Chapter 4 Honors Study Guide

**Know:**

What are resources? Anything that we use or can be used for economic gain (water, metals, food, etc)

What are the three types of fossil fuels? Coal, petroleum (oil), natural gas

What is oil shale? Rock that contains kerogen, an oil like substance, could help replace fossil fuels, plentiful in Colorado

What is ore? a naturally occurring solid material from which a metal or valuable mineral can be profitably extracted

 If we can grow it, it is a renewable resource. If we mine it, it is usually a Non-renewable resource.

The two main categories of energy are Potential and Kinetic .

What is efficiency? Amount of useful energy we can get out It is always less than

100% in accordance with the Law of Conservation Of Energy

 Name 3 renewable resources: corn, chicken, trees, water, etc…

Name 3 non-renewable resources: copper, coal, gold, etc…

**Understand:**

The main benefits of alternative energy resources are they do not produce CO2 and with the exception of Nuclear, they are renewable.

As population grows, so does demand on resources and even renewable resources may become

Non sustainable. Resources like sunlight are not affected by human consumption and are considered perpetual, while resources like fresh water and crops are affected by human consumption and are considered conditionally renewable.

Recycling helps maintain a resource but does not make it renewable, because at some point we will still run out and it cannot be replaced.

Why isn’t oil shale a good replacement for fossil fuels? It is a non-renewable resource

Electricity is created in the same way regardless of its source (with the exception of solar). Explain this process:

 (Coal ) is burned to heat water to create steam which spins a turbine which spins a generator (coiled wire in magnets) which generates electricity. Hydroelectric uses water to spin the turbine and wind power uses wind, but in all cases a turbine is spun which is connected to a generator.

When you here that we have 400 years of coal left in this country, **at current rates of consumption**, why is this misleading and really mean that we have much less than 400 years? It assumes that we will continue to use coal at current rates, but as population increases, so does our need for energy and we are not and have not used coal at a steady rate. Instead coal consumption steadily grows and we are using it faster and faster.

Describe the Law of Conservation of Energy and relate it to the electrical energy that enters a light bulb: Energy cannot be created or destroyed, it only changes form. When electrical energy enters a light bulb, some energy becomes radiant light (what we want), but some also becomes heat (thermal energy) and sound, therefore reducing how much of the initial electrical energy is useful (efficiency).

According to the rule of 70, if coal consumption increases steadily at a rate of 3.5% per year, how long would it take before we are using 4x as much coal as we are presently? 70 / 3.5 = 20 years to double x 2 = 40 years to use 4 x as much coal as presently used.

**Do:**

Choose an alternative energy source and compare and contrast the pros and cons with coal. Depends on your choice; but coal is cheap, plentiful, found in most states, provides jobs, is reliable; but it produces CO2, leads to acid rain,is non-renewable, needs to be mined which damages environment

Make an argument of why one alternative energy fuel is better for replacing fossil fuels than another and support your argument with facts. Depends on which you choose, all sources have benefits and drawbacks

The world population is currently a little over 7 billion and growing at about 1.2% per year. When will world population reach 14 billion? (use the rule of 70) 70 / 1.2 = 58.3 years

Determine the energy transformations, step by step, that take place in the production of electricity

 Coal water to steam steam spins turbine turbine spins generator electricity

 Chemical thermal motion motion motion electrical

 Map out the energy transformations that occur when dropping a tennis ball:

Grav. PE – motion – stored mechanical – motion – grav. PE – repeat (energy is “lost” as sound and thermal)

 Map out the energy transformations that happen on a rollercoaster from the top of the first big hill:

 Grav. PE – Motion – Grav. PE – motion (loss from sound and thermal along the way)

Why isn’t it possible to completely replace fossil fuels with wind and solar power? Since both are not reliable, there are times when you would not be able to meet the energy needs of the population which leads to blackouts.

 **In addition to this study guide, refer to the Energy Info-book questions and Energy Chart**