

This practice packet is a general guideline to help you study. It is NOT a definitive list. There are potentially things on here that will not show up on the test, and there are potentially things not on this list that will show up on the test. Material that appeared in Warm Ups, Notes, Homework, Classwork, Labs, Study Materials, etc are all have the potential to appear on the test.

- 1) Organize the matter into the four types of matter and explain your answer.

Matter	Type	Explanation
Gasoline		
Uranium		
Orange Juice		
Methane (CH ₄)		

- 2) Organize the changes below as physical or chemical and explain your answer.

Action	Change	Explanation
Melting of gold		
Cooking meat		
Digesting food		
Charcoal drawing		

- 3) Explain the difference between the mass number and the average atomic mass number.
 4) How many protons neutrons and electrons are in the elements below?

Element	Proton #	Electron #	Neutron #	Mass #
Nitrogen - 16				
${}^{246}_{94}\text{Pu}$				
Most abundant Iron atom				
${}^{37}_{17}\text{Cl}^{-1}$				

- 5) Chlorine has two isotopes ${}^{35}\text{Cl}$ with a mass of 34.968852g and ${}^{37}\text{Cl}$ with a mass of 35.965903. The percentage of these isotopes are 75.77% and 24.23% respectively. What is the average atomic mass unit of chlorine?
- 6) A sample of element X contains 100 atoms with a mass of 12.00 and 10 atoms with a mass of 14.00. Calculate the average atomic mass (in amu) of element X.
- 7) What is an alpha particle and what caused it to change course in the gold foil experiment?
- 8) Describe in detail everything the gold foil experiment taught us about the structure of the atom
- 9) Carbon-14 measurements on the linen wrappings from the Book of Isaiah on the Dead Sea Scrolls indicated that the scrolls contained about 79.5% of the carbon-14 found in living tissue. Approximately how old are these scrolls? The half-life of carbon-14 is 5730 years.
- 10) Phosphorus-32 is a radioactive isotope used as a tracer in the liver. How much phosphorus-32 was originally used if there is only 3.50 mg left in a sample after 288 h? (The half-life is 14.3 days.)
- 11) Show plutonium – 239 going through two alpha decays.
- 12) The isotope Uranium – 238 undergoes a alpha decay and then two beta decays what is your final elemental isotope product?

Dougherty Valley HS Chemistry
Fall Test #1 – Practice Test

- Express 1570000 in scientific notation.
 - 4.62×10^{-8}
 - 1.57×10^{-6}
 - 1.57×10^6
 - 157×10^6
 - 157×10^4
- Express 30514000 in scientific notation.
 - 3×10^7
 - 3.0514×10^7
 - 305×10^7
 - 30514×10^3
 - 305140×10^7
- The number 0.005899 expressed in scientific notation is
 - 5.90×10^3
 - 5.899×10^3
 - 5.90×10^{-3}
 - 5.899×10^{-3}
 - 5899×10^{-6}
- Express the number 0.00346 in scientific notation.
 - 3.46×10^{-3}
 - 3.46×10^3
 - 0.346×10^{-3}
 - 346×10^{-5}
 - none of these
- 1.5 kilogram(s) contains this many grams:
 - 1.5×10^2
 - 1.5×10^3
 - 15
 - 0.15
 - 1.5×10^{-3}
- The volume of a helium balloon is 2.4 L. What is this volume in cm^3 ? (1 L = 1 dm^3)
 24. cm^3
 - $2.4 \times 10^3 \text{ cm}^3$
 - $2.4 \times 10^2 \text{ cm}^3$
 - 0.24 cm^3
 - $2.4 \times 10^4 \text{ cm}^3$
- The element curium ($Z = 242$, $A = 96$) can be produced by positive-ion bombardment when an alpha particle collides with which of the following nuclei? Recall that a neutron is also a product of this bombardment.
 - ${}_{98}^{249}\text{Cf}$
 - ${}_{94}^{241}\text{Pu}$
 - ${}_{95}^{241}\text{Am}$
 - ${}_{92}^{239}\text{U}$
 - ${}_{94}^{239}\text{Pu}$
- The iodine-131 nuclide has a half-life of 8.0 days. If you originally have a 623-g sample, after 2.0 months you will have (Ignore sig figs for this problem.)
 - 46 g
 - 54 g
 - 120 g
 - 3.4 g
 - less than 1 g
- A radioactive element has a half-life of 2.00 weeks. What % of the original sample is left after 19.5 days?
 - 38.1%
 - 60.8%
 - 61.9%
 - 1.39%
 - none of these
- A sample of a radioactive element decays to 27.5% of its original amount of radioactive nuclides in 15 years. What is the half-life of this radioactive element?
 32. years
 - 2.5 years
 - 8.1 years
 - 91.9 years
 - 8.6 years
- A radioactive element has a half-life of 1.20 years. What % of the original sample is left after 168.1 days?
 - 23.4%
 - 76.6%
 - 38.3%
 - 25.5%
 - 16.4%
- The measurement $3.3 \times 10^3 \text{ g}$ also could be written as
 - 3.3 g
 - 3.3 mg
 - 3.3 pg
 - 3.3 kg
 - 3.3 dg
- Which metric prefix is used to designate 1000?
 - m
 - M
 - k
 - c
 - d
- Which of the following is an SI unit for expressing the mass of a block of Au?
 - m
 - g
 - L
 - pound
- Calculate the mass of a rectangular solid that has a density of 3.87 g/cm^3 and measures 2.50 cm by 1.80 cm by 3.00 cm.
 - 3.49 g
 - 52.2 g
 - 9.68 g
 - 28.3 g
 - 55.2 g
- Find the volume of an object that has a density of 3.14 g/mL and a mass of 55.0 g.
 - 17.5 mL
 - $5.71 \times 10^{-2} \text{ mL}$
 - 173 mL
 - $1.75 \times 10^{-2} \text{ mL}$
 - $1.73 \times 10^5 \text{ mL}$
- An object has a mass of 40.1 g and occupies a volume of 6.09 mL. The density of this object is
 - 244 g/mL
 - 0.152 g/mL
 - 6.58 g/mL
 - too low to measure
 - 40.1 g/mL
- The density of an object that has a mass of 4.48 g and occupies a volume of 1.20 mL equals
 - 4.48 g/mL
 - 1.20 g/mL
 - 3.73 g/mL
 - 0.27 g/mL
 - 5.38 g/mL

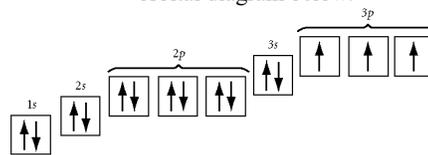
31. The half-life of a radioactive nuclide is
- that period of time in which 25% of the original number of atoms undergoes radioactive decay.
 - the time at which the isotope becomes nonradioactive.
 - that period of time in which 50% of the original number of atoms undergoes radioactive decay.
 - the period of time it takes to reduce the radioactivity by 100%.
 - none of the above
32. The state of matter for an object that has neither definite shape nor definite volume is
- solid
 - liquid
 - gaseous
 - elemental
 - mixed
33. Which of the following involves a chemical change?
- boiling water
 - melting ice
 - chopping wood
 - cooking an egg
 - none of these
34. Which of the following is a physical change?
- burning gasoline
 - cooking an egg
 - decomposing meat
 - evaporating water
 - rusting iron
35. Which of these is a chemical property?
- Ice melts at 0°C.
 - Oxygen is a gas.
 - Helium is very nonreactive.
 - Sodium is a soft, shiny metal.
 - Water has a high specific heat.
36. Which of the following involves no chemical change?
- burning paper
 - boiling water
 - baking a cake
 - lighting a match
 - driving a car
37. Which of the following is only a physical change?
- Sugar dissolves in coffee.
 - Cookies burn in the oven.
 - A banana ripens.
 - Leaves turn colors in the fall.
 - At least two of the above (a-d) exhibit only a physical change.
38. Which of the following is a chemical change?
- Water condenses on a mirror.
 - A damp towel dries.
 - Peanuts are crushed.
 - A "tin" can rusts.
 - At least two of the above (a-d) exhibit a chemical change.
39. An example of a chemical change is
- boiling alcohol
 - grinding coffee beans.
 - digesting a pizza
 - coffee spilled on a shirt
 - an ice cube melting in a drink
40. In a chemical change,
- a phase change must occur
 - the original material can never be regenerated
 - a phase change never occurs
 - the products are different substances from the starting materials
41. Which of the following describes a chemical property of gold?
- Gold is a yellow metal.
 - Gold is an inert (nonreactive) metal.
 - Gold is a soft metal.
 - Gold is a very dense metal.
 - Gold is a good conductor of heat and electricity.
42. Which of the following is a chemical change?
- water boiling
 - gasoline evaporating
 - butter melting
 - sugar dissolving in water
 - paper burning
43. How many of the following are pure compounds? sodium, sugar, oxygen, air, iron
- 1
 - 2
 - 3
 - 4
 - 5
44. Which of the following is an element?
- air
 - water
 - salt
 - helium
 - sugar
45. An example of a mixture is
- hydrogen fluoride
 - purified water
 - gold
 - the air in this room
 - all of these
46. An example of a pure substance is
- elements
 - compounds
 - pure water
 - carbon dioxide
 - all of these
47. A homogeneous mixture is also called _____.
- a heterogeneous mixture.
 - a pure substance.
 - a compound.
 - a solution.
 - an element.
48. Which of the following processes require(s) chemical methods?
- Separating a homogeneous mixture into pure substances.
 - Separating a heterogeneous mixture into pure substances.
 - Distilling a saltwater mixture.
 - Breaking a compound into its constituent elements.
 - At least two of the above (a-d) require chemical methods.
49. Which of the following processes is a chemical change?
- Dry ice sublimates when left on the demo table in lecture.
 - The light on a candle burns until a bell jar is placed over it for a period of time.
 - When a few drops of red food coloring are added to a beaker of hot water, the water immediately turns red.
 - Liquid nitrogen dumped onto the floor vaporizes at room temperature.
 - None of the above processes are chemical changes.
- 50.

51. A _____ change involves a change in one or more physical properties, but no change in the fundamental components that make up the substance.
- chemical
 - physical
 - mixed
 - Potential
 - Kinetic
52. A _____ change involves a change in the fundamental components of the substance; a given substance changes into a different substance or substances.
- chemical
 - physical
 - mixed
 - potential
 - kinetic
58. How many of the following did Dalton not discuss in his atomic theory? Isotopes, ions, protons, electrons, neutrons
- 1
 - 2
 - 3
 - 4
 - 5
59. Which of the following statements are **true**?
- Models are always wrong unless they are proved by a theory.
 - Elements, such as lead, are made of tiny particles that mostly consist of open space.
 - The air you breathe is an example of a heterogeneous mixture.
 - Because NH_3 always contains the same relative numbers of atoms, it will always contain 4.6 g of nitrogen for every 1.0 g of hydrogen.
- II only
 - II, IV
 - I, II, IV
 - I, III
 - All of the above statements are true.
63. Which particle has the smallest mass?
- neutron
 - proton
 - electron
 - helium nucleus
64. How many protons, electrons, and neutrons, respectively, does ^{127}I have?
- 53, 127, 74
 - 53, 74, 53
 - 53, 53, 127
 - 74, 53, 127
 - 53, 53, 74
65. How many protons, electrons, and neutrons, respectively, does ^{16}O have?
- 8, 18, 8
 - 8, 8, 8
 - 8, 10, 8
 - 8, 14, 8
 - 8, 18, 16
66. An atom with 15 protons and 16 neutrons is an atom of
- P
 - Ga
 - S
 - Pd
 - Rh
67. A certain isotope X^+ contains 54 electrons and 78 neutrons. What is the mass number for this element?
- 133
 - 132
 - 131
 - 55
 - 53

Answer Key	5. B	11. B	26. C	36. C	42. B	48. D	59. B
	6. B	12. D	27. C	37. B	43. E	49. D	63. C
	1. C	7. E	13. C	38. A	44. A	50. B	64. E
	2. B	8. D	14. B	39. D	45. D	51. B	65. B
	3. D	9. A	24. B	40. C	46. D	52. A	66. A
	4. A	10. C	25. A	41. D	47. E	58. E	67. A

4. A line spectrum is produced when an electron moves from one energy level
- to a higher energy level.
 - to a lower energy level.
 - into the nucleus.
 - to another position in the same sublevel.
5. Because excited hydrogen atoms always produce the same line-emission spectrum, scientists concluded that hydrogen
- had no electrons.
 - did not release photons.
 - released photons of only certain energies.
 - could only exist in the ground state.
6. For an electron in an atom to change from the ground state to an excited state,
- energy must be released.
 - energy must be absorbed.
 - radiation must be emitted.
 - the electron must make a transition from a higher to a lower energy level.
8. According to the quantum theory of an atom, in an orbital
- an electron's position cannot be known precisely.
 - an electron has no energy.
 - electrons cannot be found.
 - electrons travel around the nucleus on paths of specific radii.
13. The set of orbitals that are dumbbell shaped and directed along the x , y , and z axes are called
- d orbitals.
 - p orbitals.
 - f orbitals.
 - s orbitals.
14. A spherical electron cloud surrounding an atomic nucleus would best represent
- an s orbital.
 - a p_x orbital.
 - a combination of p_x and p_y orbitals.
 - a combination of an s and a p_x orbital.

15. The major difference between a $1s$ orbital and a $2s$ orbital is that
- the $2s$ orbital can hold more electrons.
 - the $2s$ orbital has a slightly different shape.
 - the $2s$ orbital is at a higher energy level.
 - the $1s$ orbital can have only one electron.
16. An orbital that can never exist according to the quantum description of the atom is
- $3d$.
 - $7s$.
 - $6d$.
 - $3f$.
18. The number of orientations for the d orbitals is
- 1.
 - 3.
 - 5.
 - 7.
19. How many orientations can an s orbital have about the nucleus?
- 1
 - 2
 - 3
 - 5
20. One main energy level can hold 18 electrons. What is n ?
- $+\frac{1}{2}$
 - 3
 - 6
 - 18
21. Electron occupies the lowest available energy orbital is
- Hund's rule.
 - the Aufbau principle.
 - Bohr's law.
 - the Pauli exclusion principle.
22. "Orbitals of equal energy are each occupied by one electron before any is occupied by a second electron, and all electrons in singly occupied orbitals must have the same spin" is
- the Pauli exclusion principle.
 - the Aufbau principle.
 - the quantum effect.
 - Hund's rule.
23. Which of the following lists atomic orbitals in the correct order they are filled according to the Aufbau principle?
- $1s 2s 2p 3s 4s 3p 3d 4p 5s$
 - $1s 2s 2p 3s 3p 4s 3d 4p 5s$
 - $1s 2s 2p 3s 3p 4s 4p 3d 4d$
 - $1s 2s 2p 3s 3p 3d 4s 4p 5s$
24. In the ground state, the $3d$ and $4s$ orbitals of the chromium atom (atomic number 24) are represented as
- $3d^6 4s^1$.
 - $3d^4 4s^2$.
 - $3d^5 4s^1$.
 - $4s^2 3d^4$.
25. The element with electron configuration $1s^2 2s^2 2p^6 3s^2 3p^2$ is
- Mg ($Z = 12$).
 - C ($Z = 6$).
 - S ($Z = 16$).
 - Si ($Z = 14$).
26. The electron notation for aluminum (atomic number 13) is
- $1s^2 2s^2 2p^3 3s^2 3p^3 3d^1$.
 - $1s^2 2s^2 2p^6 3s^2 2d^1$.
 - $1s^2 2s^2 2p^6 3s^2 3p^1$.
 - $1s^2 2s^2 2p^9$.
27. The number of electrons in the highest energy level of the argon atom (atomic number 18) is
- 10.
 - 2.
 - 6.
 - 8.
- Problem** Use periodic table below to answer the following Qs
28. Which element has the following electron configuration:
 $[\text{Ar}] 4s^2 3d^{10} 4p^5$?
29. Write the noble-gas electron configuration for silicon.
30. Draw the orbital diagram for phosphorus.
31. Draw the orbital diagram for argon.
32. Write the noble-gas electron configuration represented in the orbital diagram below.



- | | | | | | |
|---------|-------|-------|-------|-----------------------------|-----------------------------|
| Answers | 8. A | 17. C | 22. D | 27. D | 32. $[\text{Ne}] 3s^2 3p^3$ |
| 4. B | 13. B | 18. C | 23. B | 28. Br | 33. B |
| 5. C | 14. A | 19. A | 24. D | 29. $[\text{Ne}] 3s^2 3p^2$ | |
| 6. B | 15. C | 20. B | 25. D | 30. X | |
| | 16. D | 21. B | 26. C | 31. X | |

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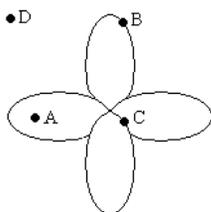
Fall Test #1 – Practice Test

- Which color of visible light has the least amount of energy per photon?
 - violet
 - blue
 - green
 - yellow
 - red
- The energy levels of the hydrogen atom (and all atoms) are _____, meaning that only certain discrete energy levels are allowed.
 - varied
 - quantized
 - ramp-like
 - continuous
 - two of these
- True or false? A packet of energy of electromagnetic radiation is called a electrons.
 - True
 - False
- The probability map for an electron is called
 - an orbit
 - a photon
 - an orbital
 - an electron configuration
 - none of these
- The maximum number of electrons allowed *in each* of the *p* orbitals is
 - 2
 - 4
 - 8
 - 18
 - none of these
- A given set of *d* orbitals consists of _____ orbital(s).
 - 1
 - 3
 - 5
 - 6
- The maximum electron capacity of an *f* sublevel is
 - 18
 - 14
 - 10
 - 6
 - 2
- A *d* sublevel can hold a maximum of
 - 5 electrons
 - 10 electrons
 - 14 electrons
 - 32 electrons
- The number of *d* orbitals in the second principal energy level is
 - 2
 - 6
 - 10
 - 0
- The electron configuration for the sulfur atom is
 - $1s^2 2s^2 2p^6 3s^2 3p^2$
 - $1s^2 2s^2 2p^6 3s^2 3p^4$
 - $1s^2 2s^2 2p^6 3s^5$
 - $1s^2 2s^2 2p^6 3s^2 3p^5$
 - none of these
- How many electrons are in the third principal energy level ($n = 3$) of one atom of Fe?
 - 2
 - 8
 - 14
 - 18
 - none of these
- The noble gases contain how many valence electrons?
 - 1
 - 7
 - 0
 - 8
 - none of these
- The maximum number of electrons in the second principal energy level of an atom is
 - 2
 - 6
 - 8
 - 18
 - 32
- Which element has the fewest electrons in its valence shell?
 - Cs
 - Mg
 - P
 - O
 - Br
- Which one of the following atoms has a partly filled *d* sublevel?
 - Ca
 - Ni
 - Zn
 - As
 - Ar
- What is the expected ground-state electron configuration for Te^{2-} ?
 - $[\text{Kr}]5s^2 5d^{10} 5p^4$
 - $[\text{Kr}]5s^2 4d^{10} 5p^4$
 - $[\text{Kr}]5s^2 4d^{10} 4f^{14} 5p^6$
 - $[\text{Kr}]5s^2 4d^{10} 5p^6$
 - $[\text{Ar}]5s^2 4d^{10} 5p^2$
- The correct electron configuration for Mn is
 - $1s^2 2s^2 2p^6 3s^2 3p^6 3d^7$
 - $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$
 - $1s^2 2s^2 2p^6 2d^{10} 3s^2 3p^3$
 - $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$
 - none of these
- The electron configuration for manganese is
 - $[\text{Ar}] 3d^7$
 - $1s^2 2s^2 2p^6 3s^1 3d^6$
 - $[\text{Ar}] 4s^2 3d^5$
 - $1s^2 2s^2 2p^6 3s^2 3d^4$
 - $[\text{Ar}] 4s^2 4p^5$
- Which of the following has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$?
 - Cr
 - Ca
 - Mn
 - Br
 - none of these

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Fall Test #1 – Practice Test

23. Which of the following atoms has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^1$?
- A) Sc
B) Ca
C) Sr
D) Ar
E) none of these
24. How many unpaired electrons does the element cobalt (Co) have in its lowest energy state?
- A) 0
B) 1
C) 2
D) 3
E) 7
25. Which electron configuration indicates a transitional element?
- A) $1s^2 2s^2 2p^6 3s^1 3p^6$
B) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^3$
C) $1s^2 2s^2 2p^5$
D) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^2$
E) none of these
26. The element with the electron configuration [Kr] $5s^2 4d^{10} 5p^3$ is
- A) As
B) Sb
C) Nb
D) Pr
E) none of these
27. How many of the following electron configurations for the species in their ground state are correct?
- I. Ca: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$
II. Mg: $1s^2 2s^2 2p^6 3s^1$
III. V: [Ar] $3s^2 3d^3$
IV. As: [Ar] $4s^2 3d^{10} 4p^3$
V. P: $1s^2 2s^2 2p^6 3p^5$
- A) 1
B) 2
C) 3
D) 4
E) 5
30. Consider the following representation of the **one** orbital below. The points represent various electron locations.



Where could an electron be located in the representation above?

- A) Point A
B) Point B
C) Point C
D) Point D
E) An electron could be located at any of these points.

31. What element has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$?

A) Cl
B) Se
C) I
D) Kr
E) Br

32. What element has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^3$?

A) N
B) P
C) S
D) Al
E) Cl

33. What element has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^6$?

A) Ar
B) Cl
C) Kr
D) S
E) none of these

34. What atom below will have the same number of electrons as Fe^{2+} ?

A) Cr
B) Ni
C) Kr
D) Ar
E) K

42. How many f orbitals have the value $n = 3$?

A) 0
B) 3
C) 5
D) 7
E) 1

46. Which Ion below has an electron configuration of $1s^2 2s^2 2p^6 3s^2 3p^6$?

A) Ar
B) Cl^{2-}
C) Ne
D) S^{2-}
E) O^{2-}

Answer Key

1. E	13. C	24. D
2. B	14. D	25. B
3. B	15. C	26. B
5. C	16. A	27. B
6. A	17. B	30. E
7. C	19. D	31. E
8. B	20. D	32. B
9. B	21. C	33. A
10. D	22. C	34. A
11. B	23. A	42. A
		46. D

