Shades from Shapes

Workshop for Teachers- IMSc & HBCSE
Teacher Workshop
TN SCERT DIET faculty

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Need TWO volunteers to make
USE FOOD Colour to make dough

We are going to exchange notes…welcome!

- **Why should we teach Diffusion for class 7-10?**

1. It is in syllabus
2. We see this in everyday life, so students should learn
3. Anything else?

- **What do you expect them when they have learnt it? ?**
- **Where will they use this- Physics, Chemistry, Biology in School?**
- **How will they relate this topic with real life?**

Mention some situations when will they think of what you taught about this in classroom?

Activity 1 : List ten such situations : 5 mins

- Fumes, flavours, fragrance that you recall
- Are Children loosing their sense of smell??
- Size of particles and diffusion

Is Particle size important for diffusion?

Can you think of examples- Medicine, food….

What do you think may change with size?
GUESS….

Can u try devise an experiment to prove what you think?

DIFFUSION rate!

Activity 2 : 10 mins
Need volunteers
Arrange this on your table
Note what is what

- Potato in water
- Tea bag
- Tomato
- Tamarind
- Lemon
- Pasta
- Ravai
- Semia
- Javarisi
- sabja seeds

WIPE the table clean

Keep things safe

Can we proceed ?


Gulab Jamun

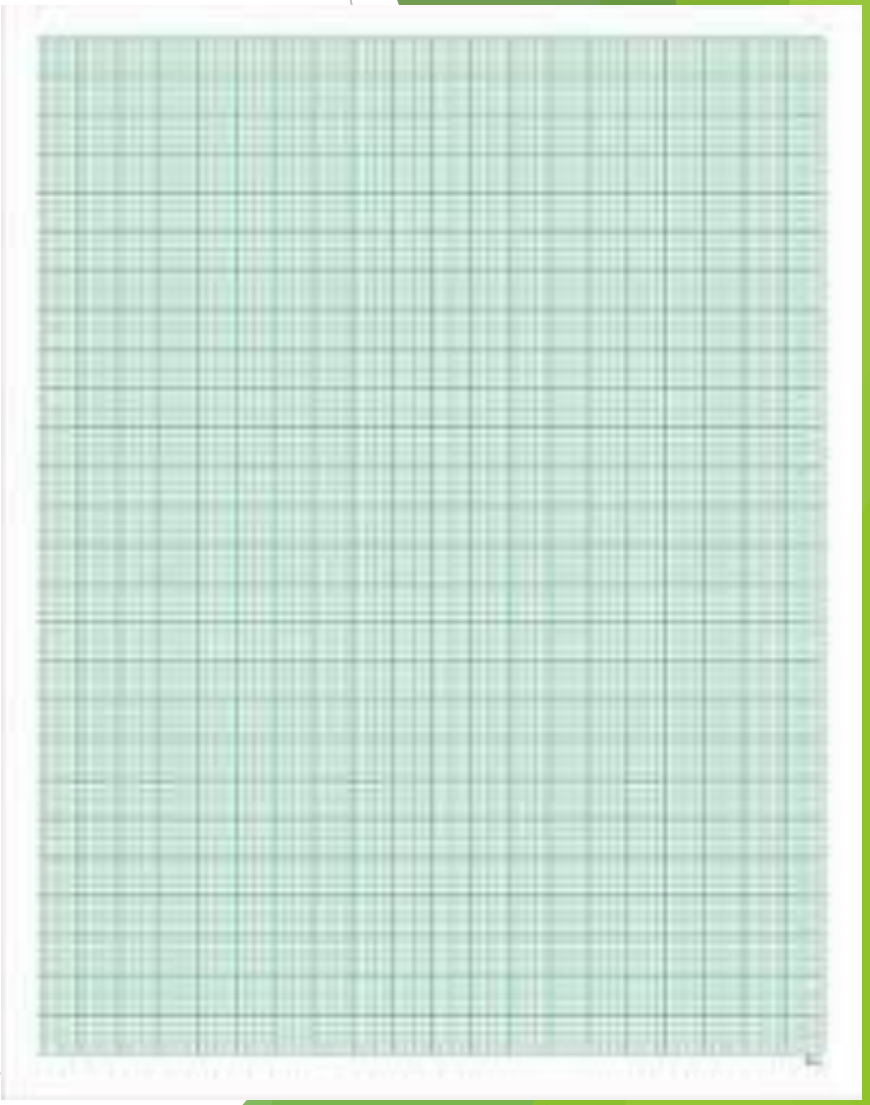

(c) www.kamalascorner.com

How to check concentration vs diffusion rate? How to check it w.r.to temp

- Sugar syrup – Water
- Salt- water
- Spray, gulab jamun, paal kozhukattai, jangiri, paints…

Activity 3 : 10 mins

- Design a tabular column for your students
- And draw a graph



Anaemia , oxygen, girls health

My child feels tired always, especially taking a book

Diffusion connect with low scores?

How far does it go?

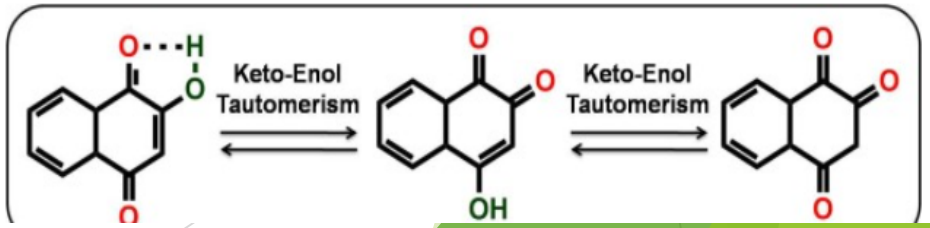
- Surfacial or penetrate?
- Factors that determine this- GUESS
- Advantage and disadvantage -think

Can I have henna pattern on paper?

Presence of Medium accelerates or reduces speed!!

Why Tamarind or lime juice added with henna?

A few research groups [29,31,32] have reported the application of henna powder (*Lawsonia inermis*) to reveal latent fingerprints. Henna is a natural plant that contains the red–orange pigment lawsone. The various tautomeric forms of lawsone are portrayed in Fig. 17. During festivals and wedding celebrations, some populations such as Indians apply henna paste to their fingers and palms. The pigment lawsone is released only in acidic media. For this purpose, acidic food materials such as lemon or tamarind is added to the henna leaves and ground to a fine paste. Addition of sugar makes this paste sticky on the palms and fingers, enhancing the interaction between the stratum corneum, the outermost layer of the skin, and the lawsone pigment. The pigment will then migrate to the skin, where it will develop orange-red colouration. The diffusion of lawsone occurs deeply into the skin when the henna paste is applied for a long time. Some populations, such as Indians apply henna paste to their white hair to give it a redhead appearance. It's no surprise that researchers are using henna to detect latent fingerprints because they want to take advantage of the natural interaction between the henna and the skin.



Activity 4 :1 min
Is diffusion a one way traffic?

- Potato in water
- Tea bag
- Trumeric piece
- Tomato
- Tamarind
- Lemon
- Pasta

Need volunteers

Each team to be given a plate, some measuring cups, plate, DOUGH, cups, water

Home work :
How can you prove it is One way traffic?
Or not?

Can you Devise an experiment by tomorrow?

Shape vs Diffusion

- Why should you keep mass a constant
- Tall jar- tip – Bucket

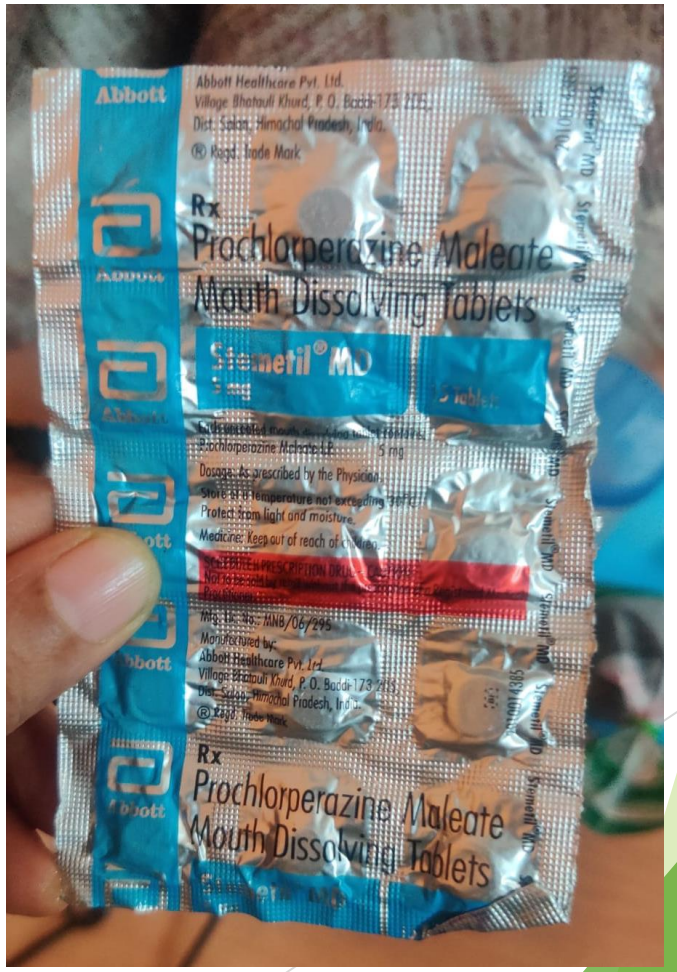
- ACTIVITY 5 : 15 mins
- Make dough and drop into cup of water
- STOP!!!
- Think of various factor that may affect and list out- activity 6
- Thick and thin ?
- Big vs small?

Teach students to Think of various factors that may affect and control variables

- What have we controlled here?
- What are the variables here?
- So how will they affect if they are not taken care of?
- Take guess!

Is there diffusion here?

Can you say why medium & size are important for diffusion rate?



END of PART 1

Activity 6
NOTICE any change? Note down before we proceed to next PART
Exchange notes

Talk to other teams

End of Part -1 Activity 7
YOU can come here and Consolidate

- List out factors that affect diffusion.
- Quote examples where do you think diffusion needs to be slow
- What is infused oil?
- Come out with a idea of demonstration, tabular column, variables list to find out relation between diffusion and shapes?
- Have you seen Any example of food or other marketed product based on this idea?

- Can you use tea bags/ tissue paper/ pasta/ any one product to demonstrate how diffusion varies with temperature, medium, size, shape…..

Volunteers needed

To handover jelly powder, hot water, cups, spoons, tray

- CLEAN UP TIME….

Thank u for cooperating….☺

Next session…

- We are going to see
  - Difussion and blood, saliva
  - Difussion and RO, water purification

SCIENCE activity ANNOUNCEMENT

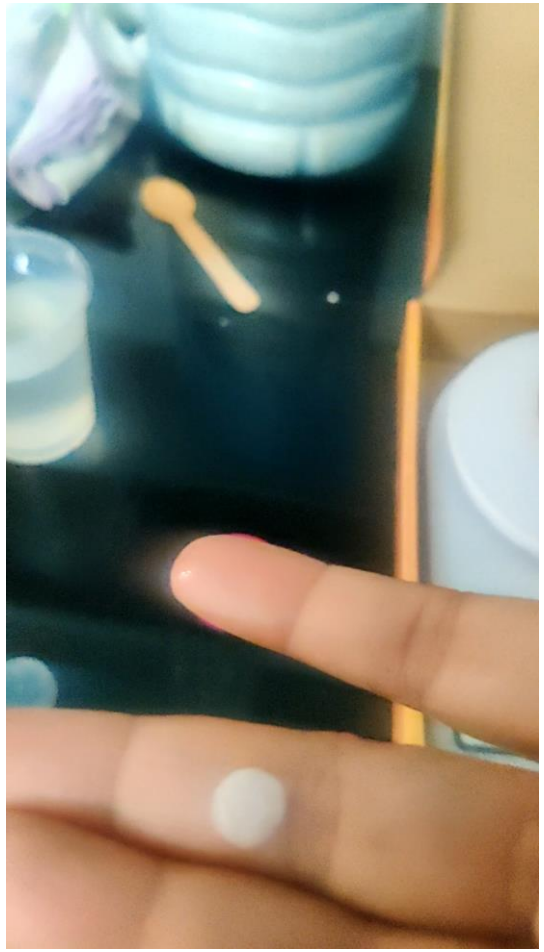
- Tomorrow ALL of you have to help me help you make
- SKIT
- YOU tube video
- Insta reels
- FB reels
- Shorts
- Story board
- Write up
- Banner
- Poetry, dance…… based on DIFFUSSION, SCIENCE behind it
- S& T using this, factories based on this, medical interventions, Current research based on this

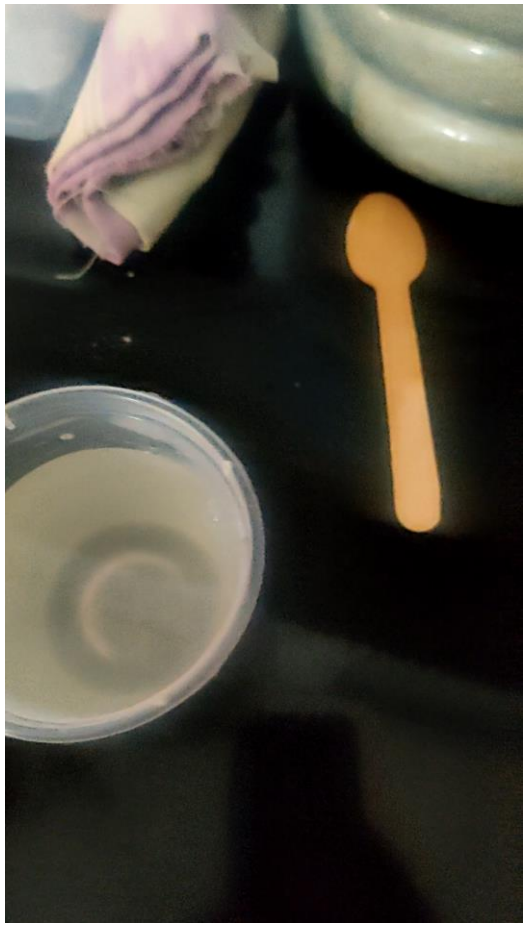
ACTIVITY 8 : 15 mins

- Add Gelatin to hot water, keep stirring
- Cool down to room temp. – Else adding NaOH will solidify it very fast – TAKE CARE
- Add Phenolphthalin- a few drops, then NaOH
- It will turn pink…make it very bright so children feel they are unnatural- So that they don't try to eat!
- Pour them in different size moulds- PLAN this

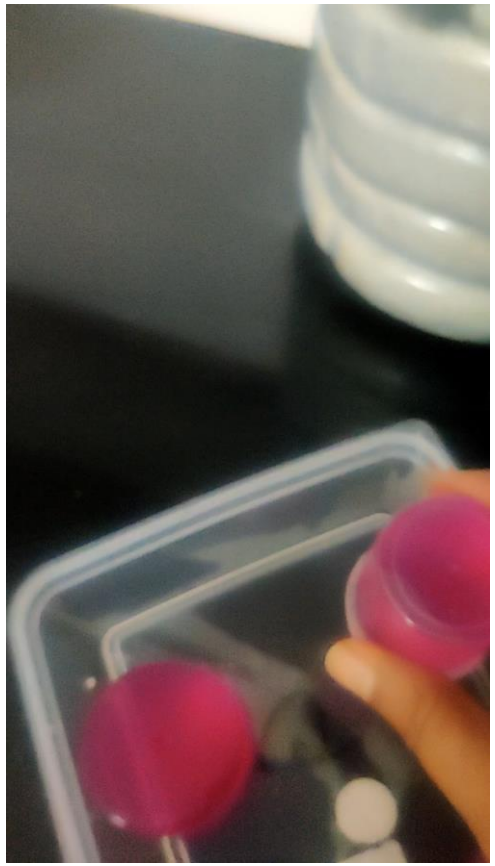

JELLY CRYSTALS
Orange
Flavour

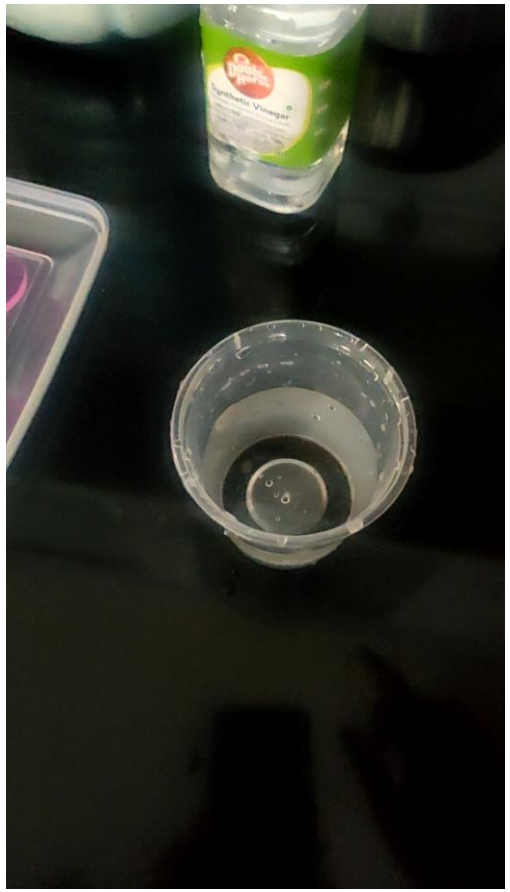

SF-400
184






Orange





Same shape- Different sizes

Leave it in acidic medium

யோசிக்கலாம் வாங்க

- Guess
- Think
- Think with info what you Know already
- Consult
- WHY you think so? What if? What if NOT?
- Rationalise
- DISCUSS , ARGUE
- COME with PLANS in new Direction…..

After few hours-
WHY? Is it a two way process?

- Jellys were not immersed inside acidic water
- but there was trace of it in the tray,
- did not wipe it clean
- Jellys were touching each other

Same shape- Different sizes

ACTIVITY 9

Leave it in acidic medium

மாத்தி யோசிங்க!

Maaththi yosikalaam,Vaanga!

One hour after immersing in the acidic water next day

Question?

- Diffusion is through surface,
- bigger cylinder has bigger surface, so there is probability of acid ions entering it better than smaller one?
- But what we see is different!

- WHY? Am I missing something? What could it be?
- What other factors should we consider?

When Dimension increases, Think what quantities increase..

- Length
- Breadth
- Height
- Surface Area
- Volume
- Weight

Does any of these play role here?

Let's Calculate…

Cube Side Length	Surface Area	Volume	Surface-area-to-volume ratio
1 cm	6 cm^2	1 cm^3	6 cm^{-1}
2 cm	24 cm^2	8 cm^3	3 cm^{-1}
3 cm	54 cm^2	27 cm^3	2 cm^{-1}

What do you notice here?

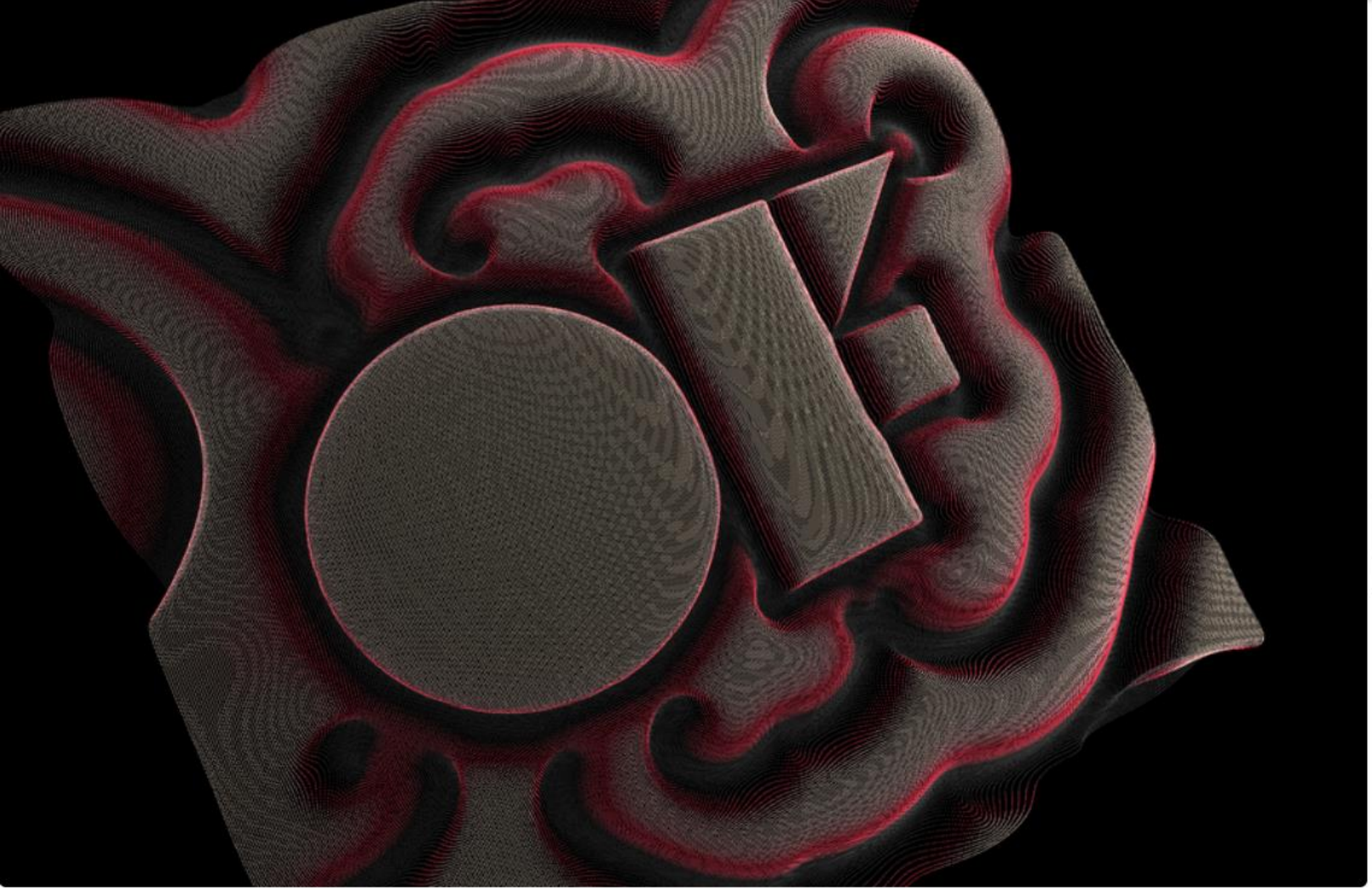
- volume is increasing at a greater factor than the surface area,
- As the cube size increases, the surface-area-to-volume ratio decreases
- The vinegar can only enter the cube through its surface,
- so as that ratio decreases, the time it takes for diffusion to occur throughout the whole volume increases significantly.

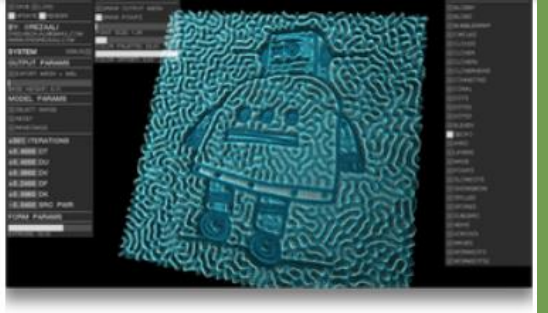
In case of cells, alveoli…

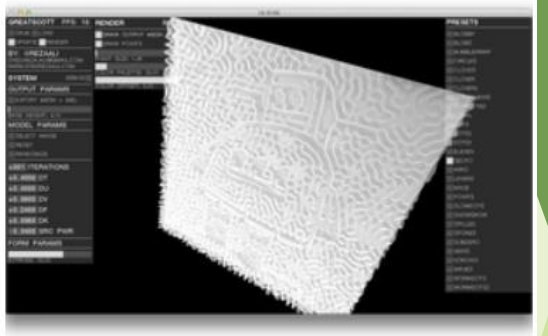
Anything that comes into a cell (such as oxygen and food) or goes out of it (such as waste) must travel across the cell membrane.
As cells grow larger, the ratio of surface area to volume decreases dramatically,

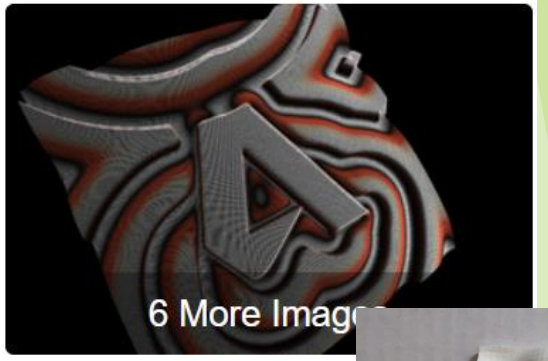
Part 2 starts…

3D Art Ink Diffusion Pigment 24 Colors

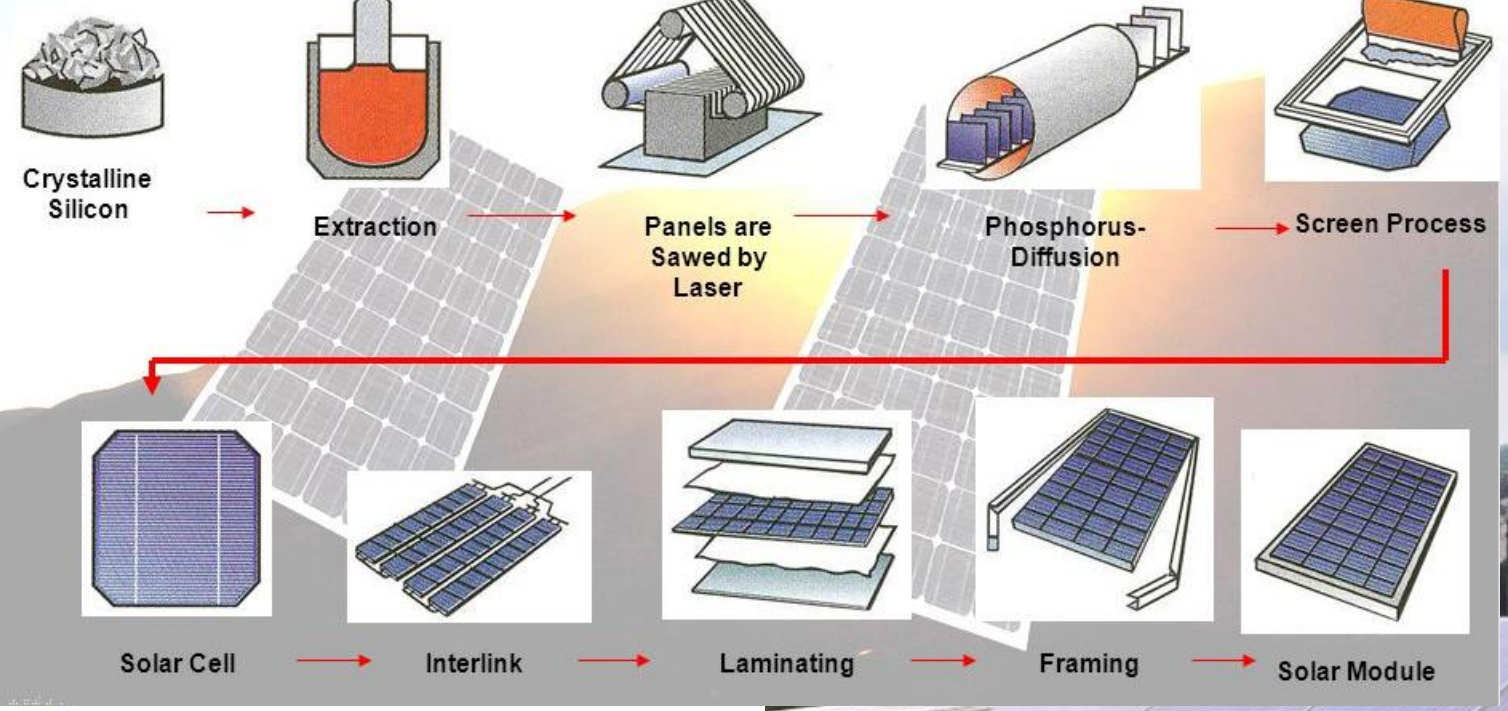


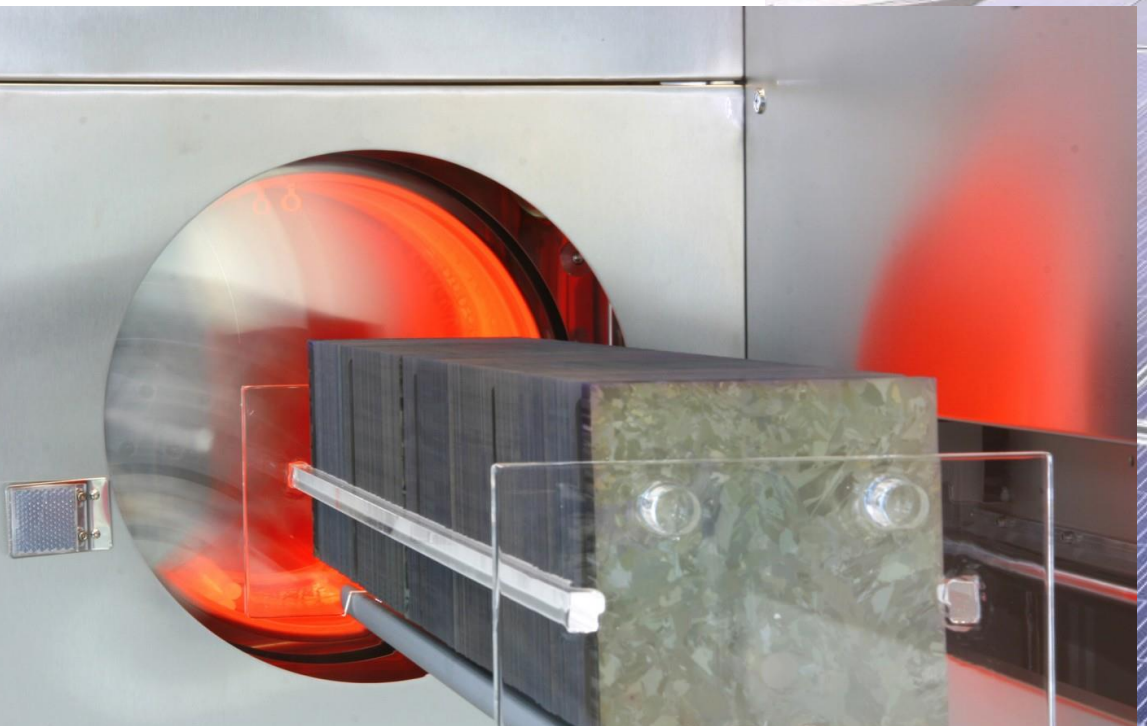






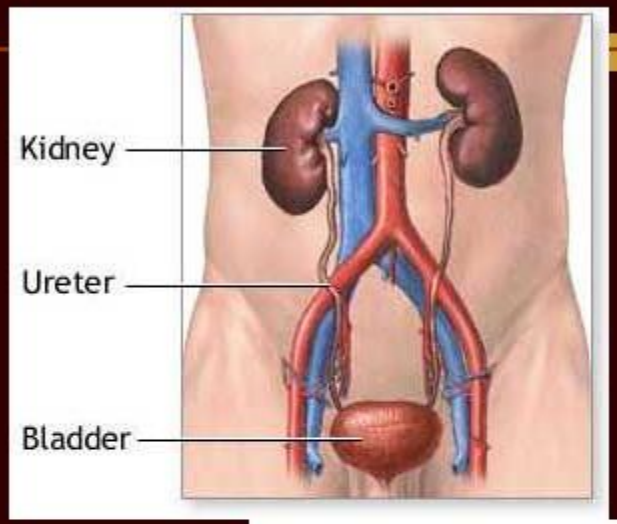
Reaction Diffusion- trend in 3D printing technology

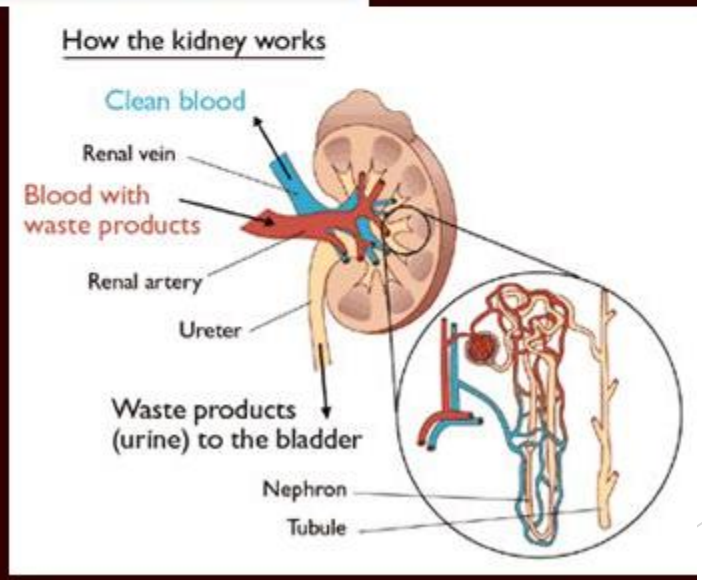

Crystalline Silicon
Extraction
Panels are Sawed by Laser
Phosphorus-Diffusion
Screen Process
Solar Cell
Interlink
Laminating
Framing
Solar Module



Diffusion and osmosis in the kidney

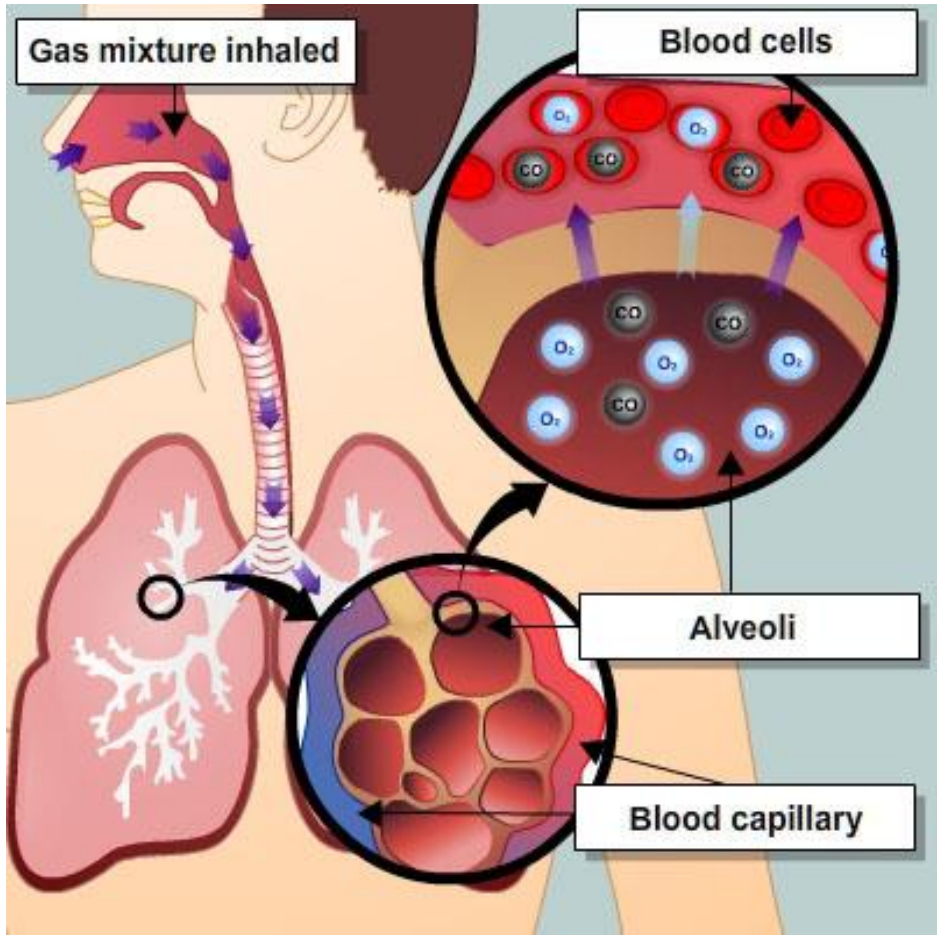
- The main function of the kidneys is to filter our blood and remove waste as urine. Both kidneys do the same job. Blood is taken to the kidneys by the renal artery and when it is cleaned, it is returned to the heart by the renal vein. The urine is taken to the bladder by the ureters.

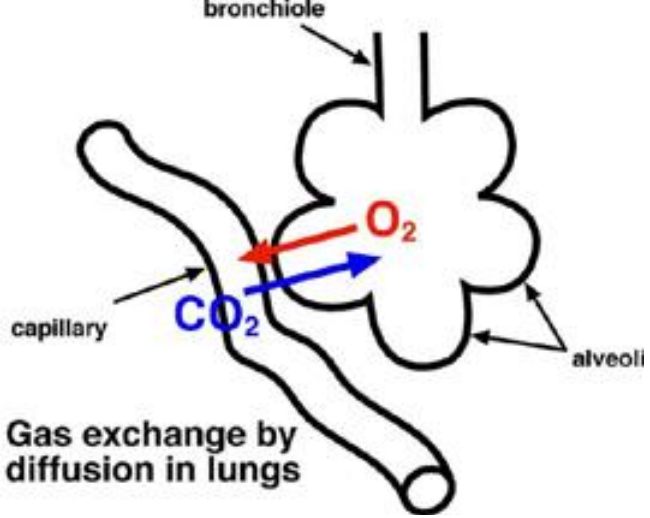


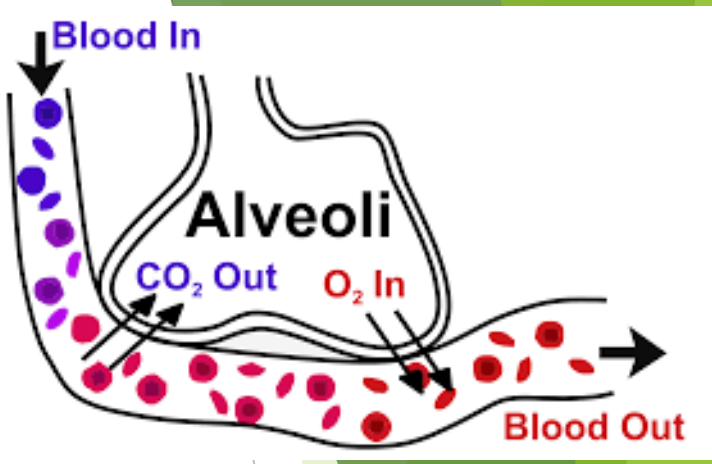


மாத்தி யோசி

Maaththi yosi!

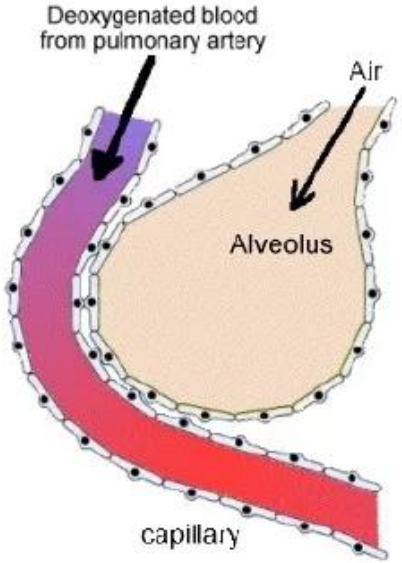




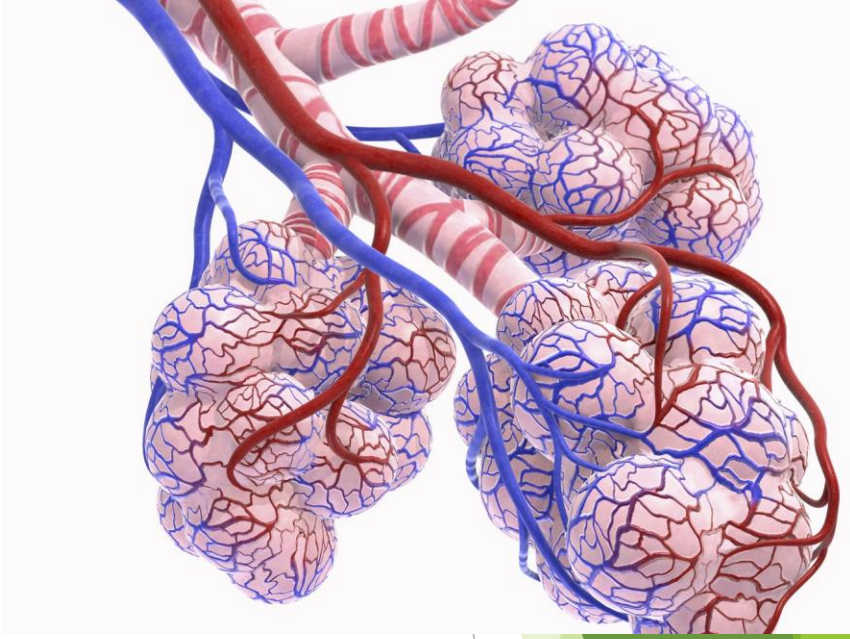


Rate of diffusion – 3 properties of gas exchange surface

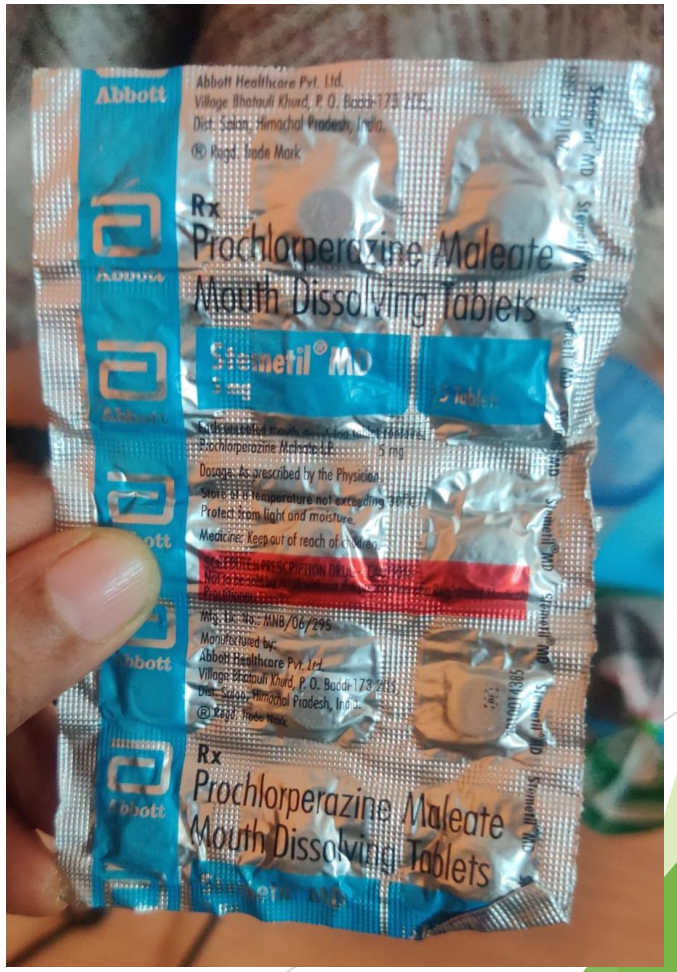
1. Surface area – rate of diffusion is directly proportional.
2. Concentration gradient- rate of diffusion is directly proportional to the difference in concentration across the GE surface.
3. Thickness of the GE surface- rate of diffusion is inversely proportional to the thickness of the GE surface. Thicker surface, slower the diffusion



- tiny balloon-shaped structures.
- Elastic in nature
- The walls of the alveoli are very thin -This lets oxygen and CO2 pass easily between the alveoli and capillaries
- One cubic mm of lung tissue around 170 alveoli.
- Though the total number varies from person to person, there are millions of alveoli in a person's lungs.
- When expanding alveoli's surface area is increased and the diffusion rate is faster.

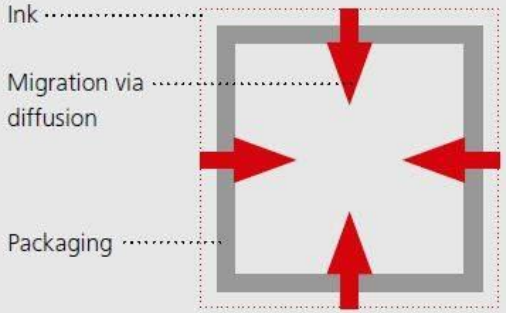


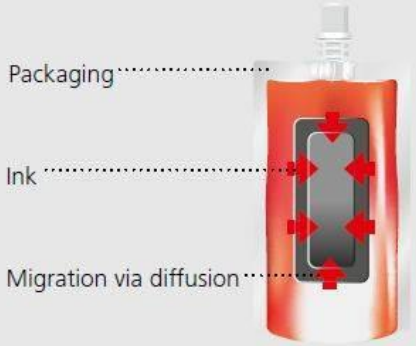
Can you say why medium & size are important for diffusion rate?



India Bans Use of Toluene in Food Packaging Printing Ink

Diffusion Scheme





Diffusion Principle

- Diffusion across packaging materials into food (or gas transfer)
- Even rigid materials (e.g. PE bottle) are not always a sufficient barrier

Learning interventions…
Actually what are we teaching them in lab?
Can we spot students' strength and challenges? Language skills, Math skills

- Spelling
- Scientific vocabulary
- Math
- Understanding
- Conceptual learning
- Abstract thinking
- Critical thinking or reasoning

- Planning
- Execution
- Tidiness, clumsiness
- Kinesthetic movements
- Graph
- Handwriting

Thank U

- IMSC
- HBCSE