

Chemistry
Pop Quiz: Orbital Notation

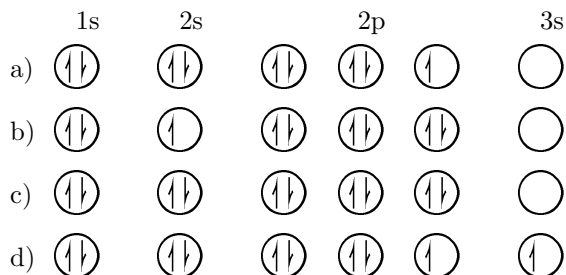
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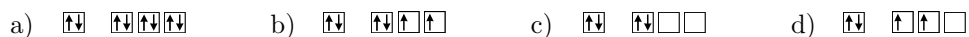
1. Which diagram correctly represents an atom of fluorine in an excited state?



2. What is the maximum number of electrons that can occupy the third principal energy level?

- a) 8 b) 10 c) 3 d) 18

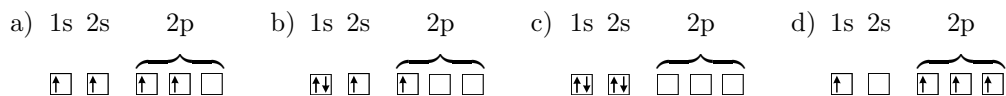
3. Which orbital notation represents the second principal energy level of a silicon atom in the ground state?



4. The total number of completely filled orbitals in an atom of nitrogen in the ground state is

- a) 1 b) 2 c) 3 d) 5

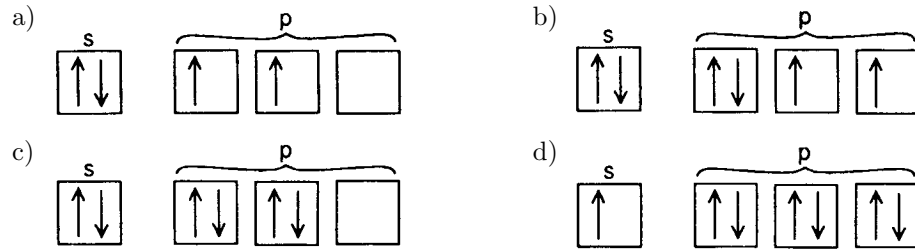
5. Which orbital notation represents an atom of beryllium in the ground state?



6. If eight electrons completely fill a principal energy level, what is the principal quantum number of the principal energy level?

- a) 1 b) 2 c) 3 d) 4

7. Which orbital notation represents an atom in the ground state with 6 valence electrons?



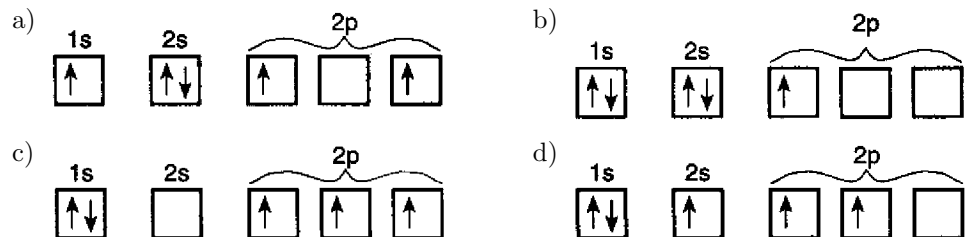
8. Which atom in the ground state contains one completely filled *p*-orbital?

- a) N b) O c) He d) Be

9. In an atom of lithium in the ground state, what is the total number of orbitals that contain only 1 electron?

- a) 1 b) 2 c) 3 d) 4

10. Which orbital notation represents a boron atom in the ground state?



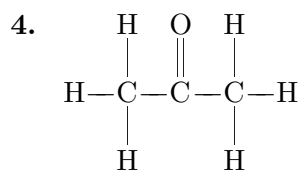
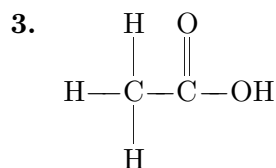
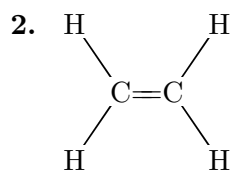
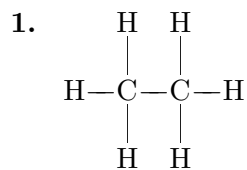
Answer List

- | | | |
|-------|------|------|
| 1. b | 2. d | 3. a |
| 4. b | 5. c | 6. b |
| 7. b | 8. b | 9. a |
| 10. b | | |

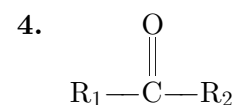
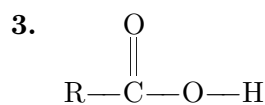
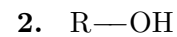
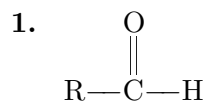
Catalog List

- | | | |
|---------------|--------------|--------------|
| 1. NY6 EH 1 | 2. NY6 EH 3 | 3. NY6 EH 5 |
| 4. NY6 EH 7 | 5. NY6 EH 9 | 6. NY6 EH 11 |
| 7. NY6 EH 13 | 8. NY6 EH 15 | 9. NY6 EH 17 |
| 10. NY6 EH 19 | | |

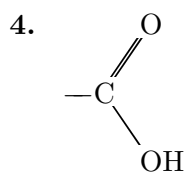
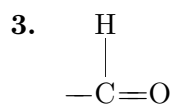
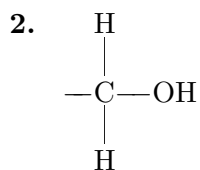
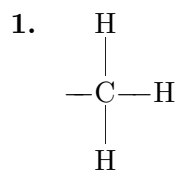
Which formula represents an unsaturated hydrocarbon?



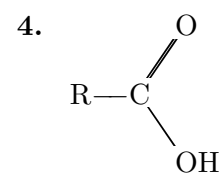
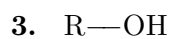
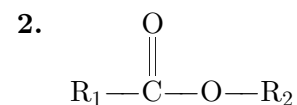
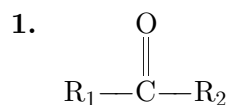
Which is the general formula for an aldehyde?



Which functional group is found in all organic acids?



Which general formula represents a ketone?

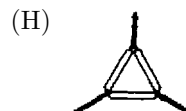
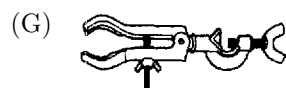


Record your answers on the sheet provided. Do not write on this exam. You may use your calculator and note sheet as you complete the questions. The exam period will last 30 minutes.

1. Atomic mass is measured in atomic mass units (amu) that are based on an atom of

(A) ^{16}O equal to 16.000 amu
(B) ^{32}S equal to 32.000 amu
(C) ^{12}C equal to 12.000 amu
(D) ^{14}N equal to 14.000 amu

-
2. Which piece of laboratory equipment should be used to remove a heated crucible from a ringstand?



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3. An atom in the ground state has 7 valence electrons. Which electron configuration could represent the outermost principal energy level of this atom in the ground state?

(A) $3s^13p^6$
(B) $3s^23p^5$
(C) $3s^13p^43d^2$
(D) $3s^23p^43d^1$

4. The unusually high boiling point of water is due to the

(F) network bonds between the molecules
(G) hydrogen bonds between the molecules
(H) linear structure of the molecules
(J) nonpolar character of the molecules

-
5. What type of bonding is found in the molecule HBr?

(A) ionic
(B) metallic
(C) nonpolar covalent
(D) polar covalent

-
6. The properties of elements are periodic functions of their

(F) mass numbers
(G) atomic masses
(H) atomic radii
(J) atomic numbers

-
7. What is the total number of electrons in an atom with an atomic number of 13 and a mass number of 27?

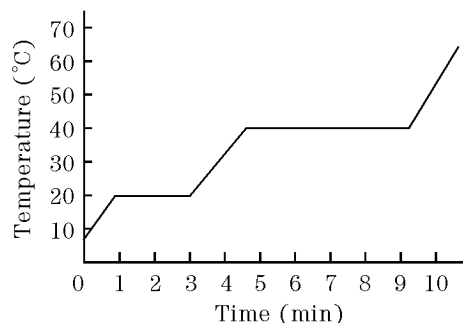
(A) 13
(B) 14
(C) 27
(D) 40

8. A neutral atom in the ground state contains 16 electrons. What is the total number of electrons in the $2p$ sublevel?
- (F) 6
(G) 2
(H) 8
(J) 16
-
9. A strontium atom differs from a strontium ion in that the atom has a greater
- (A) number of electrons
(B) number of protons
(C) atomic number
(D) mass number
-
10. All isotopes of which element in Group 16 (VIA) are naturally radioactive?
- (F) S
(G) Se
(H) Po
(J) Te
-
11. Adding a catalyst to a chemical reaction will
- (A) lower the activation energy needed
(B) lower the potential energy of the reactants
(C) increase the activation energy needed
(D) increase the potential energy of the reactants
-
12. What is the mass of 3.0×10^{23} atoms of neon?
- (F) 1.0 g
(G) 0.50 g
(H) 10 g
(J) 20 g
-
13. What is the total number of moles of hydrogen in 1 mole of $(\text{NH}_4)_2\text{HPO}_4$?
- (A) 5
(B) 7
(C) 8
(D) 9
-
14. A chemical cell differs from an electrolytic cell in that the chemical cell uses
- (F) half-reactions
(G) a solution of ions
(H) an applied electric current
(J) a redox reaction to produce electricity
-
15. When the pH of a solution is 8, what is the OH^- ion concentration in moles per liter?
- (A) 1×10^{-6}
(B) 1×10^{-7}
(C) 1×10^{-8}
(D) 1×10^{-14}
-
16. Which statement is true concerning the reaction $\text{N}(\text{g}) + \text{N}(\text{g}) \rightarrow \text{N}_2(\text{g}) + \text{energy}$?
- (F) A bond is broken and energy is absorbed.
(G) A bond is broken and energy is released.
(H) A bond is formed and energy is absorbed.
(J) A bond is formed and energy is released.
-

17. As an atom in the excited state returns to the ground state, the energy of the atom

(A) decreases
 (B) increases
 (C) remains the same

18. The graph shown represents changes of state for an unknown substance. What is the boiling temperature of the substance?



(F) 0°C
 (G) 20°C
 (H) 70°C
 (J) 40°C

19. A gas has a volume of 1400 milliliters at a temperature of 20 K and a pressure of 760 mm Hg. What will be the volume when the temperature is changed to 40 K and the pressure is changed to 380 mm Hg?

(A) 350 mL
 (B) 750 mL
 (C) 1400 mL
 (D) 5600 mL

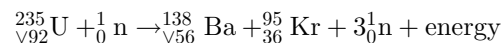
20. Which particle has the greatest mass?

(F) an alpha particle
 (G) a beta particle
 (H) an electron
 (J) a neutron

21. Which radioisotope is used to diagnose thyroid disorders?

(A) lead-206
 (B) iodine-131
 (C) cobalt-60
 (D) strontium-90

22. Given the nuclear reaction:



This equation can best be described as

(F) fission
 (G) fusion
 (H) natural decay
 (J) endothermic

23. A process in which large molecules are broken down into smaller molecules is used commercially to increase the yield of gasoline from petroleum. This process is called

(A) polymerization
 (B) hydrogenation
 (C) esterification
 (D) cracking

24. What is the original source of many textiles and most plastics?

- (F) coal
- (G) wood
- (H) petroleum
- (J) mineral ores

25. How many moles of a nonvolatile, nonelectrolyte solute are required to lower the freezing point of 1,000 grams of water by 5.58°C ?

- (A) 1
 - (B) 2
 - (C) 3
 - (D) 4
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Answer List

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|-------|-------|-------|
| 1. C | 2. F | 3. B |
| 4. G | 5. D | 6. J |
| 7. A | 8. F | 9. A |
| 10. H | 11. A | 12. H |
| 13. D | 14. J | 15. A |
| 16. J | 17. A | 18. J |
| 19. D | 20. F | 21. B |
| 22. F | 23. D | 24. H |
| 25. C | | |

Catalog List

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|---------------|---------------|---------------|
| 1. NY6 AB 2 | 2. NY6 AF 26 | 3. NY6 BA 5 |
| 4. NY6 CD 16 | 5. NY6 CE 6 | 6. NY6 EA 9 |
| 7. NY6 EE 5 | 8. NY6 EG 14 | 9. NY6 FA 19 |
| 10. NY6 GA 12 | 11. NY6 HE 11 | 12. NY6 IB 12 |
| 13. NY6 IE 6 | 14. NY6 JD 55 | 15. NY6 KD 10 |
| 16. NY6 LA 8 | 17. NY6 LF 10 | 18. NY6 MA 9 |
| 19. NY6 ND 17 | 20. NY6 OB 9 | 21. NY6 OD 4 |
| 22. NY6 QB 3 | 23. NY6 RB 3 | 24. NY6 RH 5 |
| 25. NY6 SE 19 | | |