In the planetary (Rutherford) atom model, the energies are given by:

$$PE = -\frac{ke^2}{r} \qquad KE = \frac{1}{2}\frac{ke^2}{r} \qquad TE = -\frac{1}{2}\frac{ke^2}{r}$$

If *r* increases, then

(A)PE, KE, and TE all decrease

(B) PE, KE and TE all increase

(C) PE and TE increase, but KE decreases

(D) PE and TE decrease, but KE increases

(E) Don’t know or something else

Towards Bohr’s hydrogen atom model

Based on Einstein’s idea of energy quanta and observations of discrete spectra Bohr concluded that “electrons orbit the nucleus in stationary state of certain energies”.

This implies that an electron in the Bohr model of hydrogen atom:

(A)is at a *single specific* distance from the nucleus, always.

(B) can be at any distance from nucleus.

(C) is at certain distances from nucleus corresponding to the energy levels it can be in.

(D) must always go into center where potential energy is lowest

Ground state of Bohr hydrogen atom

In the Bohr hydrogen model the total energy of the stationary states is given by:

$$E_n = \frac{E_1}{n^2} \quad \text{with} \quad E_1 = -\frac{1}{2}\frac{mk^2e^4}{\hbar^2}$$

$$\text{and} \quad n = 1, 2, 3, 4, \ldots.$$

The ground state (state with lowest energy) is

(A) state with n=1

(B) state with n=∞

(C) impossible to tell

Energy level spectrum: Bohr hydrogen atom

In the Bohr hydrogen model the total energy of the stationary states is given by:

$$E_n = \frac{E_1}{n^2} \quad \text{with} \quad E_1 = -\frac{1}{2}\frac{mk^2e^4}{\hbar^2}$$

$$\text{and} \quad n = 1, 2, 3, 4, ...$$

The energy difference between E_{n+1} and E_n …

(A) increases (B) remains the same

(C) decreases … when *n* increases.

Energy level spectrum:
Bohr hydrogen atom