

HW05 - H Atom and Electron Configuration

 This is a preview of the published version of the quiz

Started: Jul 7 at 9:44am

Quiz Instructions

Homework 05 - H Atom and Electron Configuration

Question 1

1 pts

Which of the following provided evidence that the electrons in atoms are arranged in distinct energy levels?

- ☐ the existence of elements with non-integer atomic weights
- ☐ the observation of line spectra from gas discharge tubes
- ☐ the results of the Millikan oil-drop experiment
- ☐ the scattering of alpha particles by a metal foil

Question 2

1 pts

Assume n_1 and n_2 are two adjacent energy levels of an atom. The emission of radiation with the longest wavelength would occur for which two values of n_1 and n_2 ?

- ☐ 8,7
- ☐ 2,1
- ☐ 7,6
- ☐ 4,3

Question 3

1 pts

Use the Rydberg formula for atomic hydrogen to calculate the wavelength of the photon emitted in the transition of an electron from $n=4$ to $n=2$.

☐ 205 nm

☐ 8.63 nm

☐ 486 nm

☐ 94.9 nm

Question 4

1 pts

What is the name given to the spectroscopic series to which the transition described in question 3 belongs?

☐ Balmer series

☐ Lyman series

☐ Brackett series

☐ Paschen series

Question 5

1 pts

In what region of light will the photons emitted in question 3 lie?

☐ visible, red

☐ ultraviolet

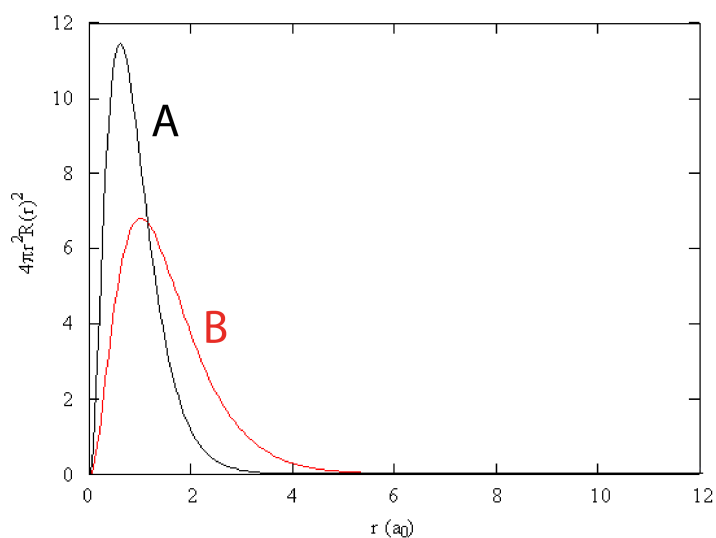
☐ visible, blue

☐ visible, yellow

Question 6

1 pts

The graph below shows the radial distribution plots (A and B only) for the 1s wavefunctions for H and He⁺. Ignore C, it is a 2s wave function. Which plot (A or B) is the 1s wavefunction for the He⁺ ion?



☐ C

☐ There is no way to know.

☐ A

☐ B

Question 7

1 pts

What is the maximum number of electrons that can have the quantum number $n=2$ in an atom?

☐ 6

☐ 8

☐ 18

☐ 2

Question 8

1 pts

The three quantum numbers for an electron in a hydrogen atom in a certain state are $n=4$, $\ell=2$, and $m_\ell=1$. The electron is located in what type of orbital?

☐ 3p

☐ 4p

☐ 3d

☐ 4d

Question 9

1 pts

The number that describes the main energy level of an electron in an atom is...

☐ the magnetic quantum number, m_ℓ .

☐ the principal quantum number, n .

☐ the angular momentum quantum number, ℓ .

☐ the atomic number, Z .

Question 10

1 pts

Can an electron in an atom be in an energy level described by the set of quantum numbers $n=5$, $\ell=3$, $m_\ell=-2$?

☐ No, because m_ℓ cannot be negative.

☐ No, because m_ℓ must equal ± 1 .

☐ Yes.

☐ No, because ℓ must equal $n-1$.

Question 11

1 pts

An electron in a 3d orbital could have which of the following quantum numbers?

☐ $n=3$, $\ell=3$, $m_\ell=1$

☐ $n=3, \ell=2, m_\ell=0$

☐ $n=3, \ell=2, m_\ell=-3$

☐ $n=3, \ell=1, m_\ell=-1$

Question 12

1 pts

How many p electrons does Se (atomic number 34) possess?

☐ 4

☐ 18

☐ 34

☐ 16

Question 13

1 pts

For which H-atom wavefunction are you most likely to find the electron farthest from the nucleus?

☐ 2s

☐ 2p

☐ 4p

☐ 3p

Question 14

1 pts

The transition metals are elements with partially filled...

☐ p subshells.

☐ s subshells.

☐ f subshells.

☐ d subshells.

Question 15

1 pts

Which element is predicted to have the ground-state electron configuration shown below?

$[\text{Ne}] 3s^2 3p^4$

☐ silicon

☐ sulfur

☐ aluminum

☐ chlorine

Question 16

1 pts

Which of the following is the valence electronic structure for a halogen?

☐ $ns^2 nd^{10}$

☐ $ns^2 np^5$

☐ ns^2

☐ $ns^2 np^6$

Question 17

1 pts

In the Aufbau order of occupancy of electronic energy levels, the level occupied just after 4p is...

☐ 5s

☐ 5p

☐ 3f

☐ 4d

Question 18

1 pts

The electron configuration for the Mn atom is...

☐ $1s^2 2s^2 2p^6 3s^2 3p^3$

☐ $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^7$

☐ $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$

☐ $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 4p^5$

Question 19

1 pts

The ground state electron configuration of a neutral silver atom is $[\text{Kr}] 5s^1 4d^{10}$ instead of $[\text{Kr}] 5s^2 4d^9$. This observation can be explained (theoretically) by the fact that...

☐ an enhanced stability is associated with filled sets of equivalent orbitals.

☐ the 4d subenergy level has higher energy than the 5s subenergy level.

☐ only one electron can occupy a 5s orbital.

☐ the magnetism measurement shows one unpaired electron.

Question 20

1 pts

Which of the following atoms has the largest radius?

☐ Ne

☐ F

☐

Br

☐ Cl

Question 21

1 pts

As an atom's radius decreases...

- ☐ its ionization energy does not change.
- ☐ its ionization energy increases.
- ☐ its ionization energy decreases.
- ☐ its ionization energy will either increase or decrease depending on whether you are going up a column or across a row.

Question 22

1 pts

Which of the following would be expected to have the highest first ionization energy?

- ☐ Ar
- ☐ Xe
- ☐ Si
- ☐ Na
- ☐ Cl

Question 23

1 pts

How many s electrons does P (atomic number 15) possess?

- ☐ 4
- ☐

2

☐ 6

☐ 5

Question 24

1 pts

How many values of the quantum number ℓ are possible when $n=5$?

☐ 7

☐ 6

☐ 4

☐ 5

Question 25

1 pts

How many values of m_ℓ are allowed for an electron in a 5f subshell?

☐ 7

☐ 6

☐ 5

☐ 4

Question 26

1 pts

How many values of m_ℓ are allowed for an electron in a 2s subshell?

☐ 4

☐ 1

☐ 3

☐ None of these.

Question 27

1 pts

How many subshells are there in the shell with $n=3$?

☐ 4

☐ 3

☐ 2

☐ 1

Question 28

1 pts

The diameter of the electron density of an atom is roughly...

☐ 1 - 5 nm

☐ 0.1 - 0.5 nm

☐ 10 - 50 nm

☐ None of these.

Question 29

1 pts

For which of the following elements would the size of the neutral atom (atomic radius) be the largest?

☐ Rb

☐ Ca

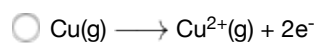
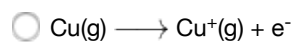
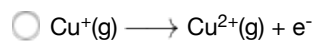
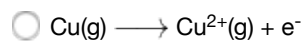
☐ Sr

☐ Na

Question 30

1 pts

Write an equation that represents the second ionization energy of copper.



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