

Midterm 2 Test Review 06**Short Answer**

1. Astatine has 85 protons. What is its atomic number?
2. Rutherfordium has an atomic number of 104. How many protons and electrons does it have?

Determine the number of protons, electrons, and neutrons for each isotope described below.

3. An isotope has atomic number 19 and mass number 39.
4. An isotope has 14 electrons and a mass number of 28.

Write each isotope below in symbolic notation. Use the periodic table to determine the atomic number of each isotope.

5. cesium-133
6. uranium-234
7. Write the mass number of the following isotope notation. ${}_{12}^{24}\text{Mg}$
8. Write the atomic number of the following isotope notation. ${}_{12}^{24}\text{Mg}$

Use the figures to answer the following questions.

Osmium
76
Os
190.2

Niobium
41
Nb
92.906

9. What is the atomic number of osmium?
10. What is the chemical symbol for niobium?
11. What is the atomic mass of osmium?
12. What units is the atomic mass reported in?
13. How many protons and electrons does an osmium atom have? A niobium atom?
14. How do the Bohr model and the quantum mechanical model of the atom differ in how they describe electrons?
15. What is noble-gas notation, and why is it used to write electron configurations?
16. Write the ground-state electron configuration of a germanium atom, using noble-gas notation.
17. Why do sodium and potassium, which belong to the same group in the periodic table, have similar chemical properties?

18. How is the energy level of an element's valence electrons related to its period on the periodic table? Give an example.
19. What is ionization energy?
20. What is the period trend in the first ionization energies? Why?
21. What is the group trend in the first ionization energies? Why?

For each of the following chemical formulas, write the correct name of the ionic compound represented. You may refer to the periodic table on pages 156–157 and Table 8.7 for help.

22. NaI
23. CaCl₂
24. NH₄Br
25. Ca₃N₂
26. Mg(ClO)₂
27. Li₂O₂
28. Fe(IO₃)₂

For each of the following ionic compounds, write the correct formula for the compound. You may refer to the periodic table on pages 156–157 and Table 8.7 for help.

29. beryllium nitride
30. nickel(II) chloride
31. potassium chlorite
32. copper(I) oxide
33. ammonium sulfide
34. calcium iodate
35. iron(III) perchlorate
36. Complete the table of hydrates.

Chemical Formula	Name
CdSO ₄	Cadmium sulfate, anhydrous
CdSO ₄ ·H ₂ O	
	Cadmium sulfate tetrahydrate

Write the conversion factor that correctly completes each problem.

37. 1.20 mol Cu × _____ = 7.22 × 10²³ Cu atoms
38. 9.25 × 10²² molecules CH₄ × _____ = 1.54 × 10²¹ mol CH₄

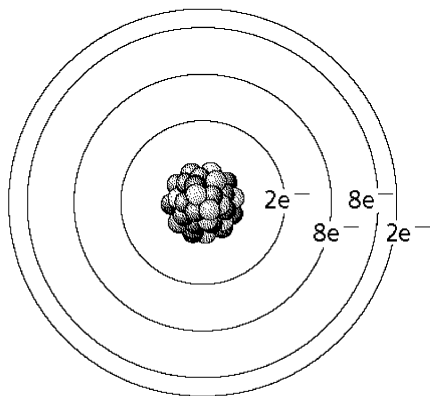
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39. 1.54×10^{26} atoms Xe \times _____ = 2.56×10^2 mol Xe

40. 3.01 mol F₂ \times _____ = 1.81×10^{24} molecules F₂

Use the figure below to answer the following questions.



41. How many valence electrons does an atom of this element have?

42. What is the atom's electron-dot structure?

43. Complete the following table.

Element	Symbol	Orbitals					Electron Configuration
		1s	2s	2p _x	2p _y	2p _z	
a. Nitrogen							1s ² 2s ² 2p ³
b.	F	↑↓	↑↓	↑↓	↑↓	↑	
c. Carbon							
d.							1s ² 2s ¹

44. Use the periodic table to complete the following table.

Atomic number = number of protons = number of electrons

Element	Atomic Number	Protons	Electrons
a. Li			
b.			87
c.	93		
d. Hg			80
e.	81		
f.	75		
g. B			5

Neon has two isotopes: neon-10 and neon-12.

45. Which isotope has the greater mass?
46. Which has more neutrons?
47. Which has more protons?
48. Which has more electrons?

For the following questions, do not use Figure 6-12, 6-15, or 6-20.
Rank the following atoms in order of decreasing radii.

49. Al, Na, P, S
50. As, Ge, Ga

Problem

51. Calculate the atomic mass of the element described below. Then use the periodic table to identify the element.

Isotope	Mass (amu)	Percent Abundance
${}^{63}\text{X}$	62.930	69.17
${}^{65}\text{X}$	64.928	30.83

52. Solve the following problem. Show your work in the space provided. A sample of a compound contains 7.89 g potassium, 2.42 g carbon, and 9.69 g oxygen. Determine the empirical and molecular formulas of this compound, which has a molar mass of 198.22 g/mol.
53. Solve the following problem. Show your work. A 2.00-g sample of a hydrate of iron(II) chloride produces 1.27 g of anhydrous iron(II) chloride (FeCl_2) after heating. Determine the empirical formula and the name of the hydrate.

Determine the empirical formula for a 100.00-g sample of a compound having the following percent composition.

54. 80.68% mercury, 12.87% oxygen, and 6.45% sulfur

Caffeine is a compound found in some natural coffees and teas and in some colas.

55. Determine the empirical formula for caffeine, using the following composition of a 100.00-g sample. 49.47 grams of carbon, 28.85 grams of nitrogen, 16.48 grams of oxygen, and 5.20 grams of hydrogen
56. If the molar mass of caffeine is 194.19 g/mol, calculate its molecular formula.