AP Chemistry
Atomic Structure – 7 Worksheet

Name: Key Date: ______________ Per: ____

1. At its closest approach, Mars is [illegible] km from Earth. How long would it take to send a radio message from a space probe of Mars to Earth when the planets are at this closest distance?

[illegible]

2. The second is defined as the time it takes for 9,192,631,770 wavelengths of a certain transition of the cesium-133 atom to pass a fixed point. What is a) the frequency of the electromagnetic radiation? b) its wavelength?

[illegible]

3. The energy required to dissociate the Cl_2 molecule to Cl atoms is [illegible] kJ/mol Cl_2. If the dissociation of a Cl_2 molecule were accomplished by the absorption of a single photon whose energy was exactly the quantity required, what would be its wavelength (in meters)?

[illegible]

4. In the stratosphere, ultraviolet radiation with a frequency of [illegible] s^{-1} can break C-Cl bonds in chlorofluorocarbons (CFCs), which can lead to stratospheric ozone depletion. Calculate the energy per quantum of this radiation.

[illegible]

5. Four possible electron transitions in a hydrogen atom are given below:

	$n_{initial}$	n_{final}
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

a) Which transition(s) represent a loss of energy? [illegible]

b) For which transition does the atom gain the greatest quantity of energy? [illegible]

c) Which transition corresponds to emission of the greatest quantity of energy? [illegible]

6. Li^{2+} is a hydrogen-like ion. Such an ion has a nucleus of charge +Ze and a single electron outside this nucleus. The energy levels of the ion are $-Z^2R_H/n^2$, where Z is the atomic number. What is the wavelength of the transition from n = 3 to n = 2 for Li^{2+}? In what region of the spectrum does this emission occur?

[illegible]