

Name _____

Date _____

Period _____

Ground State vs. Excited Electrons

Electron Configuration	Identity	Ground/Excited
1) 2-8-1		
2) 2-8-16-3		
3) 2-8-2		
4) 2-7-8		
5) 1-3		
6) 2-8-6		
7) -18-32-18-4		
8) -18-32-17-3		
9) 2-7		
10) 1-8		

Give an electron configuration for the following (unless it states excited, assume ground state.):

11. Sulfur in its ground state. _____

12. Helium in an excited state. _____

13. Give the ground state electron configuration for calcium. _____

14. Give the correct ground state electron configuration for the Ca^{2+} ion. _____

15. How many valence electrons are there in atom of bromine? _____

16. How many valence electrons are there in a Cl⁻ ion? _____

17. How many kernel electrons are there in a phosphorus atom? _____

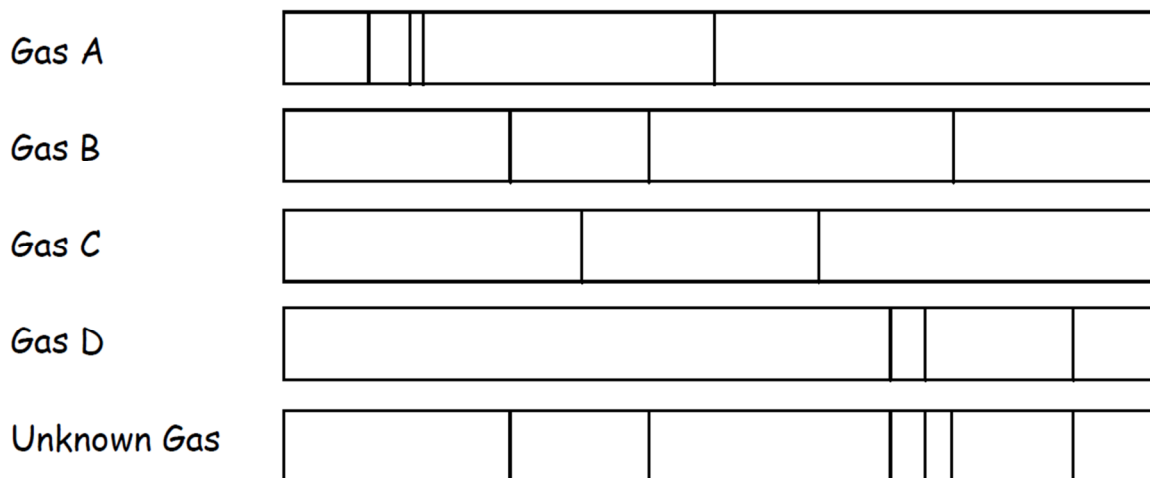
18. How many valence electrons are there in a neon atom? _____

19. How many principal energy levels are there in an iron atom? _____

Period _____

20. When atoms of an element are emitting a certain wavelength (or color) of light, it means that
- the atoms have gained energy and electrons have jumped to an excited state.
 - the atoms have gained energy and electrons have fallen back to the ground state.
 - the atoms have lost energy and electrons have fallen back to the ground state.
 - the atoms have lost energy and electrons have jumped to an excited state.

Use the emissions spectra results below to answer questions 21 and 22:



21. According to these experimental spectra results, the unknown gas is a mixture of which gases? _____
22. The lines on the visible light spectrum for the gases above represent
- electrons jumping to the same excited state or energy level.
 - electrons falling back down to their ground state from the same energy level.
 - electrons jumping to multiple excited states or energy levels.
 - electrons falling back down to their ground state from multiple energy levels.
23. How do the energy and the most probable location of an electron in the third shell of an atom compare to the energy and the most probable location of an electron in the first shell of the same atom?
- In the third shell, an electron has more energy and is closer to the nucleus.
 - In the third shell, an electron has more energy and is farther from the nucleus.
 - In the third shell, an electron has less energy and is closer to the nucleus.
 - In the third shell, an electron has less energy and is farther from the nucleus.
24. An atom of oxygen is in an excited state. When an electron in this atom moves from the third shell to the second shell, energy is
- emitted by the nucleus
 - absorbed by the nucleus
 - emitted by the electron
 - absorbed by the electron
25. Which electron configuration could represent a strontium atom in an excited state?
- 2-8-18-7-1
 - 2-8-18-8-1
 - 2-8-18-7-3
 - 2-8-18-8-2

Period _____

26. Imagine an emission spectrum produced by a container of hydrogen gas. Changing the amount of hydrogen in the container will change the colors of the lines in the spectrum.

- a) True
b) False

27. In the previous question, changing the gas in the container from hydrogen to helium will change the colors of the lines occurring in the spectrum.

- a) True
b) False

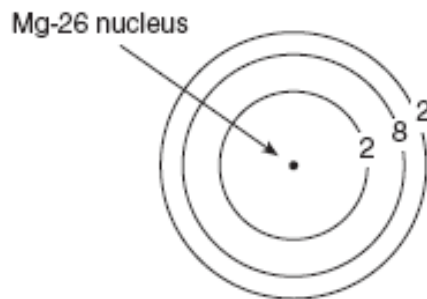
28. An absorption spectrum appears as a continuous spectrum interrupted by a series of dark lines.

- a) True
b) False

29. Emission spectra are characterized by narrow bright lines of different colors.

- a) True
b) False

Base your answers to questions 51 and 52 on the diagram below, which represents an atom of magnesium-26 in the ground state.

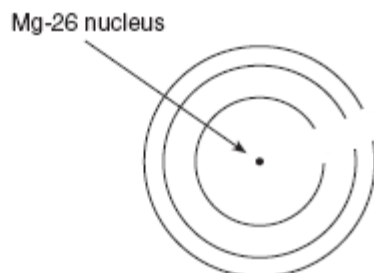


51. What is the total number of valence electrons in an atom of Mg-26 in the ground state? [1]

52. On the diagram *in your answer booklet*, write an appropriate number of electrons in *each* shell to represent a Mg-26 atom in an excited state. Your answer may include additional shells. [1]

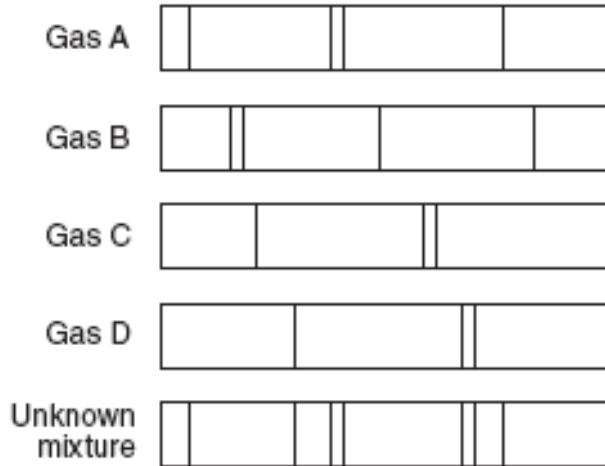
51 _____

52



Base your answers to questions 63 and 64 on the information and the bright-line spectra represented below.

Many advertising signs depend on the production of light emissions from gas-filled glass tubes that are subjected to a high-voltage source. When light emissions are passed through a spectroscope, bright-line spectra are produced.



63 Identify the *two* gases in the unknown mixture. [2]

64 Explain the production of an emission spectrum in terms of the *energy states of an electron*. [1]

63 _____ and _____

64 _____

