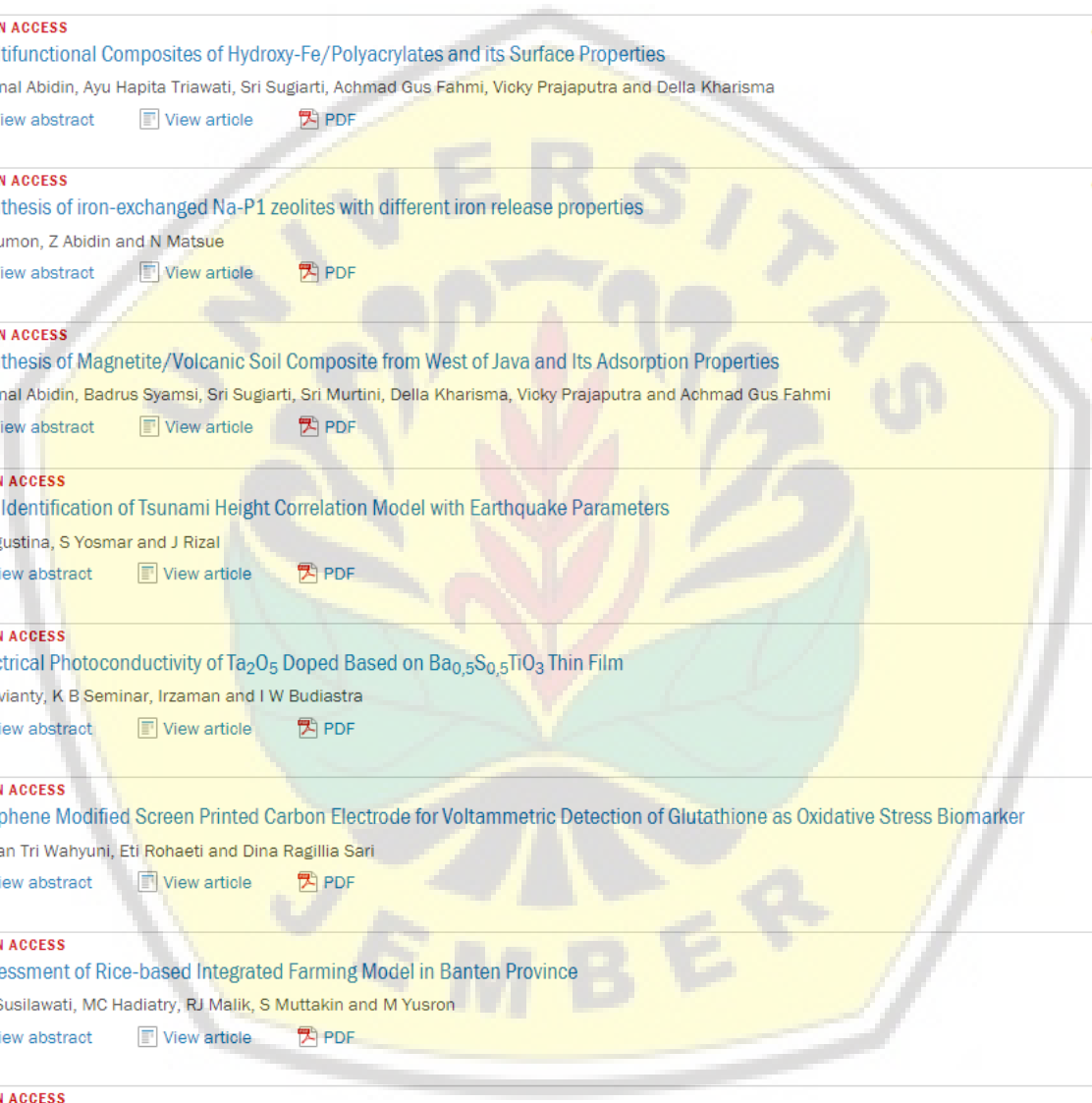
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## PREFACE

The 4th International Seminar on Sciences (ISS) is an annual meeting organized by the Faculty of Mathematics and Natural Sciences, Bogor Agricultural University (FMIPA IPB). The seminar was held for two days from 19-20 October 2017, at the IPB International Convention Center, Baranangsiang, Bogor. The main theme of this seminar was “Sciences for Green Development” in accordance with the importance of science in maintaining the ecosystem and supporting its sustainability and IPB research expertise. The scope of the seminar comprises these topics:

- Bio-based Functional Materials
- Biophysics, Biomaterials, and Biosensors
- Bioresources, Biosciences, and
- Biotechnology Data Science and Modelling
- Environmental and Climate Change
- Information Technology for Agriculture
- Internet of Things for Sustainable Agriculture
- Life Sciences
- Nanotechnology in Life Sciences
- Renewable Energy
- Actuarial Sciences and Risk Management
- Other related topics

In this year ISS, we were also honoured to have the presence of Canadian Ambassador to Indonesia His Excellency Peter MacArthur who convey his greatest appreciation of the implementation of this activity and the cooperation that exists between FMIPA IPB and University of Waterloo. The 4<sup>th</sup> ISS this year presents no less than 10 academics / researchers / experts as speakers, both from national and international institutions namely:

- **Prof. Dr. Ir. Kudang Boro Seminar (Institut Pertanian Bogor)**  
Transparency & Trace-ability for Agro-based Products is a Must.
- **Prof. Johnny Li (University of Waterloo)**  
Hedging Crop Yield with Exchange-traded Weather Derivatives.
- **Prof. Sakakibara Masayuki (Ehime University)**  
Environmental Design for Phytotechnology for Sustainable Development in Socioecological Systems.
- **Prof. Santosh Krishna Haram (University of Mumbai)**  
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- **Dr. Agus Salim (La Trobe University)**  
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- **Ika Dewi Ana, drg, PhD (Universitas Gajah Mada)**  
Studies on Development Calcium Phosphate Ceramics for The Application in Dentistry.

We would like to thank all the contributors and participant who made this event a big success. We are also pleased to announce that a record number of 82 papers will be published in the IOP EES Conference Proceeding and hope that you will also consider to join the upcoming ISS conferences.

ISS 2017 Chairperson



Dr. Yessie Widya Sari

ISS 2017 Proceeding Coordinator

A handwritten signature in black ink, consisting of stylized initials and a surname.

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## The electrical conductance studies on the chicken-egg membrane in presence of alkali chlorides

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**Abstract.** Results on the studies of electrical conductance on the chicken-egg membrane in presence of alkali chlorides (NaCl, MgCl<sub>2</sub> and AlCl<sub>3</sub>) are presented in this article. The conductance measurements of the inner thin layer membrane of a chicken-egg observed with electrolyte solution of some common alkali chlorides over a range of concentrations and at different temperatures. The increasing of concentration in the electrolyte solution through chicken-egg membrane tends to the increasing of conductance values. The magnitude follow the order Al<sup>3+</sup> > Mg<sup>2+</sup> > Na<sup>+</sup>. The temperature range studied is between 303 K and 363 K at 10 K interval. The linear regression with a negative slope shows a correlation between conductance and temperature. The increasing of temperature indicates some kind of mobilization of the ions occurred during the conductance measurement.

### 1. Introduction

Biological membranes mainly consist of lipids and proteins. The “fluid mosaic” models of biological membranes were described as two-dimensional fluids consist of double layer of lipids which proteins are embedded. Lipids are amphipathic molecules with hydrocarbon chains and polar head groups. When exposed to water, they spontaneously form membranes with a thickness are about 5 nm. Membranes can be defined as a thin layer semipermeable barrier necessary for maintaining biochemical conditions that are different from the environment. They also control the transport of substances into the cell and important players in the metabolism of cells [1-3].

Diffusion is an important phenomenon that occurs in living systems for carrying out various biological activities. The simplest mechanism where molecules can move across the membrane called as a passive diffusion. Therefore, studies of the biological membranes are necessary to explain the mechanism of transport occurring in the biological systems. During the transport processes, a molecule simply crosses the membrane and enters the aqueous solution at the other side of the membrane. The direction of the transport is determined simply by relative concentration of the molecule inside and outside the cell. Transport processes through biological membranes are important because their potential use in different separation processes [4-5].

The investigations of the electrical properties in biological membranes have been increasing attention to researcher for many years. Many researches attempted to link electrical parameters to physical, chemical or biological characteristic [6]. The interface of the membrane with intracellular and extracellular fluid effectively acts like capacitor plates in an RC parallel circuit [7]. Transport processes in biological membranes also takes place through protein channel where allowing small





molecules with appropriate size and charge to pass freely through the membrane. Therefore, membranes are excellent capacitors.

Electrical properties that used in this case are electrical conductance. Electrical conductance is a measure of transmission of an electric current through a membrane. It is an important variable that determines the extent of biological changes such as electropermeabilization, electrofusion, motility and microbial inactivation [8]. The membrane can display interesting conductance phenomena that are similar but not related to the properties ascribed to protein [3]. Electrical conductance is strongly dependent on temperature, the concentration and type of the ion. Higher increases in temperature occur with increasing electrical conductance during electrical treatment [9].

The problems to investigation of electrical phenomena in biological membranes are because of undefined pore size and complex surface characteristics. Nevertheless, this present study was to report the electrical conductance studies in biological membrane (i.e. chicken-egg membrane) when it separates solutions at different concentration of alkali chloride and temperatures. The mechanism transport through the membrane has been calculated using conductance measurement. Thus, the electrical properties are dependent on physical and chemical parameters determining the concentration and mobility of ion within the membranes.

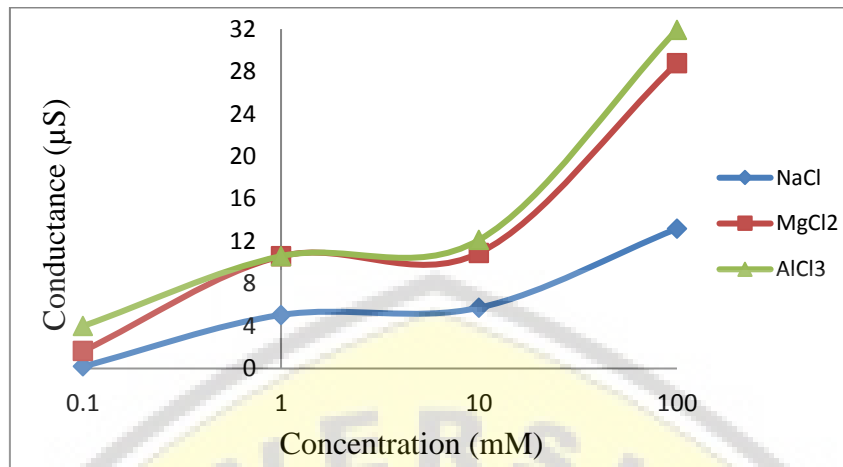
## 2. Material and methods

The inner thin layer membrane is removed by peeling it manually from the shell of a chicken-egg with sterile gloves. It was washed thoroughly with distilled water to remove any adsorbed and contaminated chemicals. Then, the chicken-egg membrane was always kept in the wet condition with dipped in distilled water to avoid any disturbance arises due to the entrapped air within the pores and also to disallow the development of crack in dry condition [10]. The membranes were cut into small discs and put in a chamber. A chamber was filled with a different concentration of alkali chloride (NaCl, MgCl<sub>2</sub>, and AlCl<sub>3</sub>). Solutions of NaCl, MgCl<sub>2</sub>, and AlCl<sub>3</sub> (Merck, Germany) were prepared with distilled water in various concentrations. The various concentrations referred in this article are 0.1 mol m<sup>-3</sup>; 1 mol m<sup>-3</sup>; 10 mol m<sup>-3</sup>; and 100 mol m<sup>-3</sup>. The 50 ml electrolyte solution was filled in chamber where consisted of 2 parallel platinum electrodes with 1 cm gap. Electrical conductance was measured directly using LCRmeter Hitester 5322-50. All measurements were made at the temperature range between 303 K and 363 K at 10 K interval.

## 3. Results and discussion

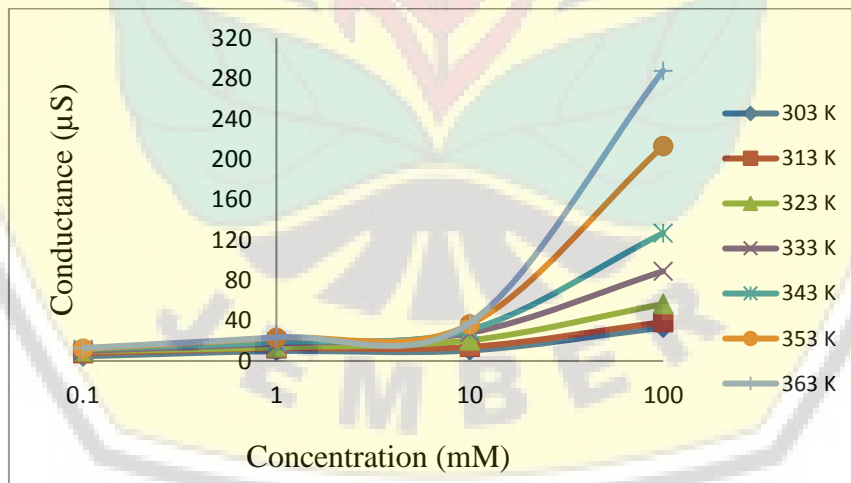
The measurements of the membrane conductance in any concentrations for different electrolytes at room temperature are shown in figure 1. The common trend found for all the electrolytes is that the membrane conductance increases with increasing in concentration. The membrane conductance changes in the order AlCl<sub>3</sub> > MgCl<sub>2</sub> > NaCl. The variation in the concentration of electrolyte determines the amount of ions in the solution. The electrical conductance is a measure of ease with which delocalized charge carriers can move through the membrane under the field's influence. In biological membranes, the electrical conductance mainly from the mobility of hydrated ions. The transport number of ions in the membrane is a function of mobility and of concentration ratios of coions and counterions [11].

According to figure 1, the magnitude of membrane conductance in AlCl<sub>3</sub> is greater than MgCl<sub>2</sub> and NaCl. It is suggesting that the hydrated sizes retained more within the membrane pores and give an effect on the measured membrane conductance. The values follow the order Al<sup>3+</sup> > Mg<sup>2+</sup> > Na<sup>+</sup>. This result is given information that in a solution the mobility of Al<sup>3+</sup> is higher than Mg<sup>2+</sup> and Na<sup>+</sup>. This fact shows that the highest valence ions which increases the mobility of these ions through membrane. However, the plot of membrane conductance in AlCl<sub>3</sub> and MgCl<sub>2</sub> is not too significant. It can be indicate that ion Al<sup>3+</sup> has been blocked to pass through the membrane.



**Figure 1.** Plots of the electrical conductance of different electrolytes through the chicken-egg membrane at room temperature.

Figure 2 is show the effect of temperature on the membrane conductance in various concentrations of AlCl<sub>3</sub> solution at the temperature range 303-363 K at 10 K intervals. The general trend at any temperature is the same, showing an increase in concentration. As regards the conductance, the temperature effect of all the electrolytes has been found the same sequence to be Al<sup>3+</sup> > Mg<sup>2+</sup> > Na<sup>+</sup> in this membrane. It also indicates that the hydrated sizes remain virtually undisturbed in the studied temperature range. The increase of membrane conductance with any electrolyte from one temperature to another at any concentration may be attributed mainly to an increase in mobility of the ions [4].

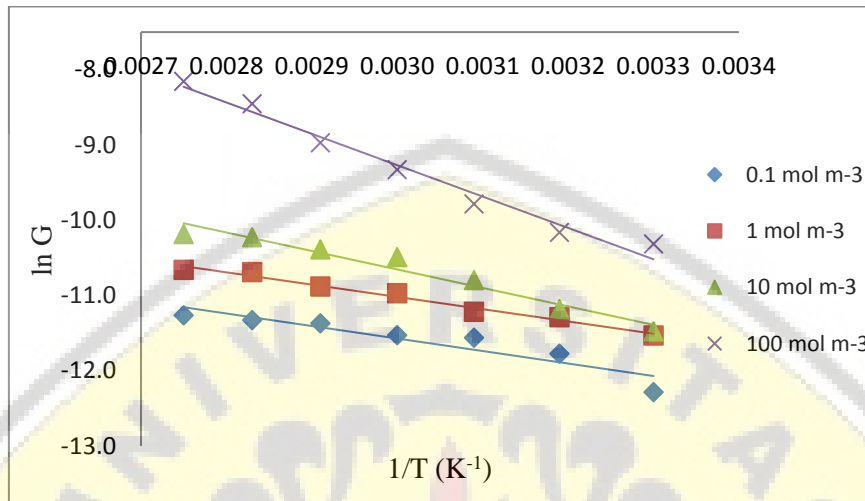


**Figure 2.** Plots of the membrane conductance in various concentrations of AlCl<sub>3</sub> solution at different temperatures (303-363 K at 10 K interval)

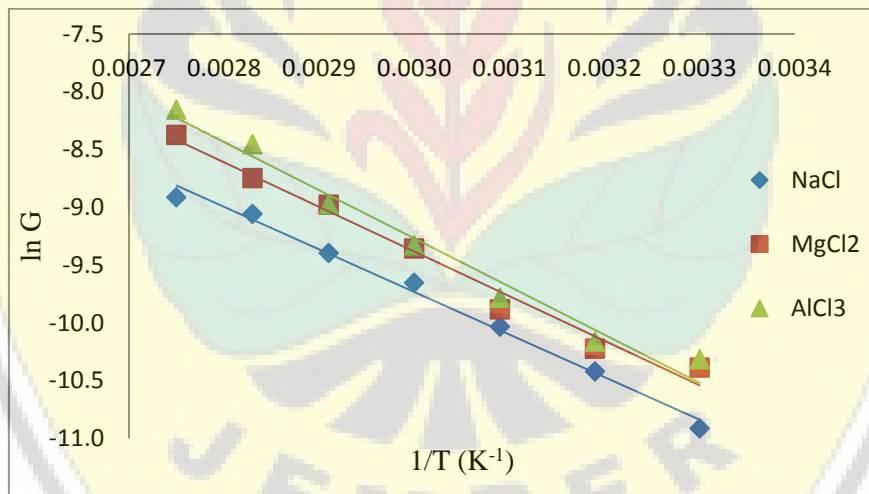
The phenomena of mechanism transport passing through the membrane can be analyzed from the measurement of electrical conductance at different temperature. By applying the Arrhenius equation in its basic form, where is,

$$G = G_0 \exp(-dU/kT) \tag{1}$$

In G values of a different concentration of electrolyte solutions are plotted against 1/T. The slopes of the Arrhenius plots shown in figure 3, that was indicated the activation energies of the membrane [12].



**Figure 3.** Plots of ln G against 1/T in any concentration of AlCl<sub>3</sub> solution at different temperature (303-363 K)



**Figure 4.** Plots of ln G value at one of the concentrations (100 mol m<sup>-3</sup>) against 1/T at different electrolytes through the chicken-egg membrane.

Figure 4 shows the plots of different electrolytes at the concentration of 100 mol m<sup>-3</sup>. The regression analysis of data results in a linear equation relating electrical conductance and temperature for all electrolyte solutions. The R<sup>2</sup> values of all the regression equation are 0.9919, 0.9816 and 0.9765 for NaCl, MgCl<sub>2</sub> and AlCl<sub>3</sub>, respectively. The negative values for such membrane in presence of alkali chlorides solution is due to the gradual accumulation of Cl<sup>-</sup> ions produces a negative charge density. It is shown that with increasing concentrations, the conductance increases because of greater accumulation of ions. The smooth linear plots suggest that there is no abrupt irreversible change in the membrane structure within the concentration and temperature range studied [13].

#### 4. Conclusion

The electrical conductance studies of the inner thin layer membrane of a chicken-egg was conducted and analyzed in terms of the physiochemical changes experimented over a range of concentrations and

at different temperatures. The general trend at any temperature is the same, showing a smooth increase in concentration. The linear regression thus indicates the suitability of the correlation between electrical conductance and temperature with coefficient determination up to 99%. The temperature effect of all the alkali chlorides solutions studied here has also maintained the same sequence of conductance variations  $Al^{3+} > Mg^{2+} > Na^+$  indicating that the hydrated sizes. There is a correlation between changes of temperature with a conductance as a mechanism transport through the inner membrane.

### 5. Acknowledgement

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### 6. References

- [1] Heimburg T 2009 *Soft Matter* **5** 3145-3147
- [2] Semrau S and Schmidt T 2009 *Soft Matter* **5** 3147-3186
- [3] Zecchi K A, Mosgaard L D and Heimburg T 2016 *Journal of Physics: Conference Series* **780** 1-9
- [4] Samanta T 2002 *Colloids and surfaces B: Biointerfaces* **27** 95-101
- [5] Tari D, Haryan S, Patankar K, Jaiswal V, Samant M, Sivakami S and Dongre 2017 *Current Science* **112**(7) 1574-1578
- [6] Damez J L, Clerjon S, Abouelkaram S and Lepetit J 2007 *Meat Science* **77** 512-519
- [7] Bier M 2006 *Acta Physica Polonica B* **37**(5) 1409-1424
- [8] Amiali M, Ngadi M O, Raghavan V G S and Nguyen D H 2006 *International Journal of Food Properties* **9**(3) 533-540
- [9] Berardinelli A, Ragni L, Cevoli C and Guarnieri A 2011 *J. of Ag. Eng. - Riv. di Ing. Agr* **1** 41-47
- [10] Samanta T and Basu A S 1998 *Colloids and surfaces A: Physicochemical and Engineering Aspects* **137** 171-180
- [11] Koter S, Piotrowski P and Kerres J 1999 *Journal of Membrane Science* **153** 83-90
- [12] Wang W, Chen X, Zhao C, Zhao B, Dong H, Ma S, Li L, Chen L and Zhang B 2018 *Polymers* **10**(1) 1-16
- [13] Maulina W 2016 *Proceeding The 1<sup>st</sup> IBSC: Towards The Extended Use of basic Science for Enhancing Health, Environment, Energy and Biotechnology* 209-210