General Chemistry for Life Scientists I

	DILLEN, ANA
Started on	Friday, 22 October 2021, 3:01 PM PDT
State	Finished
Completed on	Friday, 22 October 2021, 3:52 PM PDT
Time taken	51 mins 10 secs
Grade	**68.00** out of 80.00 (**85**%)

Question **1**

Correct

4.00 points out of 4.00

Flag question

In class we discussed the electromagnetic spectrum. Which of the following is the smallest wavelength electromagnetic radiation?

- a. Ultraviolet. ✔ Correct
- b. Infrared.
- c. Microwave.
- d. Radio.
- e. Visible blue light.

The correct answer is: Ultraviolet.

Make comment or override points

Question 2
Correct
4.00 points out of 4.00
Flag question

In a wave model, the cube of the amplitude of a wave determines the intensity of the radiation. True or false?

a. False ✔ Correct
b. True

The correct answer is: False

Make comment or override points

Response history

Step	Time	Action	State	Points
1	Oct 22, 2021, 3:01 PM PDT	Started	Not yet answered	
2	Oct 22, 2021, 3:27 PM PDT	Saved: False	Answer saved	
3	**Oct 22, 2021, 3:52 PM PDT**	**Attempt finished**	**Correct**	**4.00**

Question 3
Correct
4.00 points out of 4.00
Flag

Thallium has 41 isotopes which have atomic masses that range from 176 to 216.
203 Tl and 205 Tl are the only stable isotopes and make up nearly all of natural thallium.
Write the ground-state electron configuration of neutral thallium, Tl.

a. $[Xe]4f^{14}5d^{8}6s^{2}6p^{3}$

Question **3**

Correct

4.00 points out of 4.00

Flag question

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Write the ground-state electron configuration of neutral thallium, Tl.

a. $[Xe]4f^{14}5d^{8}6s^{2}6p^{3}$
b. $[Xe]4f^{14}5d^{10}6s^{2}6p^{1}$ ✔ Correct
c. $[Xe]4f^{14}5d^{10}6s^{1}6p^{2}$
d. $[Xe]4f^{14}5d^{5}6s^{2}6p^{6}$
e. $[Xe]4f^{14}5d^{10}6p^{3}$

The correct answer is: $[Xe]4f^{14}5d^{10}6s^{2}6p^{1}$

Make comment or override points

Response history

Step	Time	Action	State	Points
1	Oct 22, 2021, 3:01 PM PDT	Started	Not yet answered	
2	Oct 22, 2021, 3:03 PM PDT	Saved: [Xe]4f145d106s26p1	Answer saved	
3	**Oct 22, 2021, 3:52 PM PDT**	**Attempt finished**	**Correct**	**4.00**

Question **4**

Electronic quantum numbers (the quantum numbers describing electrons) can be defined as a group of numerical values which provide solutions that

Question **4**

Correct

4.00 points out of 4.00

Flag question

Electronic quantum numbers (the quantum numbers describing electrons) can be defined as a group of numerical values which provide solutions that are acceptable by the Schrodinger wave equation. The three quantum numbers for an electron are $n = 4$, $l = 1$, $m_l = 1$. Identify the electron state (orbital).

a. 3d
b. 4p ✔ Correct
c. 4s
d. 4d
e. 3p

The correct answer is: 4p

Make comment or override points

Response history

Step	Time	Action	State	Points
1	Oct 22, 2021, 3:01 PM PDT	Started	Not yet answered	
2	Oct 22, 2021, 3:03 PM PDT	Saved: 4p	Answer saved	
3	**Oct 22, 2021, 3:52 PM PDT**	**Attempt finished**	**Correct**	**4.00**

Question **5**

Nodal planes in orbitals can be accounted for by the wavelike behavior of electrons

Question 5
Correct
4.00 points out of 4.00
Flag question

Nodal planes in orbitals can be accounted for by the wavelike behavior of electrons.

a. Only for the ground state.
b. True ✔ Correct
c. False
d. Sometimes
e. Unable to determine.

The correct answer is: True

Make comment or override points

Response history

Step	Time	Action	State	Points
1	Oct 22, 2021, 3:01 PM PDT	Started	Not yet answered	
2	Oct 22, 2021, 3:13 PM PDT	Saved: True	Answer saved	
3	**Oct 22, 2021, 3:52 PM PDT**	**Attempt finished**	**Correct**	**4.00**

Question 6
Correct
8.00 points out of 8.00

UV-A light has wavelengths between 315 nm and 400 nm and is sometimes referred to as "long wave" ultraviolet light. UV-B light has wavelengths between 280 and 315 nm and is "medium wave" UV light. Which is considered the safer type of UV radiation, and why?

a. UV-B: short wavelength means less energy

Question 6
Correct
8.00 points out of 8.00
Flag question

UV-A light has wavelengths between 315 nm and 400 nm and is sometimes referred to as "long wave" ultraviolet light. UV-B light has wavelengths between 280 and 315 nm and is "medium wave" UV light. Which is considered the safer type of UV radiation, and why?

a. UV-B; short wavelength means less energy
b. UV-A; long wavelength means more energy
c. UV-A; long wavelength means less energy ✔
d. UV-C; it probably has the smallest wavelength and thus smallest energy
e. Unable to determine

Your answer is correct.

The correct answer is:
UV-A; long wavelength means less energy

Make comment or override points

Response history

Step	Time	Action	State	Points
1	Oct 22, 2021, 3:01 PM PDT	Started	Not yet answered	
2	Oct 22, 2021, 3:04 PM PDT	Saved: UV-A; long wavelength means less energy	Answer saved	
3	**Oct 22, 2021, 3:52 PM PDT**	**Attempt finished**	**Correct**	**8.00**

Question 7
Correct
8.00 points out of 8.00
Flag question

A stimulant in chocolate is found to have a molar mass of 194.19 $g.mol^{-1}$ and a mass percentage composition of 49.48% C, 5.19% H, 28.85% N, and 16.48% O. What is the molecular formula of this stimulant?

a. $C_{16}H_{20}N_8O_4$
b. $C_4H_5N_2O$
c. $C_8H_{10}N_2O_4$
d. $C_4H_5NO_2$
e. $C_8H_{10}N_4O_2$ ✔

Your answer is correct.
This is a homework problem.
F.19. Caffeine
For 100 g of stimulant,
moles of C = 48.48 g/12.01 g/mol = 4.12 mol
moles of H = 5.19 g/1.0079 g/mol = 5.15 mol
moles of N = 28.85 g/14.01 g/mol = 2.059 mol
moles of O = 16.48 g/16.00 g/mol = 1.03 mol
Dividing each number by 1.03 mol gives a ratio of 4.00 C : 5.00 H: 2.00 N: 1.00 O. The empirical formula is $C_4H_5N_2O$.
Molecular molar mass is twice the mass of the empirical formula.
Molecular formula is $C_8H_{10}N_4O_2$

The correct answer is:
$C_8H_{10}N_4O_2$

Question 8
Incorrect
0.00 points out of 4.00
Flag question

In 1924, Louis de Broglie proposed a new speculative hypothesis that electrons and other particles of matter can behave like waves. Which of the following experiments most directly supports de Broglie's hypothesis of the wave nature of matter?

a. Black-body radiation
b. α-particle scattering by a metal foil ✖ Incorrect
c. The emission spectrum of the hydrogen atom
d. Electron diffraction by a crystal
e. The photoelectric effect

The correct answer is: Electron diffraction by a crystal

Make comment or override points

Response history

Step	Time	Action	State	Points
1	Oct 22, 2021, 3:01 PM PDT	Started	Not yet answered	
2	Oct 22, 2021, 3:10 PM PDT	Saved: The photoelectric effect	Answer saved	
3	Oct 22, 2021, 3:36 PM PDT	Saved: -particle scattering by a metal foil	Answer saved	
4	**Oct 22, 2021, 3:52 PM PDT**	**Attempt finished**	**Incorrect**	**0.00**

Question 9

Partially correct

4.00 points out of 8.00

Flag question

Quantum dots (QDs) are semiconductor particles approximately a nanometer in size, having optical and electronic properties that differ from larger particles due to quantum mechanics.

If an electron is confined to a quantum dot with a radius of 1.19 nm, what is the minimum uncertainty in the velocity of the electron? 1nm = 1 x 10^{-9} m

a. 7.63 x 10^{4} $m.s^{-1}$

b. 7.73 x 10^{2} $m.s^{-1}$

c. None of these values.

d. 4.86 x 10^{4} $m.s^{-1}$

Used the radius and not the diameter.

e. 2.43 x 10^{4} $m.s^{-1}$

f. 1.21 x 10^{4} $m.s^{-1}$

Your answer is partially correct.

$(\Delta v\ m_e)\Delta x = h/4\pi$

Δx = 2(radius) = 2.38 nm = 2.38 x 10^{-9} m

$\Delta v = h/[4\pi(\Delta x)m_e]$

Δv = (6.62607015×10^-34)÷((4×3.14159)×(2.38 × 10^-9)×(9.11 × 10^-31)) = 2.43 x 10^{4} $m.s^{-1}$

The correct answer is:
2.43 x 10^{4} $m.s^{-1}$

Make comment or override points

Response history

Question 10

Incorrect

0.00 points out of 4.00

Flag question

The hydrogen spectrum is an important piece of experimental evidence to show the quantized electronic structure of an atom. In the spectrum of atomic hydrogen, where on the EM spectrum would you expect to see the spectral line representing the transition from n = 3 to n = 2?

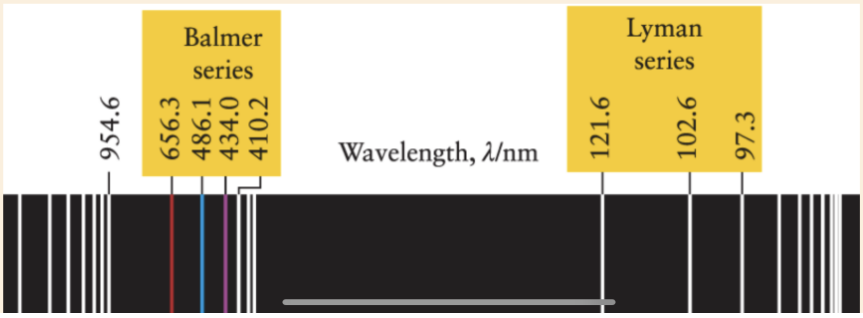
a. In the IR
b. In the visible closer to the UV
c. In the visible closer to the IR
d. In the UV ✖
e. In the IR closer to the microwave

Your answer is incorrect.

Knowing n_{final} = 2 makes it in the visible region.

Since it is 3 to 2 it is the smallest energy gap in the visible and therefore closer to the IR.

Calculation is NOT needed.



Question 11
Correct
4.00 points out of 4.00
Flag question

Broadcast stations transmit at various frequencies, depending on the channel, ranging from about 540 kHz for AM radio up to about 700 MHz for UHF television stations. What is the wavelength of radio station FM99 Rocks! transmitting at 99.1 MHz (99.1 x 10^6 Hz)?

a. 303 m
b. 0.00303 m
c. 0.330 m
d. 3.03 m ✔ Correct
e. 330 m

The correct answer is: 3.03 m

Make comment or override points

Response history

Step	Time	Action	State	Points
1	Oct 22, 2021, 3:01 PM PDT	Started	Not yet answered	
2	Oct 22, 2021, 3:18 PM PDT	Saved: 3.03 m	Answer saved	
3	**Oct 22, 2021, 3:52 PM PDT**	**Attempt finished**	**Correct**	**4.00**

Question 12
Correct

In quantum theory, which of the following can be used to predict that a gaseous carbon atom in its ground state has unpaired electrons?

Question 13

Correct

8.00 points out of 8.00

Flag question

The velocity of an electron that is emitted from a metallic surface by a photon is 3.6×10^3 km.s^{-1}.

(i) What is the wavelength of the ejected electron?

(ii) No electrons are emitted from the surface of the metal until the frequency of the radiation reaches 2.50×10^{16} Hz. How much energy is required to remove the electron from the metal surface?

a. (i) 2.0×10^{-10} m (ii) 3.32×10^{-17} J

b. (i) 4.0×10^{-10} m (ii) 1.66×10^{-17} J

c. (i) 2.0×10^{-10} m (ii) 1.66×10^{-17} J ✔

d. (i) 5.0×10^{-10} m (ii) 6.64×10^{-17} J

e. (i) 4.0×10^{-10} m (ii) 3.32×10^{-17} J

Your answer is correct.

Part (i)

lambda = h/p

lambda = 6.626×10^{-34} J s / (9.109×10^{-31} kg * 3.6×10^{6} m/s)

lambda = 2.0×10^{-10} m

Part (ii)

E = h*nu

= 6.626×10^{-34} J s * 2.50×10^{16} s^{-1}

= 1.66×10^{-17} J

The correct answer is: (i) 2.0×10^{-10} m (ii) 1.66×10^{-17} J

Make comment or override points

Question 14
Correct
4.00 points out of 4.00
Flag question

In class we discussed the electron configuration of copper. How many unpaired electrons are in a ground-state Cu atom?

a. 0
b. 2
c. 3
d. 5
e. 1

Correct

The correct answer is: 1

Make comment or override points

Response history

Step	Time	Action	State	Points
1	Oct 22, 2021, 3:01 PM PDT	Started	Not yet answered	
2	Oct 22, 2021, 3:25 PM PDT	Saved: 1	Answer saved	
3	**Oct 22, 2021, 3:52 PM PDT**	**Attempt finished**	**Correct**	**4.00**

Question 15
Correct

Aerobic respiration involves the breakdown of organic molecules (food) in the presence of oxygen. A simplified, unbalanced reaction for aerobic respiration is shown below:

Question **15**

Correct

8.00 points out of 8.00

Flag question

Aerobic respiration involves the breakdown of organic molecules (food) in the presence of oxygen. A simplified, unbalanced reaction for aerobic respiration is shown below:

$C_6H_{12}O_6(s) + O_2(g) \rightarrow CO_2(g) + H_2O(l) + \text{heat}$

In this reaction, glucose ($C_6H_{12}O_6$) reacts with oxygen to form carbon dioxide, water, and heat. If the reaction goes to completion and 5.00 grams of glucose is reacted with 6.00 g of O_2, how many grams of H_2O will be formed?

Use the following molecular masses: glucose (180.156 g/mol), O_2 (31.999 g/mol), H_2O (18.01528 g/mol)

a. 20.3 g of water will be formed.

b. 0.500 g of water will be formed.

c. 3.38 g of water will be formed.

d. 3.00 g of water will be formed. ✔

e. 0.166 g of water will be formed.

Your answer is correct.

Balanced equation:

$C_6H_{12}O_6(s) + 6O_2(g) \rightarrow 6CO_2(g) + 6H_2O(l) + \text{heat}$

moles of glucose: 5.00 g/ 180.156 g/mol = 0.027**7**53725 mol glucose

moles of oxygen: 6.00 g/ 31.999 g/mol = 0.18**7**50586 mol O_2

ratio of oxygen to glucose is 6.76, **glucose is the limiting reactant.**

One mole of glucose yields 6 moles of water, thus 0.16**6**522347 mol of water is formed.

H_2O: (18.01528 g/mol) x (0.16**6**522347 mol) = 2.9999 g

Mass of water is thus 3.00 g.