وزارة التعليم العالي و البحث العلمي
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جامعة عباس لغرور خنشلة

الجمهورية الجزائرية الديمقراطية الشعبية
PEOPLE'S DEMOCRATIC REPUBLIC OF ALGERIA
جامعة عباس لغرور - خنشلة
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Duration: 1 h 30 min **Khenchela, January 20, 2026**

Chemistry Exam No. 01

The exam consists of 30 questions. Only one correct answer is possible among the proposed options: a, b, c, d, e.

Q1. The radius of the n=2 orbit of the hydrogen atom is (a_0 = 0.53 Å):

a. 0.53 Å **b.** 1.06 Å **c.** 2.12 Å **d.** 2.65 Å **e.** 4.24 Å

Q2. The energy of the electron in the n=3 orbit of the hydrogen atom is (E_0= −13.6 eV):

a. −13.6 eV **b.** −6.8 eV **c.** −3.4 eV **d.** 1.7 eV **e.** −1.51 eV

Q3. During a transition from n=4 to n=2, the hydrogen atom:

a. absorbs a photon **b.** emits a photon **c.** does not change energy

d. ionizes **e.** remains unchanged

Q4. The energy of the photon emitted during the transition n=3 → n=1 is:

a. 1.89 eV **b.** 10.2 eV **c.** 12.1 eV **d.** 13.6 eV **e.** 3.4 eV

Q5. If the first ionization energy of hydrogen is 2.179X 10^{-18} J per atom, the second ionization energy of helium ($_2$He) per atom is:

a. 8.716 X 10^{-18} J **b.** 5.5250 KJ **c.** 7.616 X 10^{-18} J **d.** 8.016 X 10^{-18} J

e. 8.617X 10^{-18} J

Q6. The orbital radius n increases when n:

a. decreases **b.** remains constant **c.** increases

d. becomes negative **e.** becomes zero

Q7. Ionization of the hydrogen atom corresponds to:

a. n = 0 **b.** n = 1 **c.** n = ∞ **d.** n = −1 **e.** n = 2

Q8. The shorter the wavelength of a photon, the:

a. lower its energy **b.** higher its energy **c.** lower its frequency

d. undetectable it is **e.** more unstable it is

Q9. The magnetic quantum number m describes:

a. orbital energy **b.** orbital size **c.** spatial orientation **d.** spin **e.** electron shell

Q20. The real electronic configuration of Cr (Z=24) is:

a. [Ar] $3d^4\ 4s^2$ **b.** [Ar] $3d^5\ 4s^1$ **c.** [Ar] $3d^6$ **d.** [Ar] $3d^3\ 4s^3$ **e.** [Ar] $4s^2\ 3d^2$

Q21. The most electronegative element is:

a. oxygen **b.** chlorine **c.** fluorine **d.** nitrogen **e.** sulfur

Q22. Elements in the same group have:

a. the same shells **b.** the same neutrons **c.** similar chemical properties
d. the same mass **e.** the same period

Q23. An element of group 17 tends to:

a. lose 2 electrons **b.**gain 1 electron **c.** gain 2 electrons
d. lose 1 electron **e.** remain stable

Q24. The ionic radius of an anion is larger because:

a. the nucleus is larger **b.** nuclear charge increases **c.** electron repulsion increases
d. fewer protons **e.** filled orbitals

Q25. In NH_3, the number of lone pairs on nitrogen is:

a. 0 **b.** 1 **c.** 2 **d.** 3 **e.** 4

Q26. The octet rule cannot be satisfied by ($_8O$, $_6C$, $_1H$, $_7N$, $_5B$, $_9F$):

a. CO_2 **b.** NH_3 **c.** BF_3 **d.** H_2O **e.** CH_4

Q27. The most stable Lewis structure:

a. maximizes formal charges **b.** minimizes formal charges **c.** ignores the octet
d. has most lone pairs **e.** is neutral

Q28. The formal charge of nitrogen in NH_4^+ is ($_1H$, $_7N$):

a. −1 **b.** 0 **c.** +1 **d.**+2 **e.** +3

Q29. In NO_3^-, the doubly bonded oxygen has a formal charge of ($_8O$, $_7N$):

a. −1 **b.** 0 **c.** +1 **d.** −2 **e.** +2

Q30. The formal charge of sulfur in the most stable Lewis structure of the sulfate ion SO_4^{2-} ($_8O$, $_{16}S$):

a. -2 **b.**−1 **c.** 0 **d.** +1 **e.** +2