



مدونة المناهج السعودية

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الموقع التعليمي لجميع المراحل الدراسية

في المملكة العربية السعودية

BANK OF QUESTIONS

Chem(101)

بنك الأسئلة

القمة في

DOC MOHAMED ELSAYED

FIRST MID TEARM

CHAPTERS (3+4)

QUANTUM THEORY

±

PERIODIC RELATIONSHIPS

لحجز الكورس خصوصي

لحجز الميد الاول

للمراجعة

0546535899

خصم خاص لقروب القمة يمكنك الإشتراك بالكورس عبر الرابط

طريقك إلى A+

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يشمل الكورس (شرح السلايدات – حل بنك الاسئلة – حل الاختبارات السابقة – مراجعات ليلة الأختبار)

Multiple-Choice

1) There are _____ orbitals in the third shell.

- A) 25
- B) 4
- C) 9
- D) 16
- E) 1

Answer: C

2) The _____ subshell contains only one orbital.

- A) 5d
- B) 6f
- C) 4s
- D) 3d
- E) 1p

Answer: C

3) There are _____ orbitals in the second shell.

- A) 1
- B) 2
- C) 4
- D) 8
- E) 9

Answer: C

4) The $n = 1$ shell contains _____ p orbitals. All the other shells contain _____ p orbitals.

- A) 3, 6
- B) 0, 3
- C) 6, 2
- D) 3, 3
- E) 0, 6

Answer: B

5) The lowest energy shell that contains f orbitals is the shell with $n =$ _____.

- A) 3
- B) 2
- C) 4
- D) 1
- E) 5

Answer: C

6) The principal quantum number of the first d subshell is _____.

- A) 1
- B) 2
- C) 3
- D) 4
- E) 0

Answer: C

7) The total number of orbitals in a shell is given by _____.

- A) l^2
- B) n^2
- C) $2n$
- D) $2n + 1$
- E) $2l + 1$

Answer: B

8) _____-orbitals are spherically symmetrical.

- A) s

- B) p
- C) d
- D) f
- E) g

Answer: A

9) How many p-orbitals are occupied in a Ne atom _____?

- A) 0
- B) 1
- C) 6
- D) 3
- E) 2

Answer: D

10) Each p-subshell can accommodate a maximum of _____ electrons.

- A) 6
- B) 2
- C) 10
- D) 3
- E) 5

Answer: A

11) How many quantum numbers are necessary to designate a particular electron in an atom _____?

- A) 3
- B) 4
- C) 2
- D) 1
- E) 5

Answer: B

12) $[\text{Ar}]4s^23d^{10}4p^3$ is the electron configuration of a(n) _____ atom.

- A) As
- B) V
- C) P
- D) Sb
- E) Sn

Answer: A

13) There are _____ unpaired electrons in a ground state phosphorus atom.

- A) 0
- B) 1
- C) 2
- D) 3
- E) 4

Answer: D

14) There are _____ unpaired electrons in a ground state fluorine atom.

- A) 0
- B) 1
- C) 2
- D) 3
- E) 4

Answer: B

15) Elements in group _____ have a np^6 electron configuration in the outer shell.

- A) 4A
- B) 6A
- C) 7A
- D) 8A
- E) 5A

Answer: D

16) Which group in the periodic table contains elements with the valence electron configuration of ns^2np^1 _____?

- A) 1A
- B) 2A
- C) 3A
- D) 4A
- E) 8A

Answer: C

Multiple-Choice

99) Which one of the following is not a valid value for the magnetic quantum number of an electron in a 5d subshell?

- A) 2
- B) 3
- C) 0
- D) 1
- E) -1

Answer: B

102) An electron cannot have the quantum numbers $n =$ _____, $l =$ _____, $m_l =$ _____.

- A) 2, 0, 0
- B) 2, 1, -1
- C) 3, 1, -1
- D) 1, 1, 1
- E) 3, 2, 1

Answer: D

103) An electron cannot have the quantum numbers $n =$ _____, $l =$ _____, $m_l =$ _____.

- A) 6, 1, 0
- B) 3, 2, 3
- C) 3, 2, -2
- D) 1, 0, 0
- E) 3, 2, 1

Answer: B

104) Which one of the following is an incorrect subshell notation?

- A) 4f
- B) 2d
- C) 3s
- D) 2p
- E) 3d

Answer: B

105) Which one of the following is an incorrect orbital notation?

- A) 2s
- B) 3p_y
- C) 3f
- D) 4d_{xy}
- E) 4s

Answer: C

106) Which quantum number determines the energy of an electron in a hydrogen atom?

- A) n
- B) E
- C) m_l
- D) l
- E) n and l

Answer: A

111) Which set of three quantum numbers (n, l, m_l) corresponds to a 3d orbital?

- A) 3, 2, 2
- B) 3, 3, 2
- C) 3, 2, 3
- D) 2, 1, 0
- E) 2, 3, 3

Answer: A

112) At maximum, an f-subshell can hold _____ electrons, a d-subshell can hold _____ electrons, and a p-subshell can hold _____ electrons.

- A) 14, 10, 6
- B) 2, 8, 18
- C) 14, 8, 2
- D) 2, 12, 21
- E) 2, 6, 10

Answer: A

113) Which one of the following represents an acceptable set of quantum numbers for an electron in an atom? (arranged as n, l, m_l, and m_s)

- A) 2, 2, -1, -1/2
- B) 1, 0, 0, 1/2
- C) 3, 3, 3, 1/2
- D) 5, 4, -5, 1/2
- E) 3, 3, 3, -1/2

Answer: B

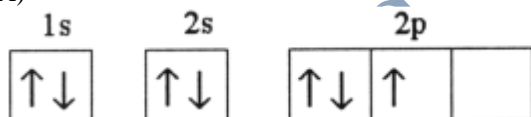
114) Which one of the following represents an acceptable possible set of quantum numbers (in the order n, l, m_l, m_s) for an electron in an atom?

- A) 2, 1, -1, 1/2
- B) 2, 1, 0, 0
- C) 2, 2, 0, 1/2
- D) 2, 0, 1, -1/2
- E) 2, 0, 2, +1/2

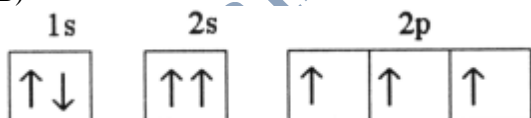
Answer: A

124) Which one of the following is the correct electron configuration for a ground-state nitrogen atom?

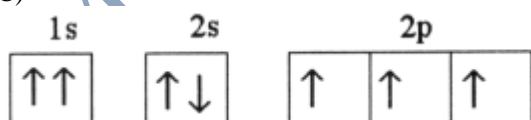
A)



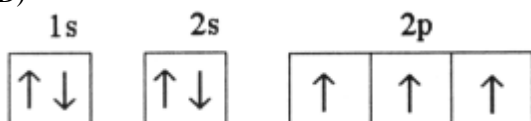
B)



C)



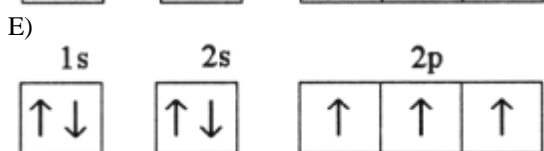
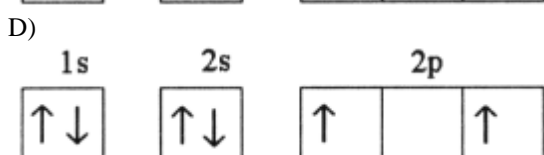
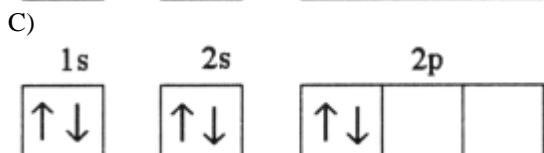
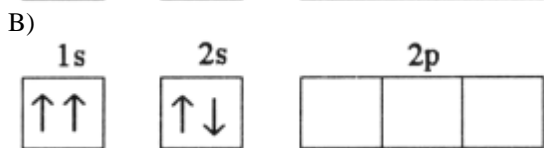
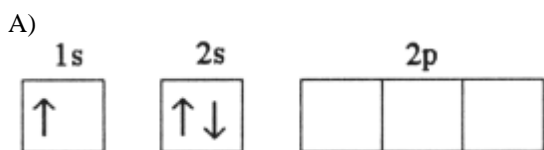
D)



E) None of the above is correct.

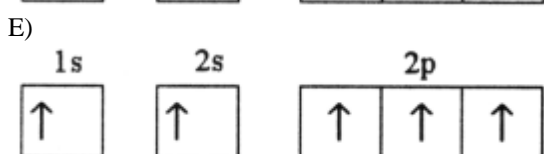
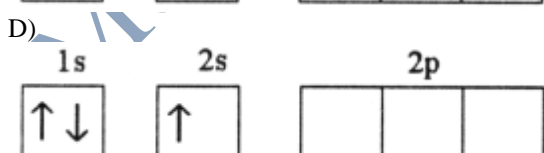
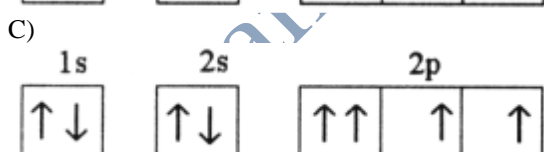
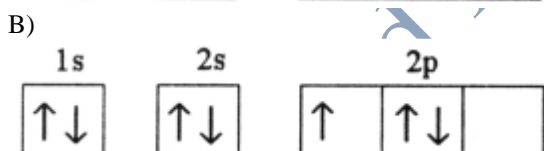
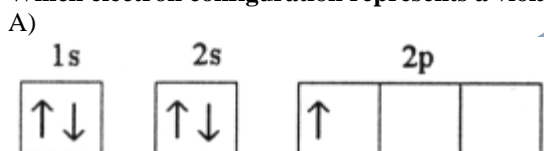
Answer: D

132) Which electron configuration represents a violation of Hund's rule for an atom in its ground state?



Answer: C

Which electron configuration represents a violation of Hund's rule for an atom in its ground state?



Answer: B

117) Which electron configuration represents a violation of the Pauli exclusion principle?

- A)
- | | | |
|----|----|----|
| 1s | 2s | 2p |
| ↑ | ↑↓ | |
- B)
- | | | |
|----|----|----|
| 1s | 2s | 2p |
| ↑↑ | ↑↓ | |
- C)
- | | | |
|----|----|----|
| 1s | 2s | 2p |
| ↑↓ | ↑↓ | ↑↓ |
- D)
- | | | |
|----|----|----|
| 1s | 2s | 2p |
| ↑↓ | ↑↓ | ↑ |
- E)
- | | | |
|----|----|-----|
| 1s | 2s | 2p |
| ↑ | ↑ | ↑↑↑ |

Answer: B

118) Which electron configuration represents a violation of the Pauli exclusion principle?

- A)
- | | | |
|----|----|----|
| 1s | 2s | 2p |
| ↑↓ | ↑↓ | ↑ |
- B)
- | | | |
|----|----|-----|
| 1s | 2s | 2p |
| ↑↓ | ↑↓ | ↑↑↓ |
- C)
- | | | |
|----|----|-----|
| 1s | 2s | 2p |
| ↑↓ | ↑↓ | ↑↑↑ |
- D)
- | | | |
|----|----|----|
| 1s | 2s | 2p |
| ↑↓ | ↑ | |
- E)
- | | | |
|----|----|-----|
| 1s | 2s | 2p |
| ↑ | ↑ | ↑↑↑ |

Answer: C

135) Which of the following elements has a ground-state electron configuration different from the predicted one?

- A) Cu

- B) Ca
- C) Xe
- D) Cl
- E) Ti

Answer: A

136) Which two elements have the same ground-state electron configuration?

- A) Pd and Pt
- B) Cu and Ag
- C) Fe and Cu
- D) Cl and Ar
- E) No two elements have the same ground-state electron configuration.

Answer: E

138) The valence shell of the element X contains 2 electrons in a 5s subshell. Below that shell, element X has a partially filled 4d subshell. What type of element is X?

- A) main group element
- B) chalcogen
- C) halogen
- D) transition metal
- E) alkali metal

Answer: D

3) The first ionization energies of the elements _____ as you go from left to right across a period of the periodic table, and _____ as you go from the bottom to the top of a group in the table.

- A) increase, increase
- B) increase, decrease
- C) decrease, increase
- D) decrease, decrease
- E) are completely unpredictable

Answer: A

5) In general, as you go across a period in the periodic table from left to right:

- (1) the atomic radius _____;
 - (2) the electron affinity becomes _____ negative; and
 - (3) the first ionization energy _____.
- A) decreases, decreasingly, increases
 - B) increases, increasingly, decreases
 - C) increases, increasingly, increases
 - D) decreases, increasingly, increases
 - E) decreases, increasingly, decreases

Answer: D

6) Element M reacts with chlorine to form a compound with the formula MCl_2 . Element M is more reactive than magnesium and has a smaller radius than barium. This element is _____.

- A) Sr
- B) K
- C) Na
- D) Ra
- E) Be

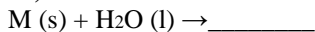
Answer: A

10) Na reacts with element X to form an ionic compound with the formula Na_3X . Ca will react with X to form _____.

- A) CaX_2
- B) CaX
- C) Ca_2X_3
- D) Ca_3X_2
- E) Ca_3X

Answer: D

11) What is the coefficient of M when the following equation is completed and balanced if M is an alkali metal?



- A) 1
- B) 2
- C) 3
- D) 4
- E) 0

Answer: B

22) An alkali metal forms a compound with chlorine with the formula _____.

(The symbol M represents any one of the alkali metals.)

- A) M_2Cl_2
- B) M_2Cl
- C) MCl_2
- D) MCl
- E) MCl_3

Answer: D

23) Element X reacts with chlorine to form a compound with the formula XCl_2 . The oxide of element X is basic. Element X is _____.

- A) Rb
- B) Ca
- C) Al
- D) P
- E) H

Answer: B

41) Atomic radius generally increases as we move _____.

- A) down a group and from right to left across a period
- B) up a group and from left to right across a period
- C) down a group and from left to right across a period
- D) up a group and from right to left across a period
- E) down a group; the period position has no effect

Answer: A

42) Of the following, which gives the correct order for atomic radius for Mg, Na, P, Si and Ar?

- A) $Mg > Na > P > Si > Ar$
- B) $Ar > Si > P > Na > Mg$
- C) $Si > P > Ar > Na > Mg$
- D) $Na > Mg > Si > P > Ar$
- E) $Ar > P > Si > Mg > Na$

Answer: D

46) Which one of the following atoms has the largest radius?

- A) O
- B) F
- C) S
- D) Cl
- E) Ne

Answer: C

47) Which one of the following atoms has the largest radius?

- A) Sr
- B) Ca
- C) K
- D) Rb
- E) Y

Answer: D

48) Which one of the following has the smallest radius?

- A) Na

- B) Cl
- C) Fe
- D) P
- E) Br

Answer: B

54) Which of the following correctly lists the five atoms in order of increasing size (smallest to largest)?

- A) $O < F < S < Mg < Ba$
- B) $F < O < S < Mg < Ba$
- C) $F < O < S < Ba < Mg$
- D) $O < F < S < Ba < Mg$
- E) $F < S < O < Mg < Ba$

Answer: B

56) Of the choices below, which gives the order for first ionization energies?

- A) $Cl > S > Al > Ar > Si$
- B) $Ar > Cl > S > Si > Al$
- C) $Al > Si > S > Cl > Ar$
- D) $Cl > S > Al > Si > Ar$
- E) $S > Si > Cl > Al > Ar$

Answer: B

58) Of the following elements, which has the largest first ionization energy?

- A) Na
- B) Al
- C) Se
- D) Cl
- E) Br

Answer: D

66) Which equation correctly represents the first ionization of aluminum?

- A) $Al(g) \rightarrow Al(g) + e^-$
- B) $Al(g) \rightarrow Al^-(g) + e^-$
- C) $Al(g) + e^- \rightarrow Al^-(g)$
- D) $Al(g) \rightarrow Al^+(g) + e^-$
- E) $Al^+(g) + e^- \rightarrow Al(g)$

Answer: D

67) Which of the following correctly represents the second ionization of aluminum?

- A) $Al^+(g) + e^- \rightarrow Al(g)$
- B) $Al(g) \rightarrow Al^+(g) + e^-$
- C) $Al^-(g) + e^- \rightarrow Al^{2-}(g)$
- D) $Al^+(g) + e^- \rightarrow Al^{2+}(g)$
- E) $Al^+(g) \rightarrow Al^{2+}(g) + e^-$

Answer: E

74) Of the following species, _____ has the largest radius.

- A) Rb^+
- B) Sr^{2+}
- C) Br
- D) Kr
- E) Ar

Answer: C

78) _____ is isoelectronic with argon and _____ is isoelectronic with neon.

- A) Cl^- , F^-
- B)
- C) Cl^- , Cl^+
- D) F^+ , F
- E)

Ne-, Kr+
E)
Ne-, Ar+
Answer: A

79) Of the following elements, _____ has the most negative electron affinity.

- A) Na
- B) Li
- C) Be
- D) N
- E) F

Answer: E

80) Of the following elements, _____ has the most negative electron affinity.

- A) S
- B) Cl
- C) Se
- D) Br
- E) I

Answer: B

85) Which equation correctly represents the electron affinity of calcium?

- A) $\text{Ca (g)} + e^- \rightarrow \text{Ca}^- \text{(g)}$
- B) $\text{Ca (g)} \rightarrow \text{Ca}^+ \text{(g)} + e^-$
- C) $\text{Ca (g)} \rightarrow \text{Ca}^- \text{(g)} + e^-$
- D) $\text{Ca}^- \text{(g)} \rightarrow \text{Ca (g)} + e^-$
- E) $\text{Ca}^+ \text{(g)} + e^- \rightarrow \text{Ca (g)}$

Answer: A

86) Which of the following correctly represents the electron affinity of bromine?

- A) $\text{Br (g)} \rightarrow \text{Br}^+ \text{(g)} + e^-$
- B) $\text{Br (g)} + e^- \rightarrow \text{Br}^- \text{(g)}$
- C) --
- D) $\text{Br}_2 \text{(g)} + e^- \rightarrow \text{Br (g)}$
- E) $\text{Br}_2 \text{(g)} + 2e^- \rightarrow 2\text{Br (g)}$

Answer: B

89) How many electrons in a ground-state tellurium atom are in orbitals labeled by $l = 1$?

- A. 4
- B. 10
- C. 12
- D. 16
- E. 22

Answer E

90) How many electrons in a ground-state cadmium atom are in orbitals labeled by $ml = -1$?

- A. 2
- B. 10
- C. 12
- D. 18
- E. 36

Answer B

91) What is the maximum number of electrons in a atom that can have the following set of quantum numbers?

$$n = 4 \quad l = 3 \quad ml = -2 \quad ms = +1/2$$

- A. 0

- B. 1
C. 2
D. 6
E. 10

Answer B

92) Consider the element with the electron configuration [Kr]5s2 4d7

. This element is

- A. a representative element.
B. a transition metal.
C. a nonmetal.
D. a noble gas.

Answer B

93). Consider the element with the electron configuration [Kr]5s2 4d105p5

. This element is

- A. a representative element.
B. a transition metal.
C. an alkali metal.
D. a noble gas.

Answer A

94). Consider the element with the electron configuration [Kr]5s2 4d105p6

. This element is

- A. a representative element.
B. a transition metal.
C. an alkali metal.
D. a noble gas.

Answer D

TABLE 7.2 Relation Between Quantum Numbers and Atomic Orbitals

n	ℓ	m_ℓ	Number of Orbitals	Atomic Orbital Designations
1	0	0	1	1s
2	0	0	1	2s
	1	-1, 0, 1	3	2p _x , 2p _y , 2p _z
3	0	0	1	3s
	1	-1, 0, 1	3	3p _x , 3p _y , 3p _z
	2	-2, -1, 0, 1, 2	5	3d _{xy} , 3d _{yz} , 3d _{xz} , 3d _{x²-y²} , 3d _{z²}
⋮	⋮	⋮	⋮	⋮

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