

1.1.1 Outline the concept and characteristics of systems

1.1.2 Apply the systems concept at a range of scales

Key words

- Inputs
- Outputs
- Flow
- Transfer
- Transformation
- Process
- Matter
- Energy
- Store/storage
- Feedback

What is a System?

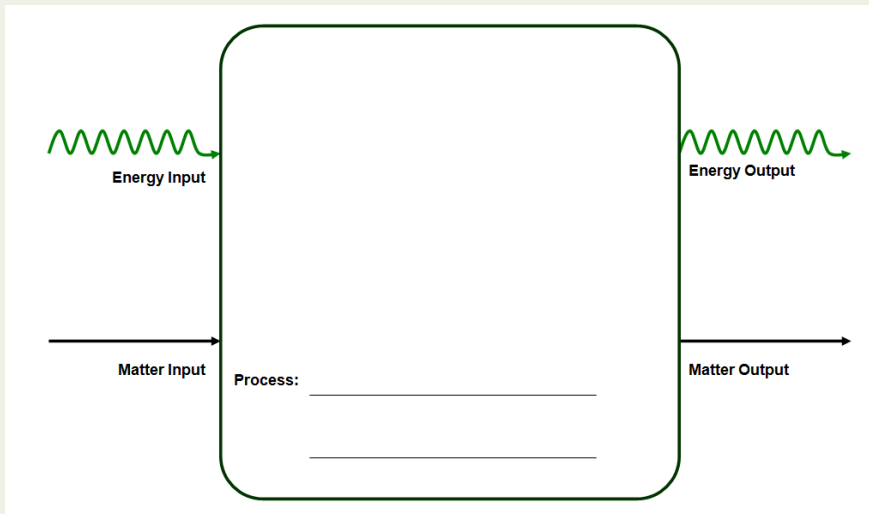
- An grouping of parts (components) and the relationships between them, which together constitute an entity or whole.

Three Main Components

Three components regulate the system and ensure that it has enough to survive. The following applies to any natural system:

- 1. INPUTS** - the elements that flow into a system.
- 2. PROCESSES** – ‘activities’ that occur within the system transfer and/or transform the inputs or they become stores
- 3. OUTPUTS** - that which flows out of a system (waste)

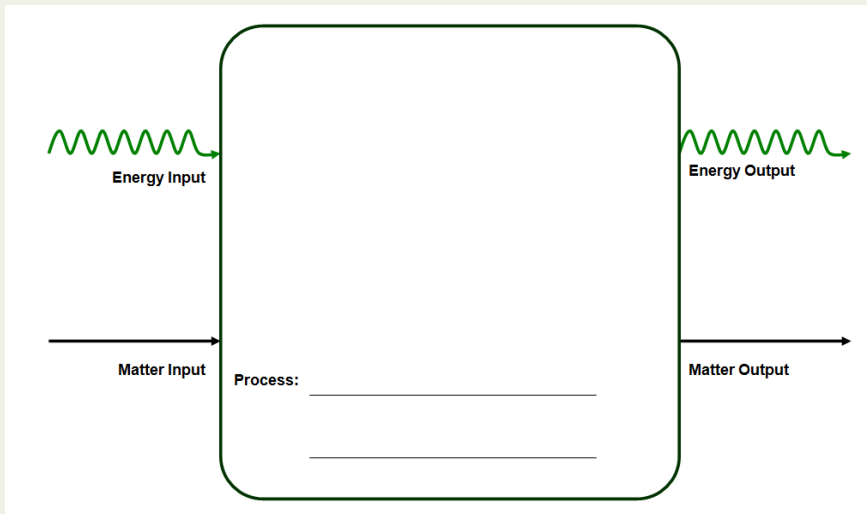
System as a Diagram



- a "system" is often represented as a flow diagram to help us understand the links between the components
- The 'flows' are represented by arrows

What Goes In?

INPUTS



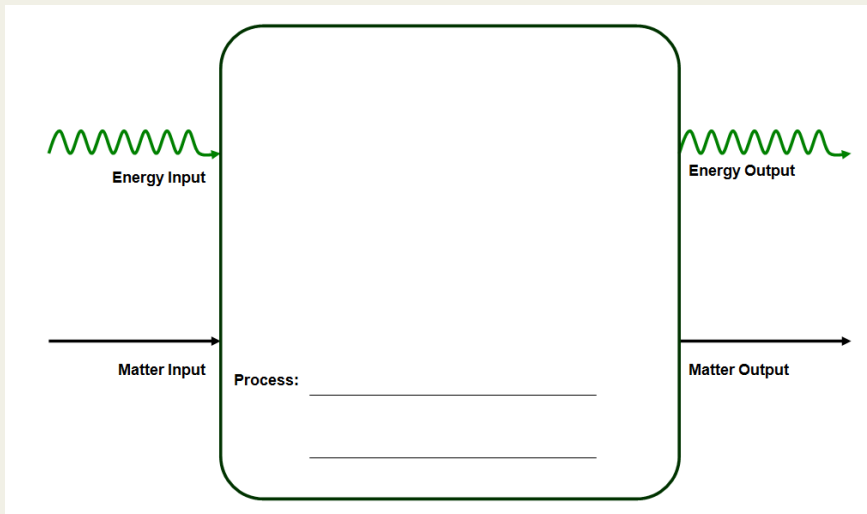
Both matter and energy can flow through an *open* system

... but what about a *closed* system?

What Goes On?

PROCESSES

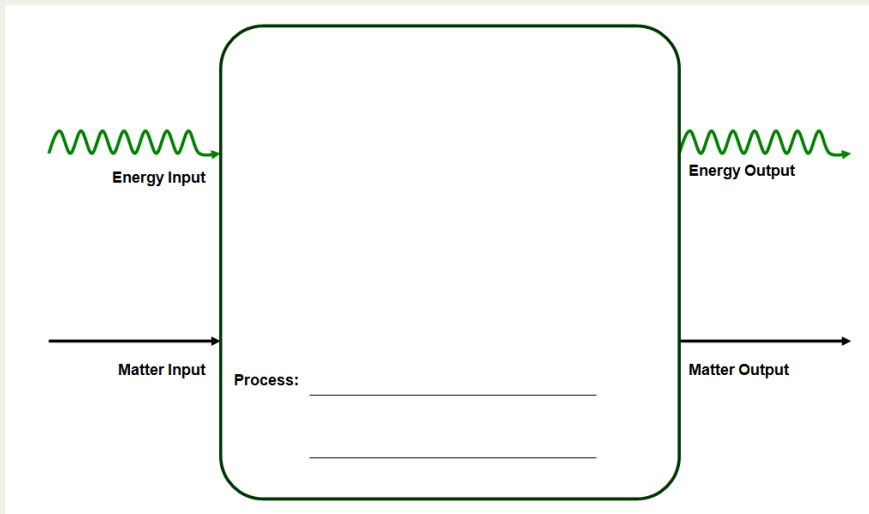
stores, transfers & transformation



what goes on in a system (using the inputs) - how matter & energy travel and changes along the way

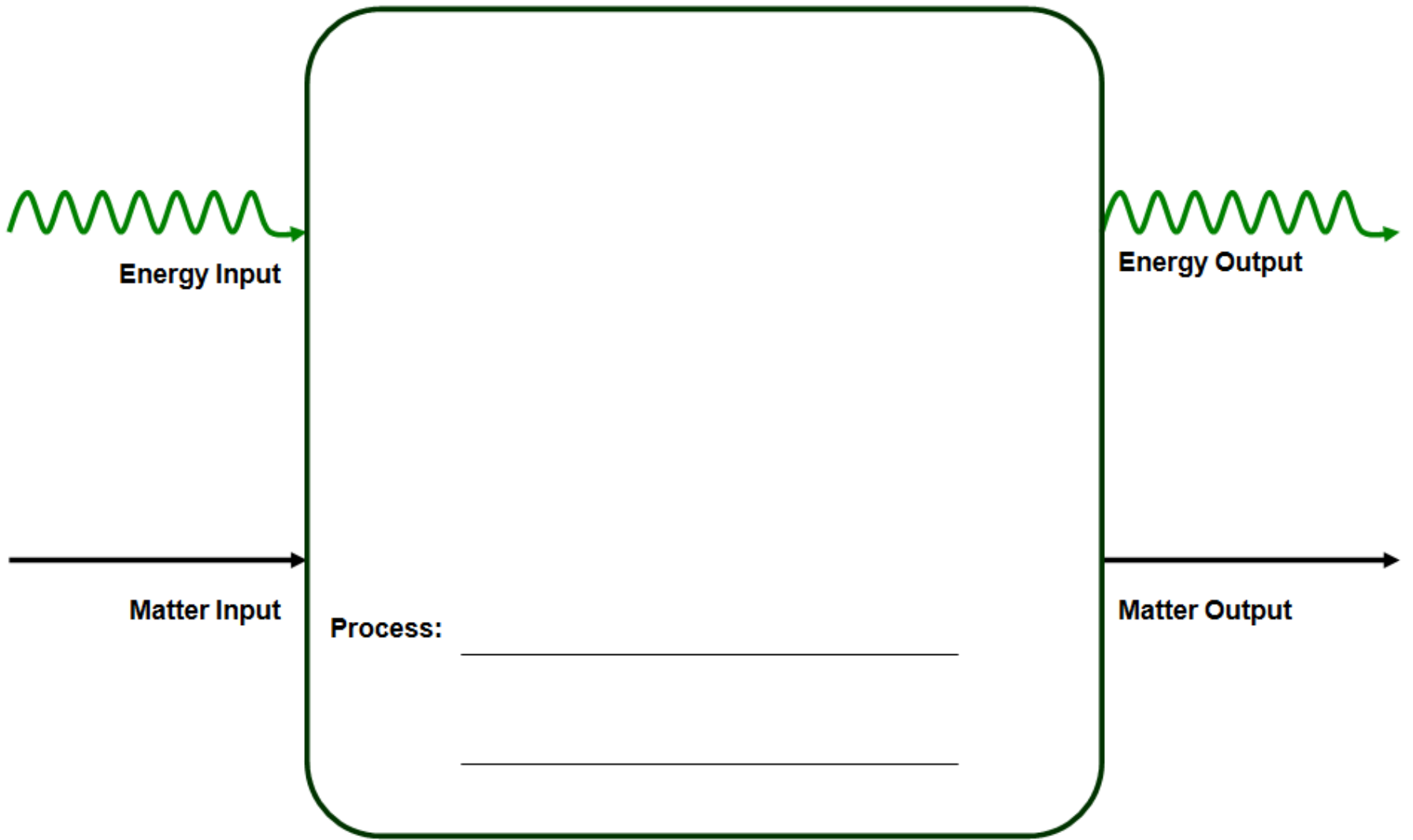
What Goes Out?

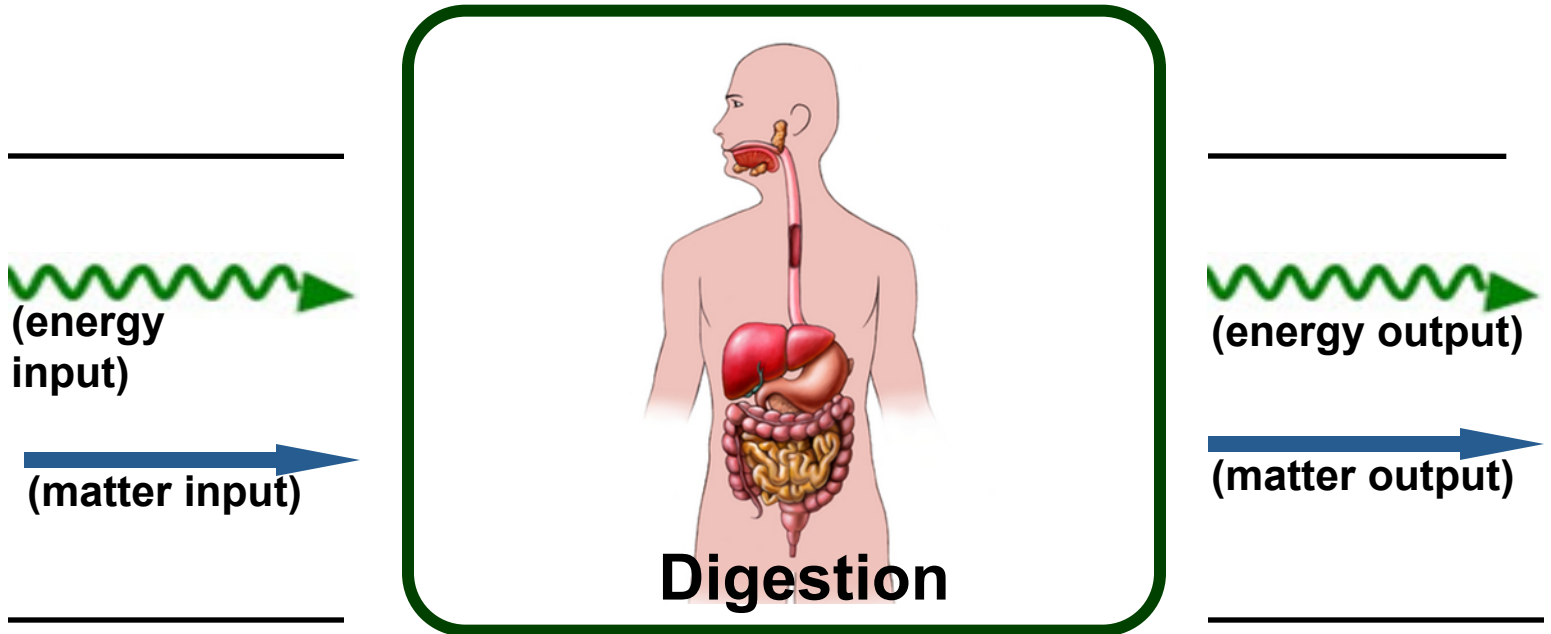
OUTPUT



Both matter and/or energy can be removed from an open system (often as waste) and can 'flow' out

...but what about a closed system?





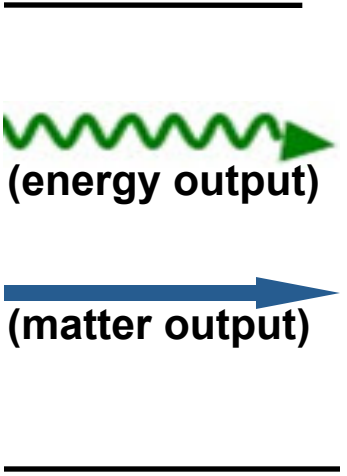
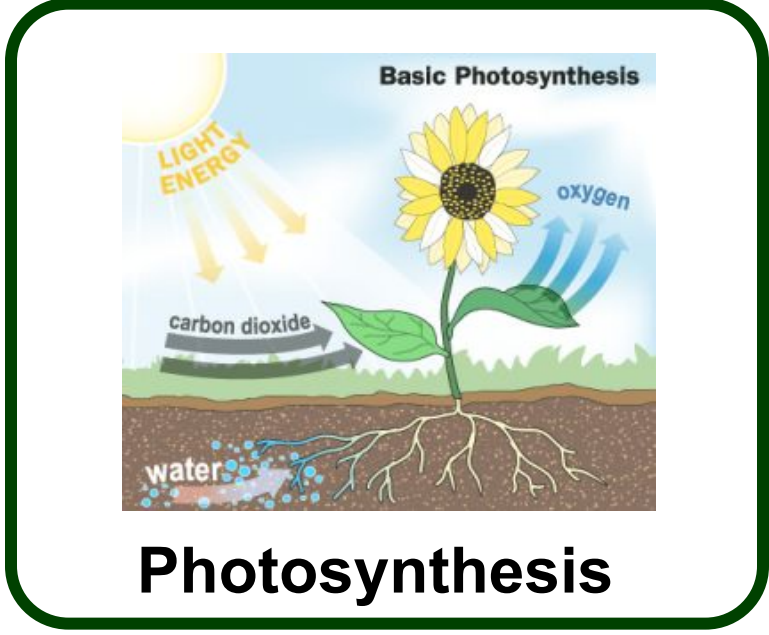
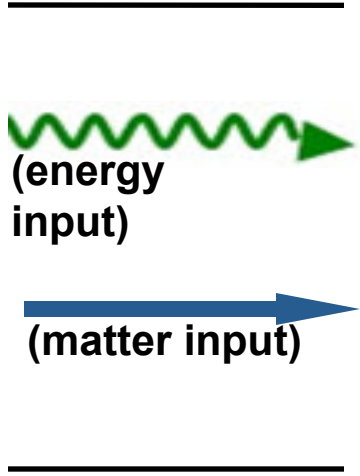
(energy input)

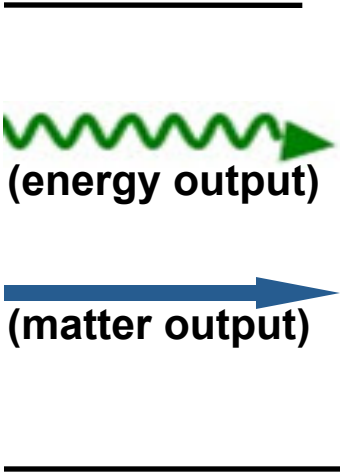
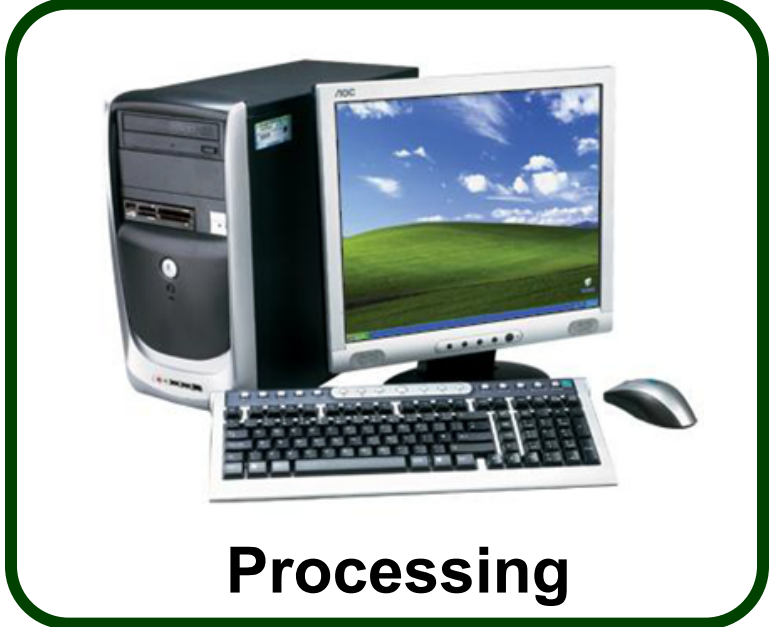
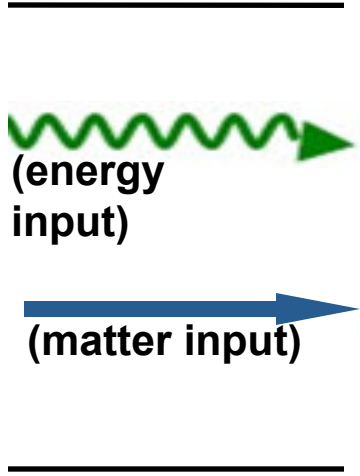
(matter input)

Digestion

(energy output)

(matter output)





Let's try to explain other types of systems...

- world population
- social system
- UWCSEA
- Singapore's economy

Inputs

Processes

Outputs

How would you explain a values system?

More on this a little later in the unit...
but something to think about...

1.1.1 Outline the concept and characteristics of systems

1.1.2 Apply the systems concept at a range of scales

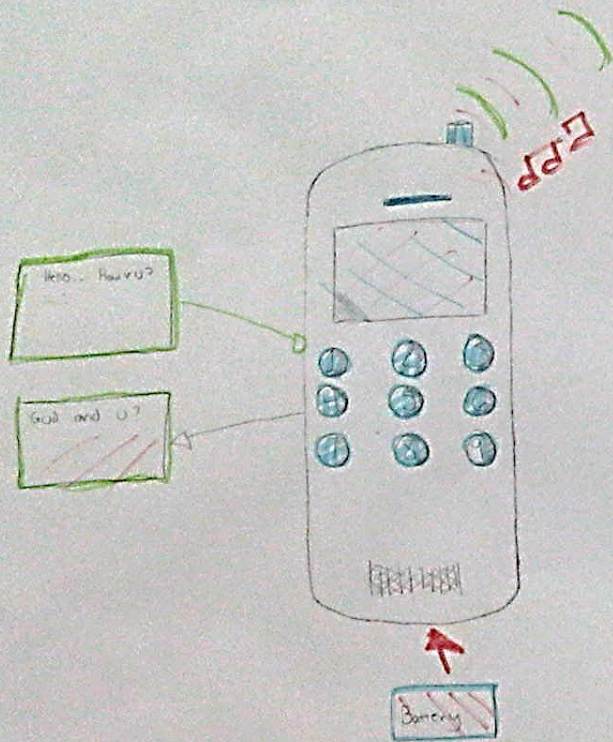
In class task:

- In pairs, 'model' your own systems diagram for an ecological system (ecosystem)
 - a tree
 - a sea
 - a pond
 - a farm
 - an animal population
- Use a plain A3 sheet of paper
- keep it neat (may be useful to sketch a draft)

System Exemplars:

Are the systems diagrams on the following slides good examples of a systems model?

Justify your response with as much detail as possible.



Inputs

- Battery/Charger
- Keyboard
- Screen
- Antenna
- Circuitboard
- Microphone and speaker
- Sensor

Processes

- Gives the phone its mobility
- Allows the user to type words and numbers
- Shows messages and numbers
- Receives data and information
- Starts to link the different parts
- Creates and picks up sound for calls.

Outputs

- Provides power to phone
- Allows to text
- Allows to see the screen / visual output
- Connects to cellular network
- Lets all the parts connect to each other
- Allows people to speak and hear
- sound and music

By: Ali, Blake, Justine, Scarlett, Quinton

An ^{open} systems diagram for making
a cup of ice tea
instant

INPUTS :
(energy + matter)

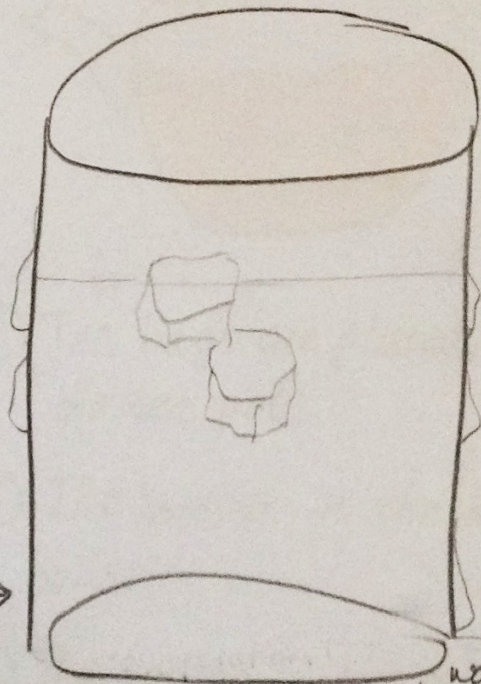
frozen water
ice cube - matter →

Sugar crystals
(powder mix) matter →
(chemical energy)

water →
(liquid - matter)

action of stirring →
(Kinetic energy)

PROCESSES :



OUTPUT :
(energy + matter)

→ water droplets
(liquid) - matter
from condensation.

- condensation outside of glass (transform)
- melting (transform)
- dissolving sugar (transform)
- water (stock)
- ice cube (stock)
- energy Cal. (stock)