

Non-Mechanical Energy

Lesson Notes

Learning Outcomes

- What is meant by non-mechanical energy?
- What are examples of non-mechanical energy?
- How can you *keep track* of mechanical and non-mechanical forms of energy?

Mechanical vs. Non-mechanical Energy

Mechanical energy is the energy possessed by an object that results from its motion or its position. All other forms of energy can be categorized as **non-mechanical energy**.

Mechanical Energy	Non-Mechanical Energy
Kinetic Energy	Electrical Energy
Gravitational Potential Energy	Thermal Energy
Elastic Potential Energy	Chemical Energy
	Vibrational/Sound Energy
	Light Energy

Keeping Track of Energy

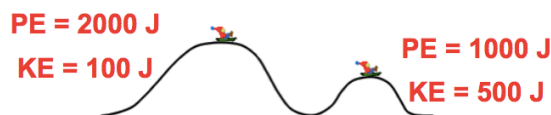
Total Mechanical Energy (TME) is something that we can keep track of. And by keeping track of the TME, we can determine how energy is changing form. Since we know that the total amount of energy - mechanical plus non-mechanical forms is conserved, the loss of mechanical energy indicates a gain in non-mechanical energy ... and vice versa.

Example 1



If 30 000 J of TME is lost, then 30 000 J of non-mechanical energy must be gained.

Example 2



If 600 J of TME is lost, then 600 J of non-mechanical energy must be gained.

Chemical Energy

Simple definition: Energy stored in food or fuel.

People use chemical energy to do work upon objects. They burn *their fuel* (food) as a source of energy.



Thermal Energy

Thermal energy is the energy possessed by an object that determines the temperature of that object. Thermal energy is associated with the amount of motion or vibration of the particles in a sample of matter. Motion/vibrations increase in intensity with increasing amount of thermal energy.

The truck loses 30 000 J of kinetic energy while braking to a stop. The energy changes to thermal energy. The tires, ground, and brakes increase their temperature as particles vibrate more vigorously.

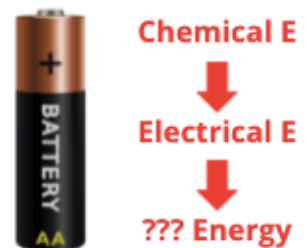


Vibrational or Sound Energy

- **Vibrational energy** is the energy associated with the vibration of objects that are otherwise at rest.
- The energy associated with vibrating objects is often dissipated to the surroundings, resulting in waves that we perceive as sound.
- Collisions cause objects to vibrate.

Electrical Energy

- **Electrical energy** is the energy associated with the movement of charges through the closed conducting loop of a circuit.
- The movement of charge is driven by a difference in electric potential (or voltage) across the two ends of the circuit.
- Other forms of energy are typically required to maintain this difference in electric potential and subsequent charge flow.



Light Energy

- **Light energy** is the energy carried by light waves from one location to another.
- Like all forms of energy, light energy is often transformed or changed into other forms of energy.
- For instance, sunlight is stored in plant material that often becomes a source of energy to fuel our bodies.

Energy Transformation

- The goal of your studies in energy is to develop the ability to keep track of energy - both conceptually and mathematically.
- Be on *the lookout* for what forms of energy exist at any given moment.