

ASEAN + + 2013 : MOVING FORWARD

ADSORPTION OF HEAVY METAL IRON $Fe(III)$ USING ACTIVATED POWDERED DUCK EGG SHELL ADSORBENT

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INTRODUCTION ...(1)

INDUSTRY'S WASTE WATER



WATER

HUMAN'S NEED

WATER POLLUTION

AIR POLLUTION

SOIL POLLUTION



INTRODUCTION...(2)

Name of Researcher

The Research

**Yeddou
(2007)**

Dried Eggshell (at 70⁰C) can be used to remove iron. It shown that the increasing temperature solution will decrease the capacity adsorbent

**Ruswanti
(2009)**

Crab's Shell can be used to make Solid Chitosan Membrane to adsorb iron. This method need PVA and PEG.

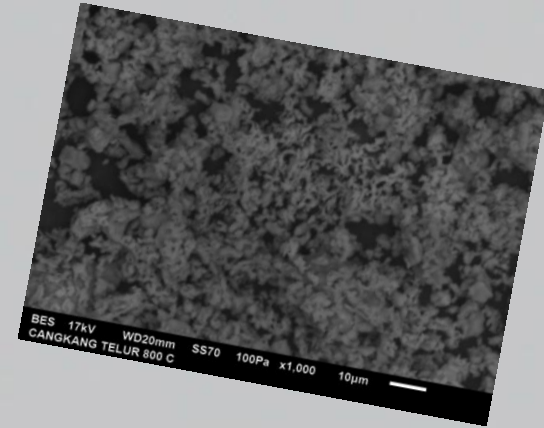


INTRODUCTION ...(3)

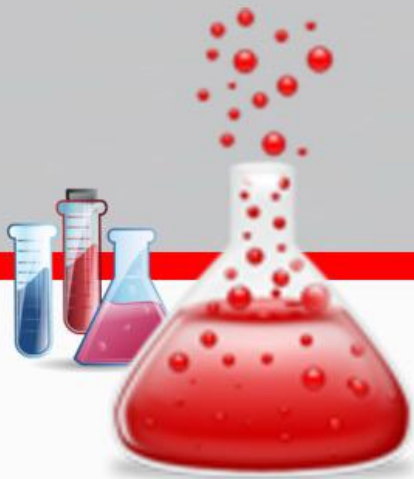
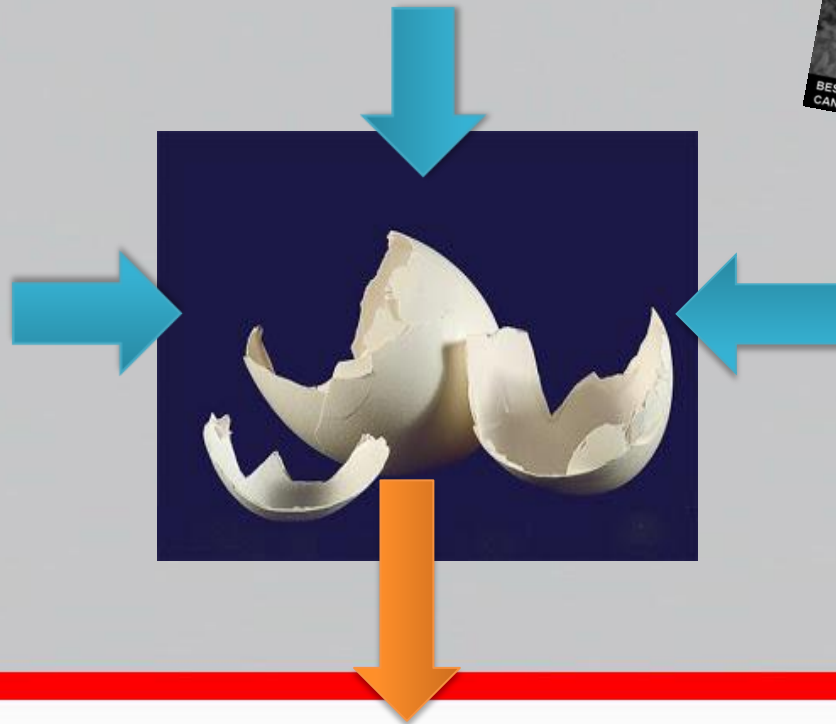


**CaCO₃ and
CaO content**

**Protein acid
mucopolysacharide**



**Pore
structure**

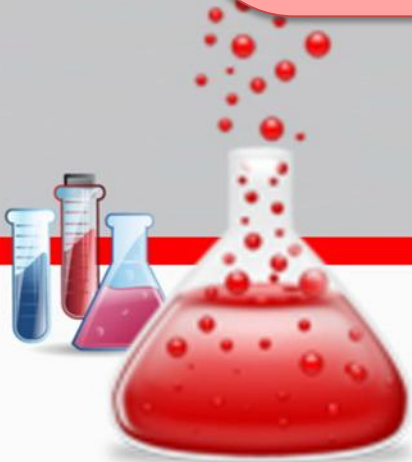


**Adsorp heavy metals
such as Fe(III)**

PURPOSE OF THE RESEARCH

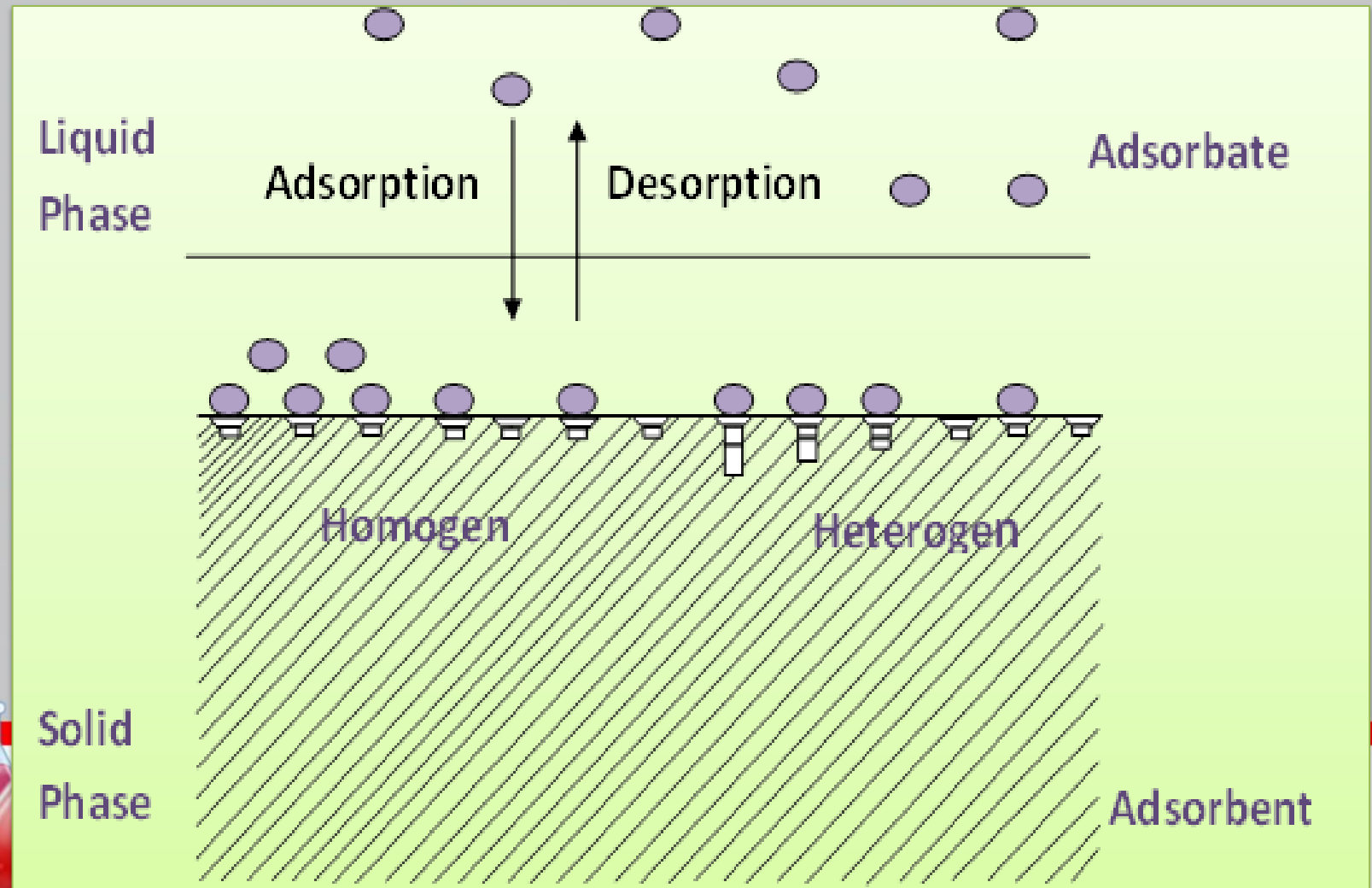


- To study the ability of adsorption
- To study the equilibrium time
- To study the adsorption kinetics
- To study the adsorption isotherm
- To study the capacity adsorption



**The Best Solution for this
Pollution is Adsorption by
Using Duck Eggshell
Adsorbent**

ADSORPTION



MATERIALS & METHOD ...(1)

Materials

1. Duck eggshell that has been activated at 600°C
2. Heavy metal (iron) solution
3. Hydrochloric acid (HCl)
4. Double-Distilled Water (dd-H₂O)

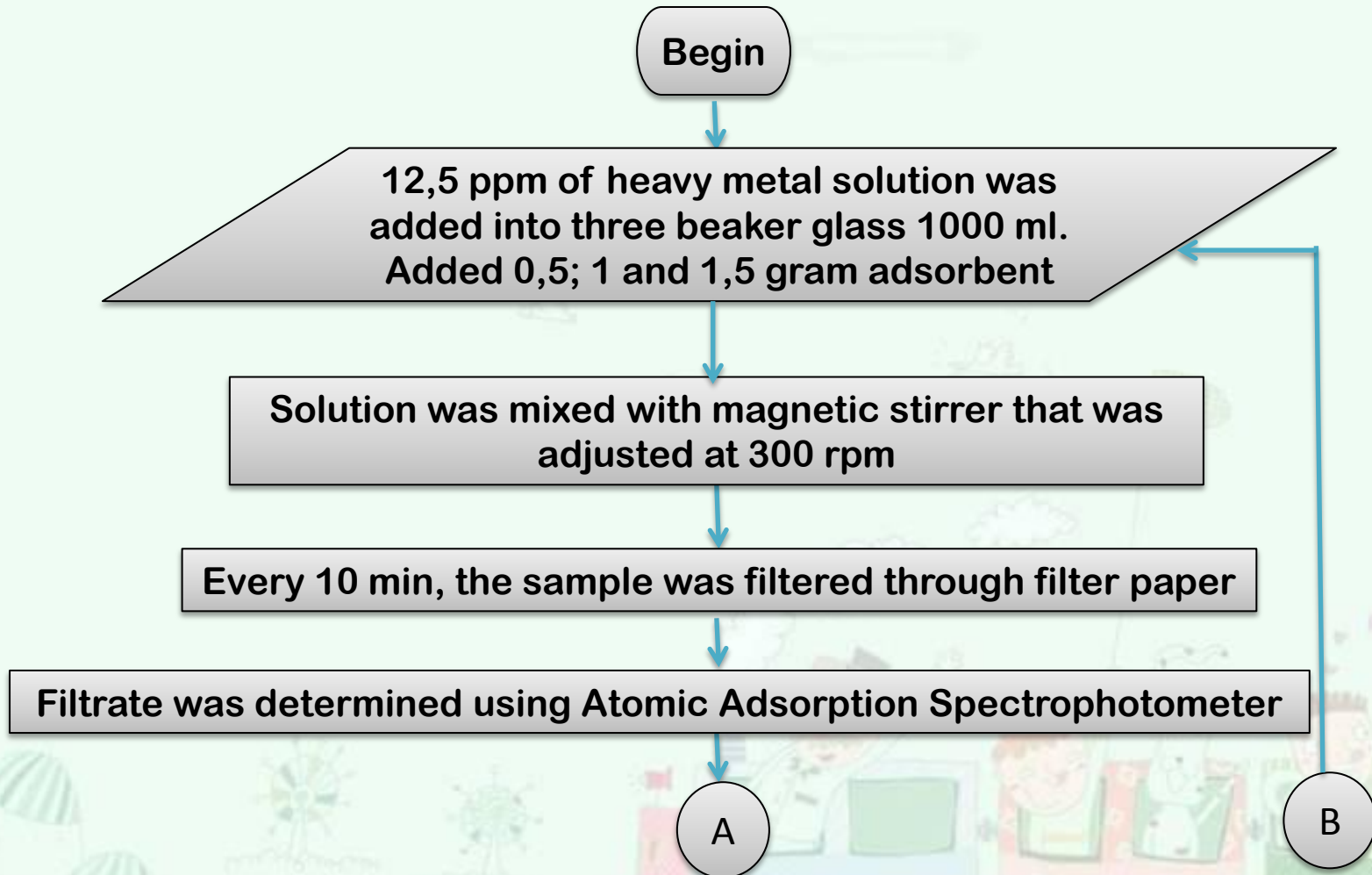
Equipment

1. Magnetic Stirrer
2. Beaker Glass
3. Erlenmeyer
4. AAS
5. Filter Paper
6. *Stopwatch*



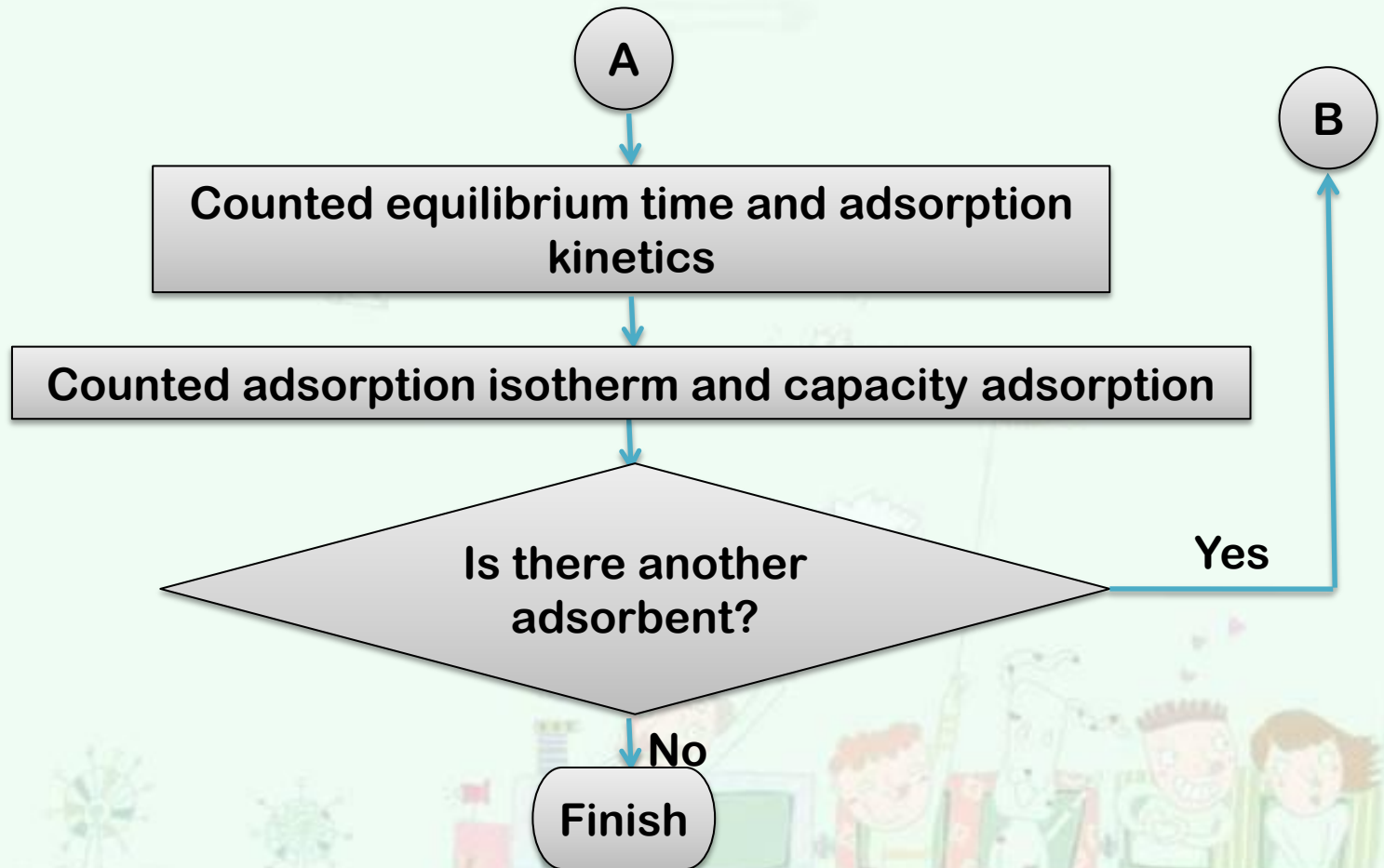
MATERIALS & METHOD ...(2)

Flowchart of Adsorption Methods



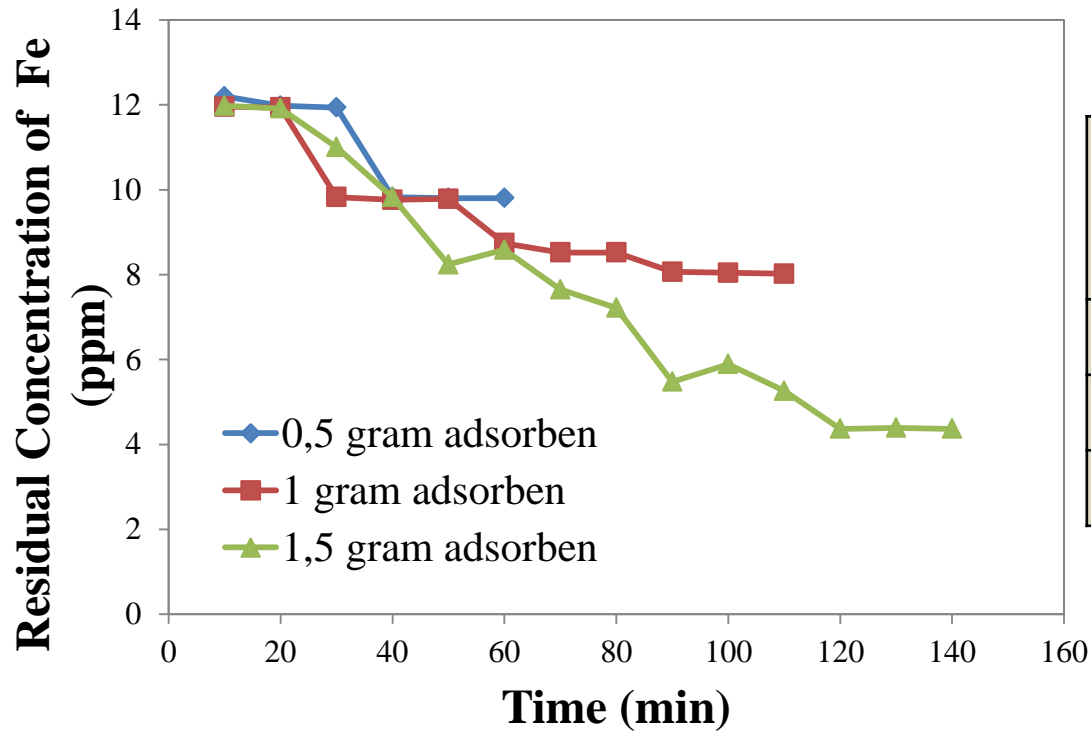
MATERIALS & METHODS ...(3)

Flowchart of Adsorption Methods



RESULTS AND DISCUSSION..(1)

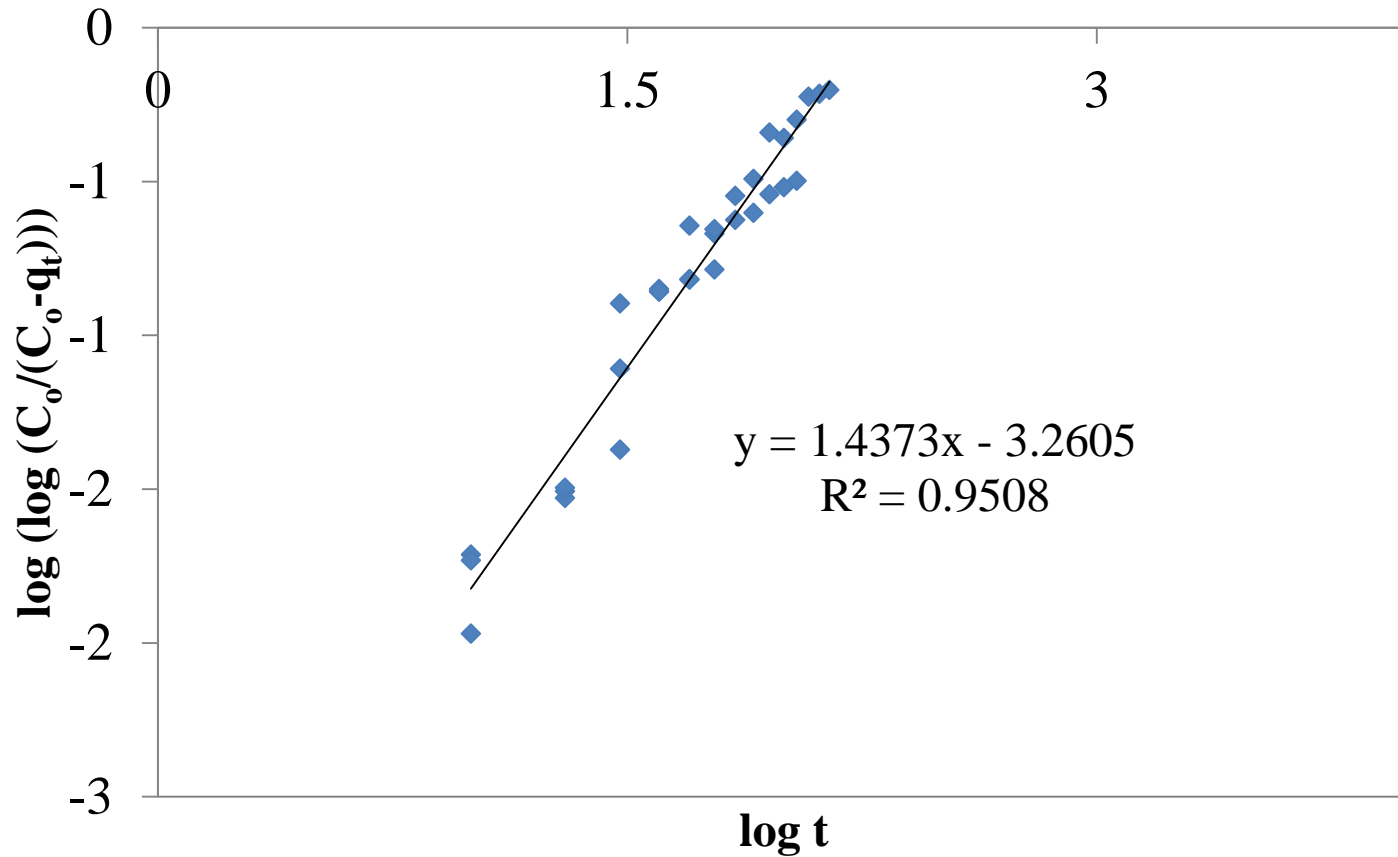
EFFECT OF EGGSHELL DOSAGE



| Adsorbent Dosage (gr) | Equilibrium Time (min) | Percentage Adsorption (%) |
|-----------------------|------------------------|---------------------------|
| 0,5 | 60 | 21,5652 |
| 1 | 110 | 35,8261 |
| 1,5 | 140 | 65,0435 |

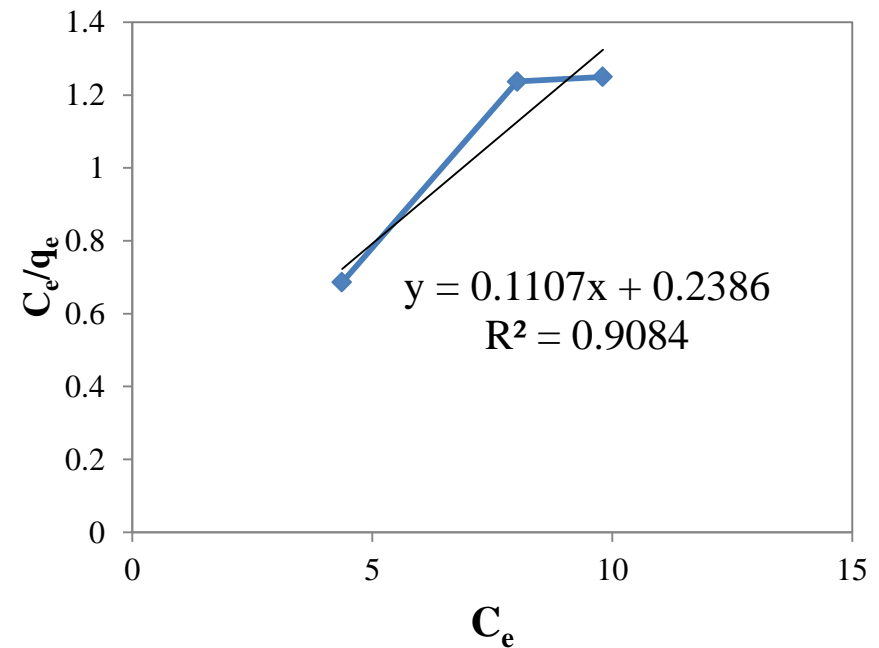
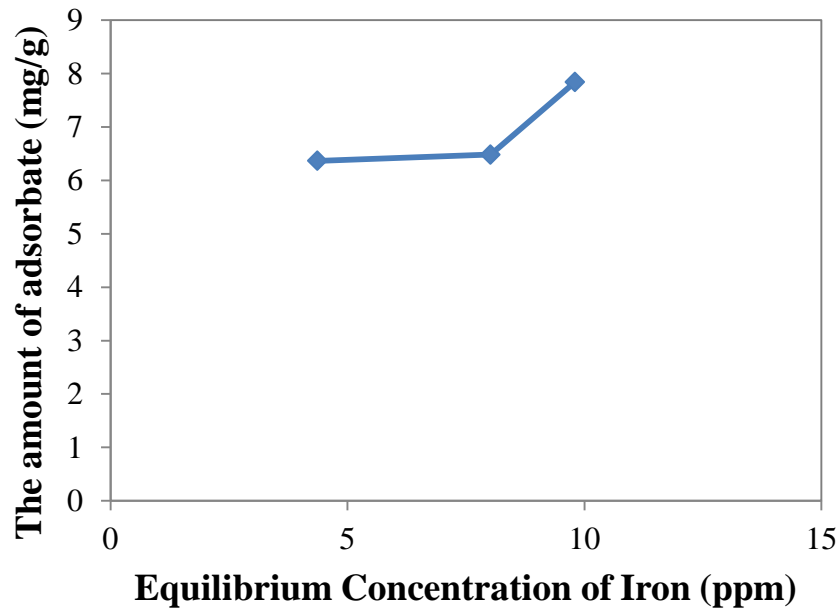
RESULTS AND DISCUSSION...(2)

DETERMINATION OF ADSORPTION KINETICS



RESULTS AND DISCUSSION ...(3)

DETERMINATION OF ADSORPTION ISOTHERM AND CAPACITY OF ADSORPTION



The value of experimental equilibrium adsorption capacity is 9,0334 mg/g.

The Langmuir isotherm was found to be the best-fitting isotherm with R^2 is 0,9084 with bq_m is 4,1911 and q_m is 9,0334.

CONCLUSION

- We can get the maximum adsorption percentage is **65,0435%** at **1,5 gram of adsorbents/1000 ml Fe(III) solution**
- **The greater** amount of adsorbent used, **the equilibrium time** will be slower to reach
- **The greater** amount of adsorbent used, **the percentage of adsorption** increased
- Sorption of iron onto duck eggshell adsorbent follows the **Bangham Kinetics**
- **The Langmuir isotherm model** is appropriate to describe the sorption of the Fe (III) ion on the duck eggshell adsorbent
- The capacity of adsorption of iron is **9,0334 mg/g.**





THANK YOU