Name _____ Chemistry ___/___/___

SOL Questions – Chapter 2

Each of the following questions below appeared on an SOL Chemistry Exam. For each of the following circle the best answer and write its letter on the line.

1. The data to the right indicates that —
a. A and B are isotopes of the same element
b. A and B are different elements
c. A has a greater charge than B
d. A is more reactive than B

	Protons	Neutrons	Electrons
Substance A	8	8	8
Substance B	8	9	8

2. Which of these elements is found in a family with the electron configuration: ns^2np^5
a. B b. N c. Te d. Br

3. With *n* representing the outermost energy level, the electron configuration for that level for elements in Group 14 is —
a. $ns^2\ np^1$ b. $ns^2\ np^2$ c. $ns^2\ np^3$ d. $ns^2\ np^4$

4. Neils Bohr's contribution to modern atomic theory was the proposition that —
a. each atom has a specific number of positive charges
b. an atom has electrons in discrete energy levels
c. electrons have a definite mass that can be computed
d. atomic mass is determined by the number of protons and neutrons in an atom

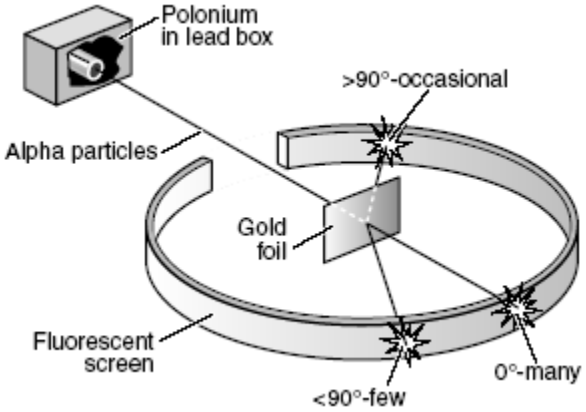
5. Which of these elements is found in a family with the electron configuration: ns^2np^3
a. Al b. Sr c. Si d. Sb

6. How many protons, neutrons, and electrons are in a neutral atom of sodium?
a. 11 p^+, 12 n°, 11 e^- b. 11 p^+, 11 n°, 12 e^- c. 12 p^+, 11 n°, 12 e^- d. 12 p^+, 11 n°, 11e^-

7. The understanding that the position of an electron in an electron cloud cannot precisely be determined was developed by Werner Heisenberg and is known as the —
a. planetary model b. uncertainty principle c. quantum theory d. first atomic theory

8. Isotopes of an element have different —
a. atomic numbers b. atomic masses c. numbers of protons d. numbers of outer-shell electrons

9. Which of these conclusions can be drawn from Rutherford's experiment?
a. Each atom contains electrons.
b. The nucleus of an atom can be split.
c. Each atom contains protons.
d. Atoms are mostly empty space.



10. How many protons, neutrons, and electrons are in a neutral atom of sulfur?
a. 16 p^+, 18 n°, 16 e^- b. 16 p^+, 16 n°, 18 e^-
c. 8 p^+, 8 n°, 8 e^- d. 18 p^+, 16 n°, 16 e^-

11. Atoms of the same element must —
a. contain the same number of neutrons b. have the same mass number
c. contain the same number of protons d. have equal numbers of protons and neutrons

12. How does the radioactive isotope C-14 differ from its stable counterpart C-12?
a. It has a different number of protons and two less neutrons than C-12.
b. It has the same number of protons and two more electrons than C-12.
c. It has the same number of protons but two more neutrons than C-12.
d. It has a different number of protons and two more neutrons than C-12.

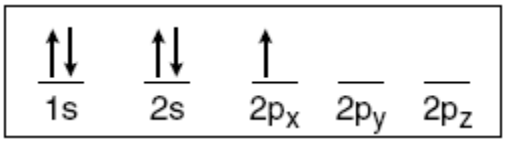
13. Which scientist was the first to conclude through experimentation that atoms have positive charges in their nuclei?
a. Bohr b. Dalton c. Thomson d. Rutherford

14. An increase in atomic number is related to an increase in atomic mass because —
a. more electrons are present in the atomic nucleus b. more electrons are orbiting the atomic nucleus
c. more protons are present in the atomic nucleus d. more protons are orbiting the atomic nucleus

15. The element chlorine exists as two naturally occurring isotopes. Cl-35 occurs 75% of the time and Cl-37 occurs 25% of the time. Which of the following calculations should be used to calculate the correct average atomic mass of chlorine?
a. (35 amu x .75) + (37 amu x .25) b. [(35 amu x 3) + 37 amu] ÷ 2
c. [(35 amu x 3) + 37 amu] ÷ 3 d. (35 amu + 37 amu) ÷ 2

16. Which of the following orbital diagrams is *incorrect* because it violates Hund's rule?

a.



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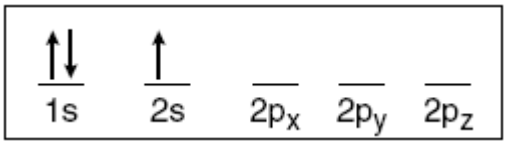

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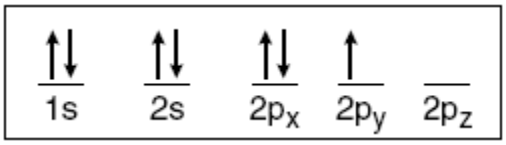
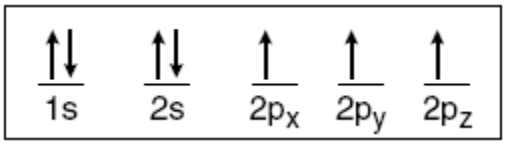


d.



17. A neutral atom of aluminum-27 contains —
a. 13 protons and 27 electrons b. 14 protons and 13 neutrons
c. 13 electrons, 13 protons, and 14 neutrons d. 13 electrons, 14 protons, and 13 neutrons

18. The atomic number corresponds to an atom's number of —
a. protons b. neutrons c. electrons d. positrons

19. One indicator that electrons in atoms are limited to specific energy levels is that —
a. atoms move faster when heated
b. the light given off by atoms is all at the same wavelength
c. the Doppler effect shows a shift in wavelength for H-atom light
d. light emitted from excited atoms occurs only at specific wavelengths

20. A scientist has found the following isotope of oxygen: $^{19}_{8}O$

How many neutrons are present in this isotope?
a. 8 b. 11 c. 19 d. 27

21. Which in the chart to the right represents an atom of calcium?
a. 1 b. 2 c. 3 d. 4

Element	Protons	Neutrons	Electrons
1	20	20	20
2	40	40	40
3	20	10	10
4	20	20	40

22. What are the numbers of protons, neutrons, and electrons in an isotope of titanium with a mass number of 50?
a. 22 p, 22 n, 28 e b. 28 p, 22 n, 22 e c. 50 p, 22 n, 50 e d. 22 p, 28 n, 22 e

23. How many protons are in an atom represented by $\frac{220}{88}$ Ra?
a. 88 b. 132 c. 220 d. 308

24. When compared to sulfur-32, sulfur-34 has more —
a. protons b. neutrons c. energy levels d. bonding configurations

25. Place the following models about the structure of the atom in the order that they were developed:
1. Planetary model
2. Quantum mechanical model
3. Solid sphere model
a. 1, 3, 2 b. 1, 2, 3 c. 2, 3, 1 d. 3, 1, 2

26. An atom contains 70 protons, 70 electrons, and 99 neutrons. What is the mass number?
a. 239 b. 169 c. 140 d. 70

27. After 1911, most scientists accepted the theory that the nucleus of an atom was very dense and very small and had a positive charge. What led scientists to accept this theory?
a. Dalton's theory of the atom was over 100 years old.
b. Scientists before 1911 used the scientific method of inquiry improperly.
c. A new model proved that the quantum theory of the atom was inaccurate.
d. Rutherford did an experiment firing alpha particles at a thin piece of gold foil.

28. Which of the following particles has a positive one charge (+1)?
a. Alpha b. Electron c. Neutron d. Proton

29. A sodium atom has an electron configuration of $1s^2\ 2s^2\ 2p^6\ 3s^1$. If the sodium atom becomes ionized, its new electron configuration will be the same as which element?
a. Lithium b. Neon c. Magnesium d. Potassium

30. Potassium (K) has a smaller atomic mass than argon (Ar) even though the atomic number of potassium is larger than the atomic number of argon. Which of the following best accounts for this observation?
a. At STP, potassium is in the solid phase, but argon is a gas.
b. It is easier for a potassium atom to lose an electron than it is for an argon atom.
c. The most common isotopes of argon have more protons than the most common isotopes of potassium.
d. The most common isotopes of potassium have fewer neutrons than the most common isotopes of argon.