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Chemistry_Questions_0114

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- Which of the following statements is correct for an electron that has the quantum numbers $n = 4$ and $m_l = -2$?
 - the electron may be in a p orbital
 - the electron may be in a d orbital
 - the electron is in the second principal shell
 - the electron must have a spin quantum number $m_s = +\frac{1}{2}$
- The set of quantum numbers, $n = 4$, $l = 3$, $m_l = 2$
 - describes an electron in a 3p orbital
 - is not allowed
 - describes an electron in a 4d orbital
 - describes one of seven orbitals of a similar type
- Which of the following statements is correct for an electron that has the quantum numbers $n = 5$ and $m_l = -4$?
 - the electron may be in a f orbital
 - the electron must have a spin quantum number $m_s = -\frac{1}{2}$
 - the electron may be in a p orbital
 - none of the above
- Identify the subshell in which electrons with the quantum numbers $n = 3$, $l = 2$ may be found.
 - 3d
 - 4f
 - 4d
 - 3p
- What type of orbital is occupied by an electron with the quantum numbers $n = 4$, $l = 1$. How many orbitals of this type are found in a multi-electron atom?
 - 4p, 3
 - 4s, 1
 - 4p, 6
 - 4s, 2

6. Identify the subshell in which electrons with the quantum numbers $n = 6, l = 1$ may be found.

- A. 6p
- B. 3d
- C. 6f
- D. 5p

7. Consider the sulfur atom. For how many electrons does this atom have $n = 2$ and $l = 1$?

- A. 2
- B. 4
- C. 6
- D. 8

8. Consider the argon atom. For how many electrons does this atom have $m_l = 1$ and $m_s = +1/2$?

- A. 0
- B. 1
- C. 2
- D. 4

9. Consider the chlorine atom. For how many electrons does this atom have $n = 3$ and $l = 0$?

- A. 2
- B. 4
- C. 6
- D. 8

10. Identify the subshell in which electrons with the quantum number $n = 5, l = 4$ are found.

- A. 5d
- B. 5f
- C. 4f
- D. 5g

11. Give the corresponding atomic orbital designations for electrons with the following quantum numbers.

	n	l	m_l	m_s
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1)	3	2	0	- 1/2
2)	5	3	-1	- 1/2
3)	4	1	+1	- 1/2

- A. 3p,5d,3s
- B. 2d,5f,4p
- C. 2d,5d,4p
- D. 3d,5f,4p

12. Give the corresponding atomic orbital designations for electrons with the following quantum numbers;

	n	l	m_l	m_s
1)	2	1	0	- 1/2
2)	5	3	-1	- 1/2
3)	3	2	+1	- 1/2

- A. 2p,5f,3p
- B. 2s,5d,3p
- C. 2p,5d,3p
- D. 2p,5f,3d

13. Which of the following sets of quantum numbers is not allowed?

- A. $n = 3, l = 1, m_l = -1, m_s = +\frac{1}{2}$
- B. $n = 2, l = 1, m_l = 0, m_s = +\frac{1}{2}$
- C. $n = 3, l = 0, m_l = 0, m_s = +\frac{1}{2}$
- D. $n = 2, l = 2, m_l = -1, m_s = -\frac{1}{2}$

14. Which of the following sets of quantum numbers is not allowed?

- A. $n = 3, l = 1, m_l = -1$
- B. $n = 2, l = 0, m_l = 0$
- C. $n = 3, l = 2, m_l = -3$
- D. $n = 2, l = 1, m_l = 0$

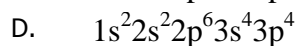
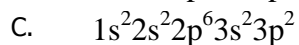
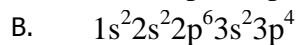
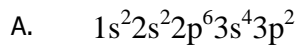
15. Which of the following sets of quantum numbers are not allowed for an electron in an atom?

	n	l	m_l	m_s
1)	2	1	0	+1/2
2)	2	3	+1	-1/2
3)	3	2	-2	-1/2
4)	2	2	0	+1/2
5)	2	1	0	+1/2

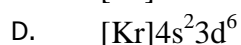
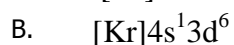
- A. 1, 3, 5
B. 2, 4
C. 2, 4, 5
D. 3, 4
16. Elements of a group in the periodic table _____
- A. have similar chemical properties.
B. are isotopes.
C. are also called a period.
D. have consecutive atomic numbers
17. A horizontal row in the periodic table containing a sequence of elements is a _____
- A. period
B. group
C. family
D. subgroup
18. What would be the atomic number of an element that might have one electron in the 6f subshell?
- A. 109
B. 12
C. 127
D. 118
E. None of the above
19. Which of the following electron configurations is correct for cobalt, (atomic number 27)?
- A. $[\text{Ar}]5s^24d^7$
B. $[\text{Ar}]4s^23d^7$
C. $[\text{Ar}]4s^24d^9$



20. Which of the following electron configurations is correct for sulfur, (atomic number 16)?



21. Which of the following electron configurations is correct for iron, (atomic number 26)?



22. Consider the chlorine atom. For how many electrons does this atom have $n = 3$ and $l = 0$?

A. 2

B. 4

C. 6

D. 8

23. Consider the argon atom. For how many electrons does this atom have $ml = 1$?

A. 0

B. 1

C. 2

D. 4

24. Which of the following elements has the smallest electron affinity?

A. F(9)

B. B(5)

C. N(7)

D. C(6)

25. Which of the following elements has the largest electron affinity?

- A. N(7)
- B. Na(11)
- C. O(8)
- D. F(9)

1. Consider the following elements and arrange them in order of increasing number of electrons depicted in electron dot symbols. Which one occupies the intermediate position in the series? P-5, Se-6, Si-4, I-7, and B-3

- A. P
- B. B
- C. Si
- D. I

2. Consider the following elements and select the one which has the smallest number of electrons shown in an electron dot symbol. Al-3, Se-6, Si-4, Sb-5 and Br-7

- A. Al
- B. Br
- C. Si
- D. Sb

3. Consider the following species. Which contain an odd number of electrons? BrO_3 , HO_2^- , N_2O , SO_3 and SO_3^{2-}

- A. 2 and 5
- B. only 2
- C. 3 and 4
- D. only 1

4. Consider the following species. Which contain an odd number of electrons? O , O^{2-} , O_2^{2-} , O_2^- and O_3

- A. only 3
- B. only 2
- C. 2 and 3
- D. only 4

5. Consider the following species. Which contain an odd number of electrons? NO_2 , CO , O_3^- , O_2^{2-} and SO_2

- A. 2 and 4
- B. 2 and 5
- C. 2, 4 and 5
- D. 1 and 3

6. Write resonance structures for NO_2^- and NO_3^- . Based on these structures one can conclude that
- both have the same bond length
 - NO_2^- has longer bonds than NO_3^-
 - NO_2^- has shorter bonds than NO_3^-
 - bond lengths are variable in both compounds
7. The ion, CS_3^{2-} consists of a central carbon atom bonded to the three other atoms. Write a resonance form conforming to the Lewis octet rule and determine the number of double bonds in this species.
- zero
 - three
 - two
 - one
8. Write resonance structures for SO_2 and SO_3 . Based on these structures one can conclude that
- both have the same bond length
 - SO_2 has longer bonds than SO_3
 - SO_2 has shorter bonds than SO_3
 - bond lengths are variable in both compounds
9. What types of hybrid orbitals are involved in bonding of BH_4^- ?
- sp
 - sp^2
 - sp^3
 - dsp^3
10. What types of hybrid orbitals are involved in bonding of BCl_3 ?
- sp
 - sp^2
 - sp^3
 - dsp^3
11. What types of hybrid orbitals are involved in bonding of PCl_5 ?
- sp
 - sp^2

- C. sp^3
- D. dsp^3

12. Which of the species in the following list is tetrahedral?

- 1. BF_4^-
- 2. SF_4
- 3. XeF_4
- 4. SiF_4

- A. 1 and 3
- B. 1 and 4
- C. 1 only
- D. 2 and 3

13. Which of the species in the following list is square planar?

- 1. BF_4^-
- 2. SF_4
- 3. XeF_4
- 4. SiF_4

- A. 2 and 3
- B. 3 only
- C. 1 only
- D. 1 and 4

14. Which of the following molecules is nonlinear?

- A. HCN
- B. C_2H_2
- C. SO_2
- D. CO_2

15. Which of the following elements has the smallest electron affinity?

- A. N(7)
- B. B(5)
- C. C(6)
- D. F(9)

16. The largest of the following species is:

- A. As^{3-}
- B. Se^{2-}

- C. S^{2-}
- D. Br

17. Draw the Lewis formula for IF^{2+} . How many lone pair(s) of electrons are there in the valence shell of the central atom?
- A. 0
 - B. 1
 - C. 2
 - D. 3
18. Draw the Lewis formula for NF^{4+} . I'm pretty sure they mean NF_4^+ . How many lone pair(s) of electrons are there in the valence shell of the central atom?
- A. 0
 - B. 1
 - C. 2
 - D. 3
19. Draw the Lewis formula for PF_3 . How many lone pair(s) of electrons are there in the valence shell of the central atom?
- A. 0
 - B. 1
 - C. 2
 - D. 3
20. The bond angles in BCl_3 are:
- A. exactly 109.5°
 - B. slightly less than 109.5°
 - C. slightly less than 90°
 - D. exactly 120°
21. The bond angles in IF^{4+} are:
- A. slightly less than 109.5°
 - B. slightly less than 90°
 - C. exactly 109.5°
 - D. exactly 90°
22. The bond angles in IF^{2+} are:
- A. exactly 109.5°

- B. exactly 120°
 C. slightly less than 90°
 D. slightly less than 109.5°
23. Calculate the H_o for the following reaction using the given bond energies. (H-Cl = 431 kJ; O-O = 494 kJ; H-O = 463, Cl-Cl = 243).
 $4 \text{HCl(g)} + \text{O}_2\text{(g)} \rightarrow 2 \text{H}_2\text{O(g)} + 2 \text{Cl}_2\text{(g)}$
 A. -102
 B. -120
 C. -139
 D. -152
24. Use the following bond energies to calculate H_o for the given reaction. (H - C = 414; C - C = 347; C = C = 619; H - O = 464; C - O = 351).
 $\text{CH}_3\text{CH}_3\text{(g)} + \text{H}_2\text{O(g)} \rightarrow \text{CH}_3\text{CH}_2\text{OH(g)}$ The reaction isn't balanced!!!!
 $\text{CH}_2\text{CH}_2\text{(g)} + \text{H}_2\text{O(g)} \rightarrow \text{CH}_3\text{CH}_2\text{OH(g)}$ For this reaction I get -29.
 A. -22
 B. -33
 C. -45
 D. -56
25. Calculate the H_o for the following reaction using the given bond energies. (C - H = 414 kJ; F - F = 155 kJ; H - F = 431, C - F = 485).
 $\text{CH}_4\text{(g)} + 4 \text{F}_2\text{(g)} \rightarrow \text{CF}_4\text{(g)} + 4 \text{HF(g)}$
 A. -1388
 B. -1422
 C. -1542
 D. -1598