

# Quantum Physics: Atomic Physics

⚠ This is a preview of the draft version of the quiz

Started: Nov 4 at 11:05am

## Quiz Instructions

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### Question 1

1 pts

Under which conditions is it possible for an electron to be emitted from a photoelectric surface?

- when the frequency of incident light great enough
- when the work function is less than the energy of the light wave
- when the intensity of incident light is great enough
- when the incident light has shown on the surface for a sufficient amount of time

### Question 2

1 pts

Which of the following is evidence from photoelectric effect experiments that light has particle properties?

- The total amount of energy absorbed by the surface is not equal to the combined energies of the ejected electrons.

- The frequency of the incident light is proportional to the velocity of the ejected electrons from a photoelectric surface.
- As the intensity of light increases, the number of electrons ejected from a photoelectric surface does not change.
- All of these

**Question 3****1 pts**

In order for an electron to be ejected from a photoelectric surface, a certain amount of energy is required. This amount of energy depends on the photoelectric surface and is the same as the work required to remove an electron from it. This minimum frequency is

- the same as visible light.
- the threshold frequency.
- the maximum kinetic energy.
- Planck's constant.

**Question 4****1 pts**

Which of the following best explains why helium gas glows white while argon gas looks lavender?

- the photons emitted are related to only one color of light for each type of element

- the photons emitted by an atom are related to the amount of energy between orbitals correct
- the photons emitted vary in frequency but all have the same color for a given gas
- the photons emitted form a broad spectrum related to the diameter of the atom

**Question 5****1 pts**

Of the following types of electromagnetic radiation, which has the most amount of energy per photon?

- infrared
- UV
- radio
- visible

**Question 6****1 pts**

Light of a single frequency strikes a sheet of photoelectric material and no electrons are emitted. Which of the following changes could result in an electron being emitted from the material? (Choose all that apply.)

- a decrease in the light's intensity
- an increase in the light's frequency

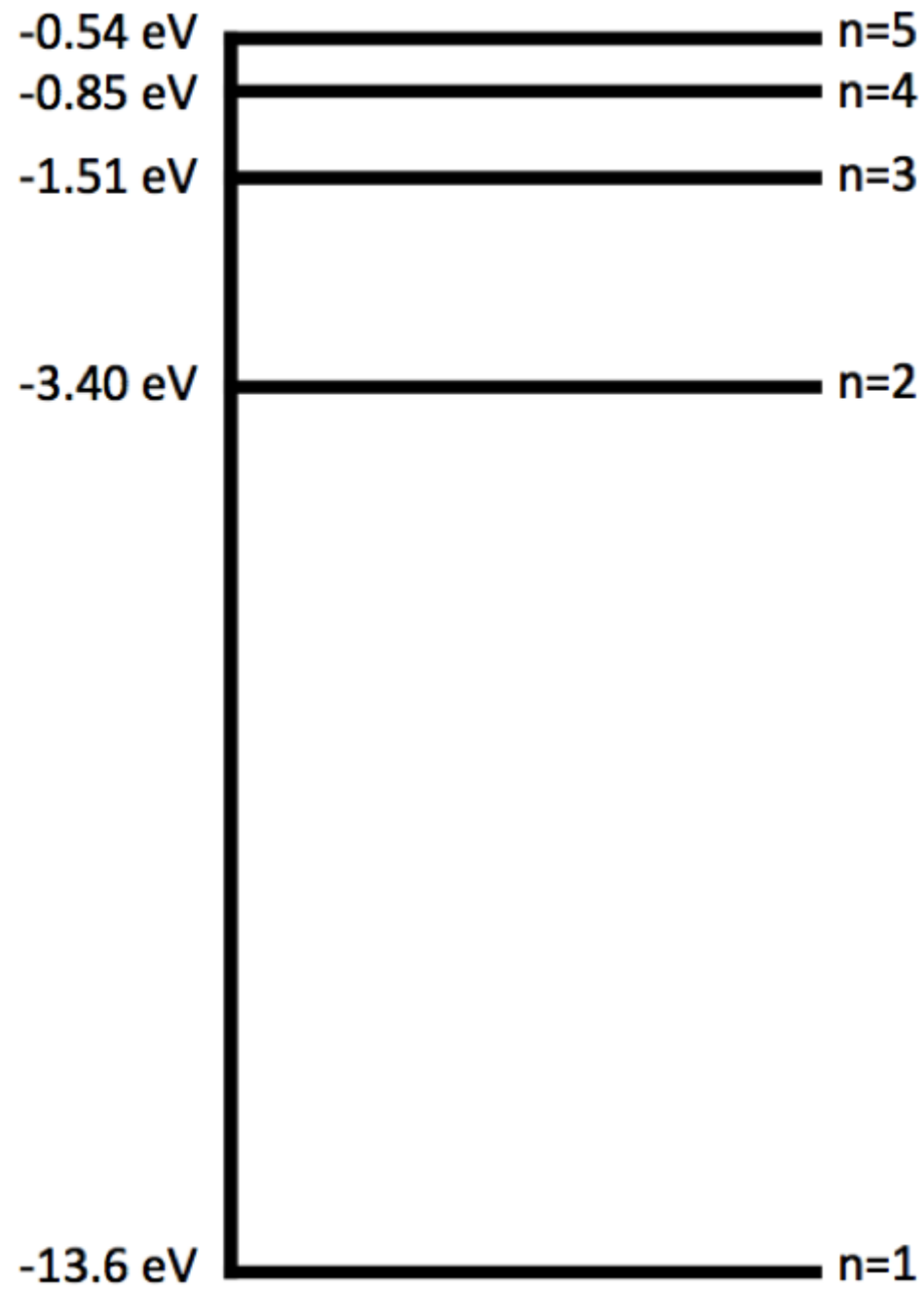
- a decrease in the light's frequency
- an increase in the light's intensity

**Question 7****1 pts**

Consider a slowly moving proton. If the kinetic energy of the proton is doubled, how will this change its de Broglie wavelength?

- it decreases by a factor of 2
- it increases by a factor of 2
- it does not change
- it decreases by a factor of  $\sqrt{2}$

**Question 8****1 pts**



For the emission spectrum given above, which of the following photon energies is NOT possible if an electron has been excited to  $n=4$ ?

2.55 eV

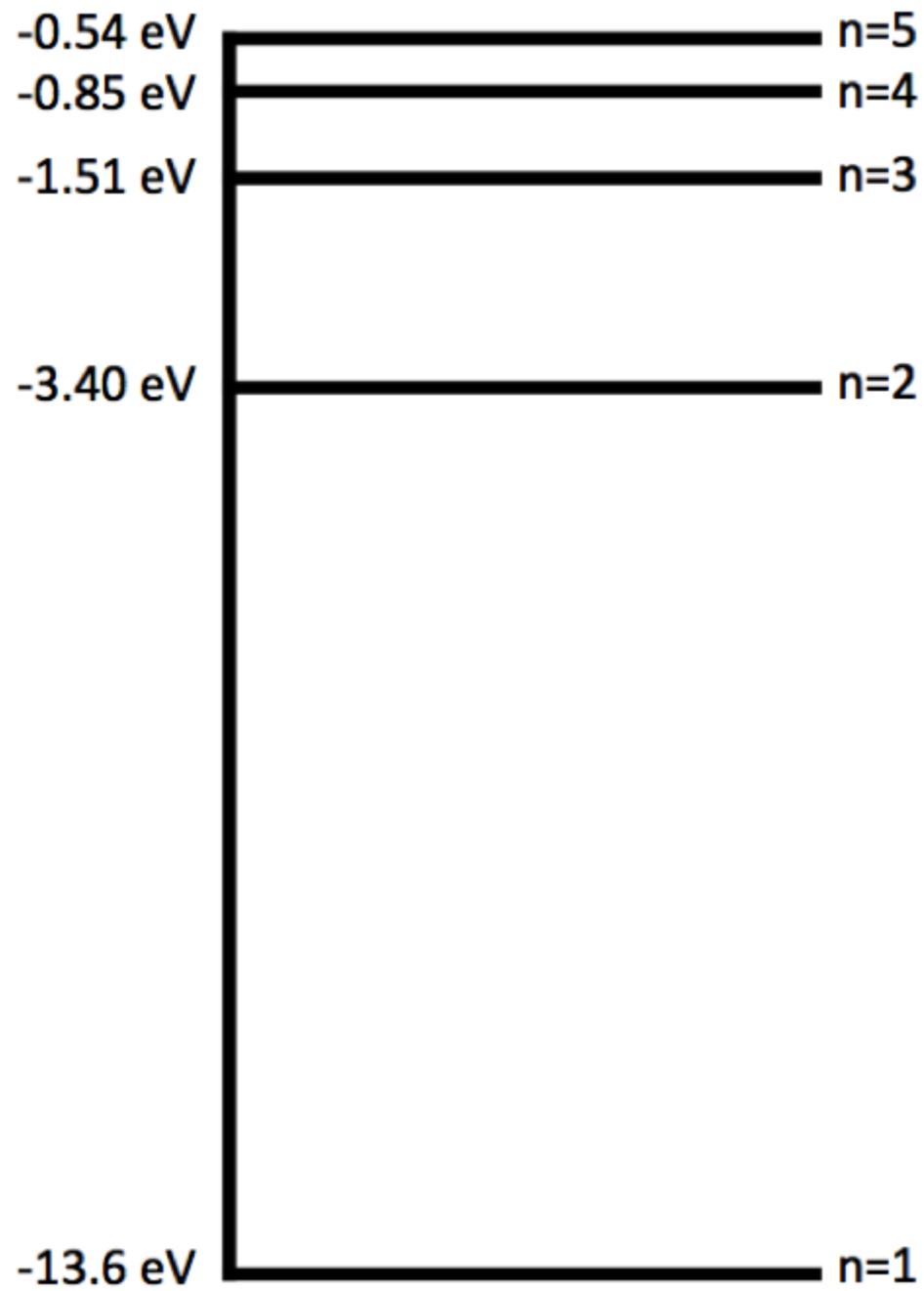
10.2 eV

0.31 eV

0.66 eV

### Question 9

1 pts



Which of the following transitions results in the photon with the shortest wavelength?

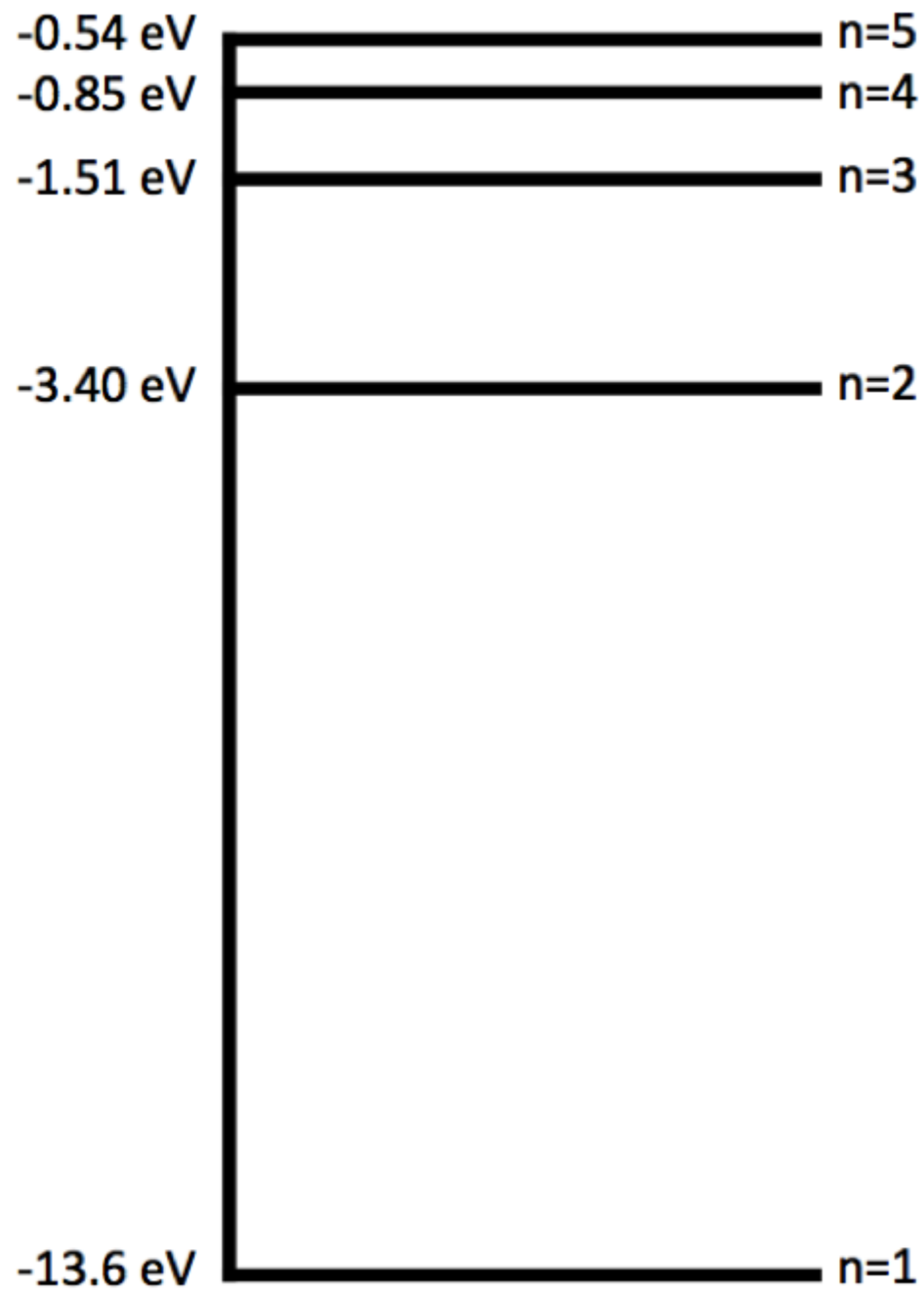
- n=3 to n=1
- n=2 to n=1
- n=5 to n=4
- n=3 to n=2

### Question 10

1 pts

How much energy is needed to ionize the atom if the electron is in the n=3 state?

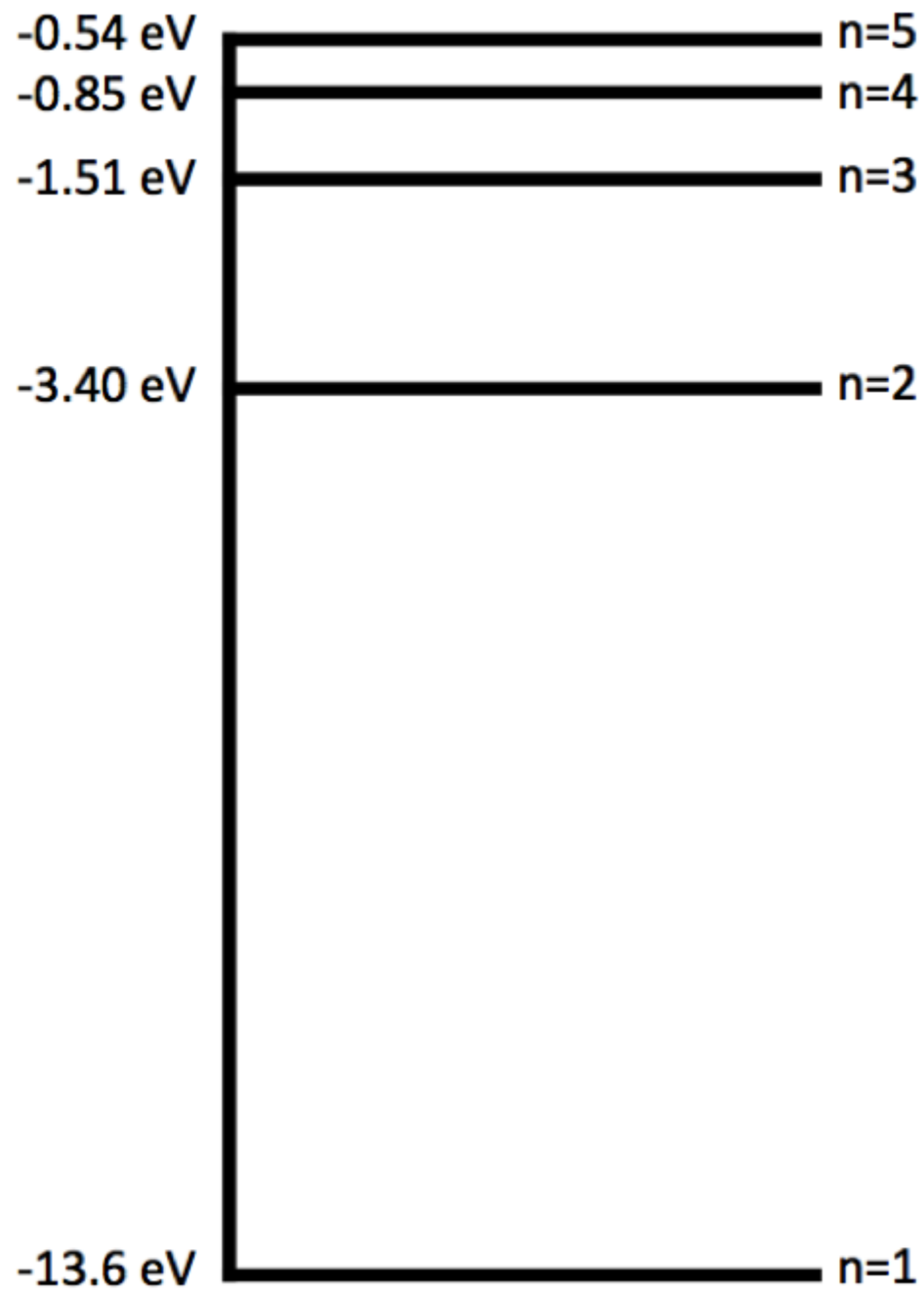




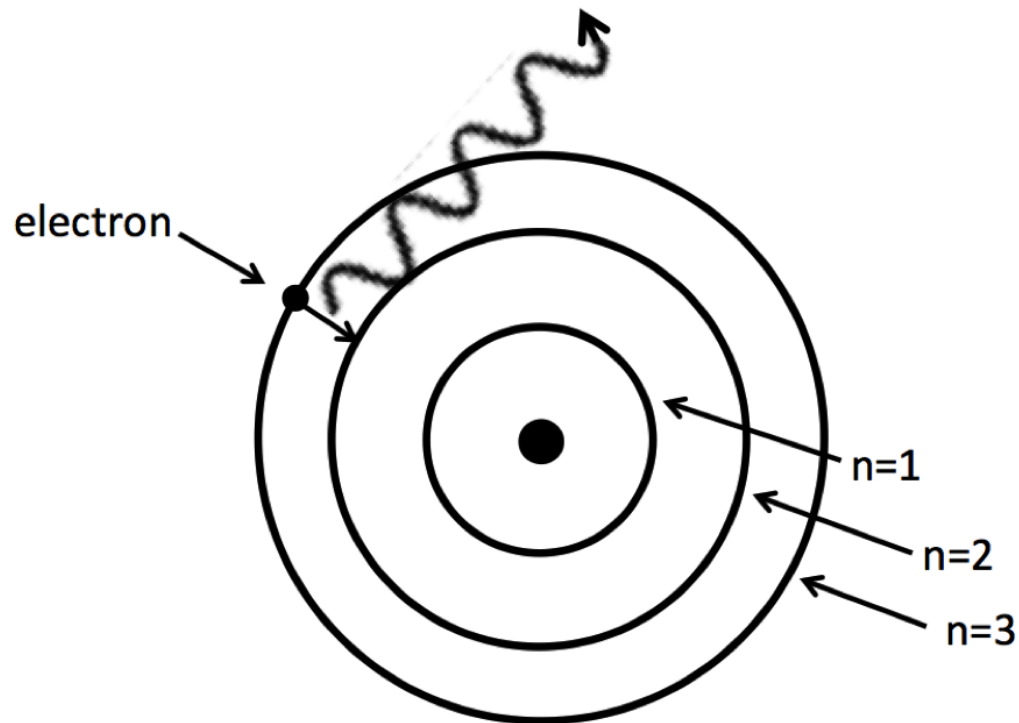
- 15.11 eV
- 1.51 eV
- 0.97 eV
- 12.09 eV

**Question 11****1 pts**

What is the frequency of a photon emitted when an electron falls from  $n=3$  to  $n=1$ ?



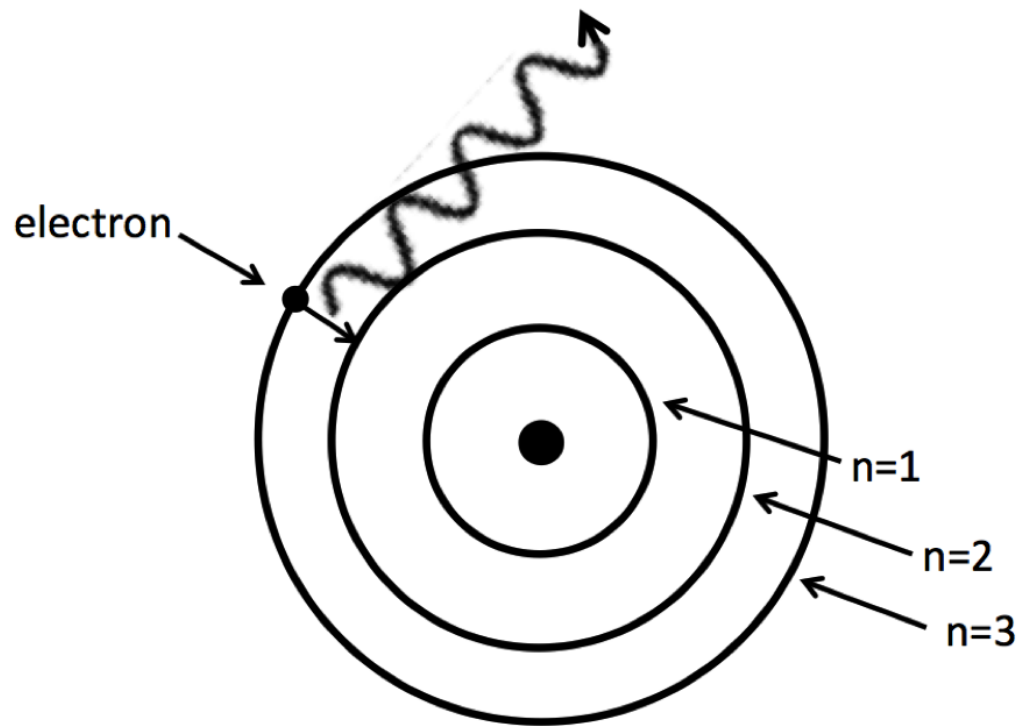
- $3.29 \times 10^{15} \text{ Hz}$
- $2.92 \times 10^{15} \text{ Hz}$
- $2.12 \times 10^{15} \text{ Hz}$
- $4.55 \times 10^{15} \text{ Hz}$

**Question 12****1 pts**

The diagram above represent a Bohr model of hydrogen. An electron in the third orbital falls to the second orbital. What does the wavy line represent?

- light
- a release of energy
- all of these
- a photon being emitted

**Question 13****1 pts**



If the electron falls from  $n=3$  to  $n=1$  instead, which of the following is true?

- the wavelength of the wave will increase
- the photon will have greater momentum
- the frequency of the wave will decrease
- the wave will carry less energy

Not saved

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