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PH 315

Homework 1

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*Part 1: Sustainable Energy*

1. **List three reasons why fossil fuels are not sustainable**
   1. “Easily accessible fossil fuels are a finite resource”
   2. Burning fossil fuels puts CO2 in the air
      1. Consensus is this is bad
   3. Regardless of your views, your particular country/state may be running out of fossil fuels putting you at others’ mercy.
2. **Why does MacKay suggest that we sometimes use numbers that are deliberately approximate?**

In order to make the numbers “easy to remember”

1. **Give at least one reason why kiloWattHours (kWh) are a natural choice of energy unit for conversations about sustainable energy.**

The unit is used for your energy bill and numbers for everyday usage typically come out to 5’s, 10’s, and maybe 50’s which are nice and comprehensible.

1. **How many kWh per day does it take to run a typical north American house?**

80 kWh… with an extra 2 or 3 to run the cat.

1. **How many kWh does it take to drive 100 km?**

80 kWh

*Part 2: Quantum mechanics of electromagnetic radiation and molecular absorption*

1. **Which color of visible light does oxygen gas absorb?**

Dark red light

1. **The earth glows strongly in which part of the electromagnetic radiation spectrum?**

infrared

1. **What is the minimum temperature of a piece of iron to emit in the visible part of the electromagnetic radiation spectrum?**

450 degrees C

1. **What percentage of electromagnetic radiation emitted by a traditional light bulb is invisible to human eyes?**

95% is invisible to our eyes

1. **After a carbon dioxide molecule absorbs an infra-red photon, what direction will a new infra-red photon be emitted from the molecule?**

Random direction