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CASEAN - 6

# PROCEEDINGS

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MACHINE LEARNING FOR SEISMIC SIGNAL PROCESSING BASED ON PERFORMANCE OF EVALUATION BROADBAND NETWORK STATION IN SUMATERA REGION, INDONESIA .....	73
<i>Marzuki Sinambela, Kerista Tarigan, Syabrud Hamsidi, Anisastel Rajagukguk and Marhapoan Situmorang</i>	
THE UPHILL DIFFUSION OF GLYCEROL IN THE SINGLE COMPONENT SYSTEM	81
<i>Fu Ba Dang</i>	
OBSERVATION OF A FARAWAY GALAXY OF THE EARLY UNIVERSE .....	86
<i>T.T.Thai, P.Tuan-Anh, P.N.Diep, D.T.Hoai, P.T.Nhuong, N.T.Phuong, P.Davriulat</i>	
BRAIN TUMOR DETECTION USING CLUSTERING ALGORITHMS AND MORPHOLOGICAL OPERATIONS .....	92
<i>Nguyen Luong Thien Nhut, Huyen Phuong Uyen, Dang Van Liet</i>	
BREAST CANCER DETECTION USING BI-DIMENSIONAL EMPIRICAL MODE DECOMPOSITION AND THRESHOLDING .....	98
<i>Nguyen Hong Giang, Nguyen Thu Thuy, Dang Van Liet</i>	
SCIENTIFIC METHODS FOR ESTIMATING THE STRUCTURE OF DETERRENT LAYER IN PYROXYLIN PROPELLANT .....	104
<i>Pham Quang Hieu, Pham Van Toai, Chu Chien Huu</i>	
EFFECT OF INGREDIENTS CONTENT AND TEMPERATURE ON DYNAMIC VISCOSITY OF COMPOSITE EXPLOSIVE .....	110
<i>Nguyen Van Khuong, Ngo Van Giao, Nguyen Tran Hung</i>	
EFFECT OF ALUMINIUM POWDER ON AIR SHOCK WAVE PARAMETERS OF COMPOSITE EXPLOSIVES .....	116
<i>Nguyen Van Khuong, Ngo Van Giao, Nguyen Tran Hung</i>	
LOW-LEVEL LASER THERAPY FOR SHOULDER TENDINOPATHY .....	124
<i>Huyen Minh Tri, Ngo Thi Thien Hoa, Tran Minh Thai, Cao Ngoc Minh, Trinh Tran Hong Duyen, Tran Thi Ngoc Dung</i>	
BIOCHAR PRODUCED FROM BIOMASS FUELS AND THEIR CHARACTERIZATIONS FOR DIRECT CARBON FUEL CELL (DCFC) APPLICATION .....	129
<i>Vin Maung Maung, Thinzar Lwin, Than Than Win and Khin Khin Win</i>	
DEVELOPMENT AND INVESTIGATION OF THE COPPER ION GENERATOR FOR WATER RESOURCE TREATMENT .....	135
<i>Trinh Khac Kien, Tran Thi Chung Thuy, Vu Duong, Nghiem Thi Ha Lien, Do Quang Hoa</i>	

## THE UPHILL DIFFUSION OF GLYCEROL IN THE SINGLE COMPONENT SYSTEM

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**Abstract.** In the uphill diffusion, diffusion flux goes up to a higher concentration area. Uphill diffusion often occurs in multicomponent systems and the cause of uphill diffusion is the coupled diffusion effect. However, uphill diffusion can occur in single-component systems (single uphill diffusion). In this paper, authors recent studied results about single uphill diffusion of glycerol in water. Theory, simulation, and experiment have shown that: i) single uphill diffusion can occur for glycerol solution; ii) dynamics of single uphill diffusion of glycerol is the thermal velocity in the low concentration is greater than that in high concentration area; iii) an experimental result agrees with theory and simulation.

**Keywords:** Uphill diffusion, single-component system.

### I. INTRODUCTION

Uphill diffusion often observes in multicomponent systems [1-20]. The cause of uphill diffusion is the coupled diffusion effect (this is the diffusion flux of any component depends on the concentration gradient of the partner component) [12]. However, the uphill diffusion can occur in single-component system and the cause of single uphill diffusion is the difference between thermal velocity in high concentration and low concentration regions [21-23]. Studied results of single uphill diffusion for glycerol presented and discussed as follows.

### II. UPHILL DIFFUSION AND SINGLE UPHILL DIFFUSION

General diffusion process can classify in four types (Fig.1a) [12]:

- i) The diffusion flux goes down to a lower concentration area, that is the downhill diffusion;
- ii) The diffusion flux goes up to a higher concentration area, that is the uphill diffusion;
- iii) Although the concentration gradient equals to zero, the diffusion flux does not vanish, that is the osmotic diffusion;
- iv) The concentration gradient does not equal to zero, the diffusion flux vanishes, and that is the diffusion barrier.

Most of the uphill diffusion occurs in multicomponent systems and dynamics of the uphill diffusion is coupled diffusion effect [6, 11, 12].

