

S90 Topic 4 How Do We Transfer Energy in Electrical Systems?

TYPES OF ENERGY: MRS CHEN

ENERGY: THE ABILITY TO DO WORK.

M Mechanical (Kinetic energy, Motion)

R Radiant (light)

S Sound

C Chemical

H Heat

E Electrical

N Nuclear (Fission – splitting nuclei , Fusion – forcing nuclei together)

Energy Inputs and Outputs in Electrical Systems

Fill out the following table using MRS CHEN:

ELECTRICAL DEVICE	INPUT ENERGY	OUTPUT ENERGY
LIGHT-EMITTING DIODES (LEDs)		
PHOTOVOLTAIC CELLS (solar power)		
QUARTZ CRYSTALS		
BBQ LIGHTER		
THERMOCOUPLE		
RESISTORS		
BATTERY		
ALTERNATOR		
BATTERY CHARGER		
MOTOR		
GENERATOR		

THERMOCOUPLES and THERMOPILES

Thermocouples provide great accuracy in measuring temperature using an electric current.

Made of two different metals (ex. copper and iron) that react differently to heat. The 2 metals are joined together at the ends, and make a circuit. **One end is the reference junction, the other end measures the heat** in something like a furnace, stove, jet engine, water heater..... As the measuring end heats up the electrons move in the two metals, creating a current. The potential difference (voltage) is measured and converted into a temperature reading. These can be used as safety devices: if something gets too hot it can be turned off, an alarm light or sound can go on.

☐ Draw a labeled diagram of a thermocouple (see pg. 294):

<http://videos.howstuffworks.com/discovery/34524-gimme-shelter-replacing-a-thermocouple-video.htm>

THERMOPILES (ALSO CALLED THERMOELECTRIC GENERATORS: Lots of thermocouples connected in a series. Used in remote areas to generate limited amounts of electricity. Also used to measure extremely small temperatures differences (even 1 millionth of a degree!), radiation from stars, the amount of heat in living tissues, any situation where highly sensitive reading are needed.

☐ Draw a labeled diagram of a thermopile (see pg. 295).

PIEZOELECTRIC EFFECT

What is the piezoelectric effect?

What types of materials are used to create the piezo-electric effect?

What device uses the piezo-electric effect in reverse?

LEDS (LIGHT EMITTING DIODES)

What are LEDs?

What types of devices are they very useful in?

PHOTOVOLTAIC CELLS (SOLAR CELLS)

How Solar Panels work:

1) http://www.teachersdomain.org/asset/psu06-e21_vid_pv4/

Learn how a solar panel works. Energy from sunlight energizes electrons in the atoms of silicon that are in the solar panel. These electrons flow out of the solar panels along conducting wires → appliances in your house → then back to the solar panels to complete the circuit.

2) http://www.teachersdomain.org/asset/ate10_int_newsolar/

Forefront of research in use of solar energy

3) http://www.teachersdomain.org/asset/klvx09_vid_klvxsolar/

Shows a solar farm at Nellis Air Force Base in Nevada – build on a capped landfill – land that can't be used for anything else.

4) http://www.teachersdomain.org/asset/ate10_int_solarcell/ this interaction shows you more detailed information about solar cells

☐ Draw a labeled diagram and explain how a solar cell works (see pg. 297)

☐ ASSIGNMENT: ANSWER QUESTIONS 1-5 PG. 299 IN FULL SENTENCES.