

Calculations Using Significant Figures

1. $1.35 \text{ m} \times 2.467 \text{ m} = \underline{3.33 \text{ m}^2}$
2. $1.035 \text{ m}^2 / 42 \text{ m} = \underline{25 \text{ m}}$
3. $12.01 \text{ mL} + 35.2 \text{ mL} + 6 \text{ mL} = \underline{53 \text{ mL}}$
4. $55.46 \text{ g} - 28.9 \text{ g} = \underline{26.6 \text{ g}}$
5. $.012 \text{ cm} \times 3.2 \text{ cm} \times 100.1 \text{ cm} = \underline{6.7 \text{ cm}^3}$
6. $0.15 \text{ cm} + 1.15 \text{ cm} + 2.051 \text{ cm} = \underline{3.35 \text{ cm}}$
7. $150 \text{ L}^3 / 4 \text{ L} = \underline{40 \text{ L}^2}$
8. $505 \text{ kg} - 450.25 \text{ kg} = \underline{55 \text{ kg}}$
9. $1.252 \text{ mm} \times 0.115 \text{ mm} \times 0.012 \text{ mm} = \underline{0.0017 \text{ mm}^3}$
10. $1.278 \times 10^3 \text{ m}^2 / 1.4267 \times 10^2 \text{ m} = \underline{8.958 \text{ m}}$

Convert into Scientific Notation

- a) $12994 = \underline{1.2994 \times 10^4}$ b. $.0004405 = \underline{4.405 \times 10^{-4}}$ c. $3388.55 = \underline{3.38855 \times 10^3}$ d. $.0033 = \underline{3.3 \times 10^{-3}}$

Convert to regular form

- a. $6.033 \times 10^5 = \underline{603,300}$ b. $2.202 \times 10^2 = \underline{220.2}$ c. $5.07 \times 10^{-3} = \underline{0.00507}$

Determine correct number of significant figures:

- 305 3
305.0 4
3050 3
0.0305 3
0.03050 4
a. 356.56 5 b. 0.00201 3 c. 23000 2 d. 34.000 5

ATOMIC

Match each description in Column B with the correct term in Column A

Column A	Column B
1. Proton J	a. The total number of protons and neutrons in the nucleus of an atom
2. Atom G	b. The weighted average mass of the atoms in a naturally occurring sample of an element
3. Mass number A	c. 1/12 the mass of a carbon 12 atom
4. Atomic mass unit C	d. The number of protons in the nucleus of an element
5. Electron F	e. Atoms with the same number of protons but different numbers of neutrons
6. Isotopes E	f. Negatively charged subatomic particle
7. Atomic Number D	g. The smallest particle of an element that maintains its identity in a chemical reaction
8. Atomic Mass B	h. A horizontal row of the periodic table
9. Period H	i. Subatomic particle with no charge
10 Neutron I	11 Positively charged subatomic particle

Choose the best answer:

The nucleus of an atom is

- a. Negatively charged and has a low density
- b. Negatively charged and has a high density
- c. Positively charged and has a low density
- d. Positively charged and has a high density

The number of neutrons in the nucleus of an atom can be calculated by

- a. Adding together the numbers of electrons and protons
- b. Subtracting the number of protons from the number of electrons
- c. Subtracting the number of protons from the mass number
- d. Adding the mass number to the number of protons

The sum of the protons and neutrons in an atom equals the

- a. Atomic number

- b. Number of electrons
- c. Atomic mass
- d. Mass *number*

Which of these statements is false

- a. Electrons have a negative charge
- b. Electrons have a mass of 1 atomic mass unit
- c. The nucleus of an atom is positively charged
- d. The neutron is found in the nucleus of an atom

An atom of an element with atomic number 48 and mass number 120 contains

- a. 48 p, 48 e and 72 n
- b. 72 p, 48 e, and 48 n
- c. 120 p, 48 e, and 72 n
- d. 72 p, 72 e, and 48 n

$$\begin{array}{r} 120 \\ - 48 \\ \hline 72 \end{array}$$

How do the isotopes hydrogen - 2 and hydrogen - 3 differ?

- a. Hydrogen-3 has one more electron than Hydrogen-2
- b. Hydrogen-3 has 2 neutrons
- c. Hydrogen-2 has 3 protons
- d. Hydrogen-2 has no protons

The number 80 in Bromine-80 represents

- a. The atomic number
- b. The mass number
- c. The sum of protons and neutrons
- d. None of the above

Which of these statements is not true

- a. Atoms of the same element can have different masses
- b. The nucleus of an atom has a positive charge
- c. Atoms of isotopes of an element have different numbers of protons
- d. Atoms are mostly empty space

If E is the symbol for an element, which two of the following symbols represent isotopes of the same element?

- 1. ${}^{24}_{12}\text{E}$
- 2. ${}^{24}_{13}\text{E}$
- 3. ${}^{25}_{11}\text{E}$
- 4. ${}^{25}_{12}\text{E}$

The release of tremendous energy in fission and fusion is due to a loss of mass according to $E = mc^2$.

List 3 differences between fission and fusion.

1. fission - splits 1 atom \rightarrow 2 different atoms (smaller) fusion - joining of atoms \rightarrow 1 atom
2. fission - occurs in nuclear power plants & atomic bombs (WWII)
fusion - occurs in sun/stars & hydrogen bombs
3. fission - releases less energy per mass; leaves radioactive waste
fusion - releases more energy per mass; little to no waste

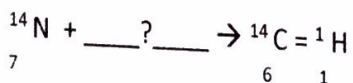
In Nuclear Fission

- a. Certain Atoms break into fragments when struck by neutrons
- b. A chain reaction cannot occur
- c. Energy is absorbed
- d. All of the above

Nuclear fusion

- a. Occurs when large nuclei fuse together
- b. Takes place in the sun
- c. Generally produces hydrogen nuclei
- d. All of the above

What particle is needed to complete this equation?



- a. ${}^1_0\text{n}$
- b. ${}^0_{-1}\text{e}$
- c. ${}^4_2\text{He}$
- d. ${}^0_{-1}\text{e}$

A device that is used primarily for the detection of beta radiation is

- a. The film badge

MINERVA

- b. The Geiger counter
- c. The scintillation counter
- d. All of the above

Complete the following reactions by filling in the blanks with the correct numbers:



After 252 Days, a 24 g sample of scandium-42 contains only 3.0 g of the isotope

24 g → 12 g → 6 g → 3 g

How many half-lives have occurred?

3

How many days is one half life?

84 days

Name	Symbol	Atomic #	Mass #	# Protons	# Neutrons	3 Electrons
1 Boron	B	5	11	5	6	5
2 Zinc	Zn	30	61	30	31	30
3 potassium	K	19	42	19	23	19
4 titanium	Ti	22	49	22	27	22
5 antimony	Sb	51	122	51	71	51
6 Uranium (II)	U ⁺²	92	238	92	146	92
7 Silver (I)	Ag ⁺¹	47	107	47	60	47
9 Cesium, (I)	Cs ⁺¹	55	134	55	79	54
10 Molybdenum	Mo ⁺³	42	97	42	55	39
12 Krypton	Kr	36	83	36	47	39
14 Nitride	N ³⁻	7	15	7	8	7
15 Chloride	Cl ⁻¹	17	37	17	20	18

Nuclear Chemistry

Beta particles are

- a. X-rays
- b. Neutrons
- c. Helium nuclei
- d. Protons

e. Electrons

An unstable nucleus _____.

- a. Increases its half-life
- b. Emits energy when it decays
- c. Expels all of its protons
- d. Increases its nuclear mass by fission

The WEAKEST form of radiation is _____.

- a. Beta radiation
- b. Cannot determine
- c. Gamma radiation
- d. Alpha radiation

Which symbol is used for an alpha particle?

- a. ${}^1_4\text{He}$
- b. ${}^2_1\text{He}$
- c. ${}^4_2\text{He}$
- d. ${}^2_2\text{He}$

What symbol is used for beta radiation?

- a. ${}^0_{-1}\text{e}$
- b. ${}^{-1}_{-1}\text{e}$
- c. ${}^{-1}_0\text{e}$
- d. ${}^0_0\text{e}$

Complete this reaction: ${}_{86}^{222}\text{Rn} \rightarrow {}_{84}^{218}\text{Po} + \underline{\hspace{2cm}}$

- a. ${}^1_1\text{H}$
- b. ${}^0_1\text{n}$
- c. ${}^4_2\text{He}$
- d. ${}^{-1}_0\text{e}$

To what Element does polonium-208 (atomic number 84) decay when it emits an alpha particle?

- a. ${}_{86}^{214}\text{Rn}$
- b. ${}_{82}^{210}\text{Pb}$
- c. ${}_{82}^{204}\text{Pb}$
- d. ${}_{82}^{210}\text{Po}$

Nuclear fusion _____.

- a. Is used in medicine
- b. Occurs at low temperatures
- c. Takes place in the sun

- d. Is used in power plants

When small nuclei combine to form a large nucleus, the reaction is

- a. Chemical
- b. Fusion
- c. Fission
- d. Ionization

Smoke detectors commonly use _____ decay from ^{95}Am

- a. Neutron
- b. Gamma
- c. Alpha
- d. Beta

Radioisotopes are often used for _____.

- a. Food additives
- b. Time travel
- c. Medical testing
- d. Fireworks

A beta particle has a mass number of _____, a charge of _____, and a mass equal to that of a(n) _____.

- a. 1, 0, neutron
- b. 4, 2⁺, helium nucleus
- c. 0, 1⁻, electron
- d. 0, 1⁺, electron
- e. 1, 1⁺, proton

It is FALSE to say that gamma rays...

- a. Are stopped by 1mm of paper
- b. Have no mass
- c. Are a common type of radiation emitted in decay processes
- d. Have a great penetrating power and severely damage both skin and internal organs
- e. Travel at the speed of light

Joining light nuclei to form heavier nuclei is _____? _____; Splitting of heavy nuclei into lighter nuclei is _____? _____

- a. Nuclear fusion; nuclear fission
- b. Combination; decomposition
- c. Induced radioactivity; natural radioactivity
- d. Nucleons; radioisotopes

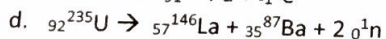
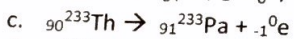
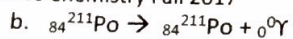
Which one of the following represents fusion?

- a. ${}^3_1\text{H} + {}^2_1\text{H} \rightarrow {}^4_2\text{He} + {}^1_0\text{n}$

Mrs. Progar

Honors Chemistry Fall 2017

Common Assessment 1 Review



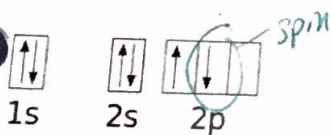
Cesium-131 has a half-life of 30 years. What percentage of the original sample would remain after 90 years?

- a. 0
- b. 50
- c. 100
- d. 12.5
- e. 25

If E is the symbol for an element, which two of the following symbols represent isotopes of the SAME element?

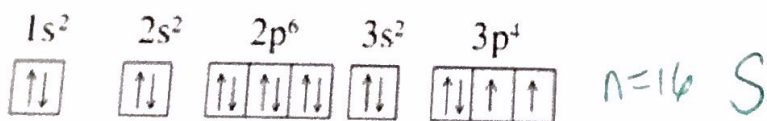
- 1. ${}_{12}^{24}\text{E}$
 - 2. ${}_{13}^{24}\text{E}$
 - 3. ${}_{11}^{25}\text{E}$
 - 4. ${}_{12}^{25}\text{E}$
- a. 1 and 2
 - b. 3 and 4
 - c. 1 and 4
 - d. 2 and 3

What rule is broken in the following orbital diagrams?



Hund

Which Element is represented by this orbital diagram?



Electrons

Choose the correct term.

Quantum

Hund's Rule

Photons

atomic emission spectrum

Hertz

Aufbau principle

Wavelength

1. The lowest energy arrangement of electrons in a subshell is obtained by putting electrons into separate orbitals of the subshell before pairing electrons.
 Hund
2. Packets/quanta of electromagnetic energy
 photons
3. The SI unit of frequency
 Hz
4. An atomic orbital can hold no more than 2 electrons
 Pauli Exclusion
5. The amount of energy required to move an electron from its present energy level to the next higher one; or, the amount released when an electron drops to a lower level
 quantum
6. The modern description of the location and energy of electrons in an atom
 quantum mech model
7. This principle states that electrons enter orbitals of lowest energy first
 Aufbau
8. The distance between two adjacent crests of an electromagnetic wave
 wavelength
9. This is produced by passing the light emitted by an element through a prism
 Atomic Emission Spectra

Name _____ Date _____ Class _____

13. What is the maximum number of electrons allowed in the $2p$ sublevel?
 a. 2
 b. 6
 c. 10
 d. 14
14. What is the maximum number of electrons that can occupy one orbital?
 a. 1
 b. 2
 c. 8
 d. 18
15. The electron configuration for fluorine is
 a. $1s^2 2s^2 2p^6$
 b. $1s^2 2s^2 2p^5$
 c. $1s^2 2s^2 2p^6 3s^2$
 d. $1s^2 2s^2 2p^6 3s^2$
16. The first three electrons that enter into p orbitals must have l_z in
 a. opposite spins, the same l_z value
 b. opposite spins, opposite l_z values
 c. low energy levels
 d. opposite charges
17. The atom whose electron configuration is $1s^2 2s^2 2p^6 3s^2 3p^1$ is
 a. B
 b. Na
 c. Al
 d. Ga
18. The configuration for element # 20, Calcium, is
 a. $3s^2$
 b. $4s^2$
 c. $2s^2$
 d. $4s^1$
19. The element having the same s and p configurations for principal energy level 3 as the element F has for its principal energy level 2 is
 a. Na
 b. Al
 c. P
 d. Cl
20. The frequency and wavelength of all waves are
 a. directly related. (change in same way)
 b. inversely related. (opposite ways)
 c. unrelated
 d. equal
21. The SI unit of cycles per second is called a
 a. photon
 b. quantum
 c. hertz
 d. hund
22. Among the following groups of atoms, which have the same outer (valence) ~~electron~~ configurations?
 a. H, He
 b. Li, Be, N, Ne
 c. Mg, Al, Ca, Ga
 d. N, P, As, Bi
23. The wavelength of light with a frequency of $2.50 \times 10^{15} \text{ s}^{-1}$ is
 a. $1.20 \times 10^8 \text{ m}$
 b. $8.33 \times 10^8 \text{ m}$
 c. $1.20 \times 10^{-8} \text{ m}$
 d. $8.33 \times 10^{-8} \text{ m}$
24. ~~When the~~ electron in a hydrogen atom absorbs ~~energy~~ energy, it
 a. is now in its ground state. (stays)
 b. is now in its excited state. (jumps)
 c. has released a photon. (falls)
 d. none of the above

KEY PROCS

Name _____ Date _____

C. Problems

25. Solve the following problems in the space provided. Show your work. Write the electron configurations for the following atoms. (long and short)

- a. Mg
 $1s^2 2s^2 2p^6 3s^2$
- b. P
 $1s^2 2s^2 2p^6 3s^2 3p^3$
- c. Br
 $1s^2 2s^2 2p^6 3s^2 3p^4 4s^2 4p^5$
- d. Xe
 $1s^2 2s^2 2p^6 3s^2 3p^4 4s^2 4p^6 5s^2 5p^6 6s^2 6p^6$
26. Identify the elements described below.
 a. Configuration = $1s^2 2s^2 2p^6 3s^2 3p^4$
 Sulfur
- b. Contains a full second energy level (2s and 2p)
 Ne
- c. Contains the first d electron (3d)
 Sc
- d. Contains seven electrons in its fourth energy level (4s and 4p combined)
 Br
- e. Contains only two electrons in its fifth energy level (5s)
 Strontium
- f. Contains three unpaired electrons in its third energy level (3p)
 Strontium
- g. Contains five electrons in its 3d orbitals
 Manganese
- h. Has its outermost electron in 7d
 Manganese

27. What is the frequency of radiation whose wavelength is $6.25 \times 10^{-7} \text{ m}$?

28. What is # 27's energy?

THE PERIODIC TABLE

Name _____ Date _____ Class _____

Vocabulary Review

Match the correct vocabulary term to each numbered statement. Write the letter of the correct term on the line.

Column A

1. The highest occupied s and p sublevels are partially filled (full columns)

2. The "d" block.

3. metals having only 2 electrons in the highest occupied energy level (2 valence e^-)

4. size of an atom.

5) decreases for cations and anions from left to right across a period

6. measures the ability of an atom to attract electrons when the atom is in a compound

7. an atom or group of atoms that has a positive or negative charge

8. elements in which the valence s and p sublevels are filled ($s^2 - p^6$)

9. nonmetals of Group 17

10. The f block

11. energy required to remove an electron from an atom

12. positively charged ion

13. Group 1 elements

14. good conductors of heat and electric current

15. negatively charged ion

16. poor conductors of heat and electric current

Column B

representative elements

b. electronegativity

c. atomic radius

d. metals

e. ionization energy

f. cation

g. noble gases

h. alkali metals

i. lanthanides/actinides

j. nonmetals

k. ionic radius

l. ion

m. Group 2

n. transition metal

o. halogens

p. anion

THE PERIODIC TABLE

Name _____ Date _____ Class _____

Chapter Test B

A. Matching

Match each term in Column B with the correct description in Column A. Write the letter of the term on the line.

Column A

1. size of an atom

2. negatively charged ion

3. the vertical columns of the periodic table

4. the nonmetallic elements of Group 17

5. elements in which the highest occupied s and p sublevels are filled ($s^2 - p^6$)

6. the tendency for the atoms of an element to attract electrons when the atoms are in a compound

7. positively charged ion

8. the energy required to remove an electron from an atom

9. the Group 1 elements

10. When elements are arranged in order of increasing atomic number, there is a periodic repetition of their physical and chemical properties.

Column B

a. electronegativity

b. groups

c. atomic radius

d. ionization energy

e. alkali metals

f. halogens

g. noble gases

h. anion

B. Multiple Choice

Choose the best answer and write its letter on the line.

11. The modern periodic table is arranged in order of increasing
 a. atomic mass
 b. atomic number
 c. atomic size
 d. atomic radius

12. The elements in the full columns
 a. alkali metals
 b. alkaline earth metals
 c. transition metals
 d. representative elements

24. Removing one electron from an atom results in the formation of an
 a. ion with a 1+ charge.
 b. ion with a 1- charge.
 c. ion with a 7+ charge.
 d. ion with a 7- charge.

23. As the number of electrons added to the same principal energy level increases, atomic size generally
 a. increases.
 b. decreases.
 c. remains the same.
 d. varies randomly.
20. As you move down a group in the periodic table, atomic size generally
 a. increases.
 b. decreases.
 c. remains the same.
 d. varies randomly.

22. The smallest atom from among the following is
 a. Na.
 b. Mg.
 c. Si.
 d. Cl.
21. The largest atom from among the following is
 a. Li.
 b. Na.
 c. Rb.
 d. Fr.

19. The element with 8 electrons in its 3d sublevel is
 a. O.
 b. Ne.
 c. Ar.
 d. Ni.
18. The electron configuration of the element chlorine ends in
 a. $3s^2$
 b. $3p^5$
 c. $3s^2 3p^5$
 d. $3s^2 3p^6$

17. The elements that contain electrons in an f sublevel near the highest occupied energy level are referred to as
 a. alkali metals.
 b. alkaline earth metals.
 c. transition metals.
 d. inner transition metals (actinides/lanthanides).

16. An element that contains an electron in a d sublevel is
 a. Mg.
 b. O.
 c. Fe.
 d. Ne.
15. Among the groups of elements listed below, which have the same number of valence e⁻?
 a. Li, B, C, F
 b. Na, Mg, Al, S
 c. K, Ca, Rb, Sr
 d. N, P, As, Sb

14. What is the number of electrons in the nitrogen group?
 a. 5
 b. 3
 c. 8
 d. 18

13. Which of the following is true concerning the noble gases?
 a. Their highest occupied s and p sublevels are filled.
 b. They belong to Group 18.
 c. They are sometimes referred to as the inert gases.
 d. All of the above.

© Pearson Education, Inc., publishing as Pearson Prentice Hall. All rights reserved.

35) Explain why elements with high first ionization energies typically also have high electronegativity values.
 Write a short essay for the following statement.

D. Essay

- a. Which has the lowest first ionization energy?
 b. Which is a noble gas?
 c. Which has the highest electronegativity?
 d. Which has the highest second ionization energy?
 e. Which is the largest atom?

34. The outermost energy level configurations for the theoretical elements A-E are listed below. Use the symbols A through E to answer each of the questions that follow.

Atom	Largest Atomic Radius	Greater Ionization Energy	Lower Electronegativity
a. Li, K	K	Li	K
b. C, F	C	F	C
c. Mg, Ca	Ca	Mg	Ca
d. O, S	S	O	S

33. Among the following pairs of atoms, identify the larger of the two, the one with the greater first ionization energy, and the one with the lower electronegativity.

- a. In order of decreasing atomic size (largest to smallest)
 K, R, Li, C, F
- b. In order of increasing ionization energy
 Cs, R, Li, C, F
- c. In order of decreasing electronegativity
 F, C, Li, K, As

32. Arrange the following elements as described below.

Li, C, K, F, Cs

Very low electronegativity - because valence e⁻s

(19)

Name _____ Date _____ Class _____