

## Ch. 5

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- 5.1 basics of energy
  - importance of energy
    - all living things
      - stay alive
      - carry out their daily activities
    - example
      - animals and plants
        - grow
      - human
        - power appliances and machines
  - forms of energy
    - sound energy
    - chemical energy
    - light energy
    - thermal energy
    - kinetic energy
    - potential energy
    - electrical energy
  - units of energy
    - joules(J)
    - kilojoules(kJ)
      - =1000J
    - calorie (cal)
    - kilocalories (kcal)
      - =1000 calories
- 5.2 energy conversion
  - Converting energy from one form into another
    - sound energy
      - given out (by)
    - chemical energy
      - stored in

- light energy
  - from the
- thermal energy
  - given out (by)
- kinetic energy
  - of the
  - have
- potential energy
  - gain
- electrical energy
  - supplied to
- conservation of energy
  - law
    - energy can be converted from one form into another
    - can't be created or destroyed
- efficiency of energy conversion
  -

$$\text{Efficiency} = \frac{\text{useful energy output}}{\text{total energy input}} \times 100\%$$

- 5.3 heat transfer
  - conduction
    - take place in an object or between two objects in contact
    - heat can be transferred by conduction through an object from the hot end to the cold end
  - conductor of heat
    - good
      - metals
    - bad
      - non-metals
      - water
      - air
  - ranking list

- 1. copper
  - 2. aluminium
  - 3. iron
  - 4. stainless steel
  - 5. glass
  - 6. glass
  - 7. wood
  - 8. plastic
- applications of conductors & insulators of heat
    - good conductors
      - example
        - cooking utensils
          - made iron or copper
            - reduce cooking time
          - heat sink
            - made of metal
              - conduct heat away
            - prevent the computer from overheating
      - bad conductors
        - example
          - handles of cooking utensils
            - made of poor conductors of heat
    - convection
      - the transfer of heat from one place to another by movement of liquid or gas
      - can't take place in solids
      - the movement of water (or gas) forms a convection current of water (or gas)
    - application and effects
      - electrical appliances
        - heating element of electric kettle
          - be placed at the bottom
            - heat can be transferred by a convection current
        - air conditioner installed near the ceiling

- cold air blown out & sink while hot air
    - replace it
      - a convection current is formed
      - room is cooled
  - nature
    - during the day
      - land absorbs heat from Sun faster than sea water
      - land becomes hotter than sea
        - hot air from land & cold air blows in from sea
          - replace the hot air that has risen
          - results in sea breezes
    - night
      - land cools down faster than sea & cool air blows from land to sea
        - form land breezes
  - radiation
    - heat transfer
      - space between Sun and Earth
        - vacuum
          - heat can't be transferred through by conduction & convection
            - both processes require medium → transfer heat
          - radiation can take place in vacuum
        - heat is transferred by radiation
      - absorption and emission
        - absorption
          - temperature increases when absorb radiation
          - example
            - stand under Sun, body absorb radiation from Sun → body temperature increase
          - **good absorbers** of radiation
            - **dull black** surfaces
          - **poor absorbers** of radiation
            - **shiny silver** surfaces
        - emitter

- good emitters
  - **dull black** surfaces
- bad emitters
  - **shiny silver** surfaces
- application
  - heat radiator behind a refrigerator is painted black
    - loses heat easily
  - cooking utensils with shiny surfaces
    - can help keep water/ food hot for a longer period