

Chemistry 51

Exam 1

Part A

Follow the directions and select the **BEST** answer for each section. Mark your answers on the scantron answer sheet carefully. Make sure your scantron answer sheet is filled out properly- do so before you begin! You must use pencil. Clearly indicate which Scantron form is the **PRIMARY** and **SECONDARY** ones by writing "**PRIMARY**" and "**SECONDARY**" on the top-right hand corner of each Scantron (over your name).

There are 29 questions/problems for 100 pts. total.

A. Match or fill in the blank. Remember to choose the "**BEST**" answer!

3 pts. each

- Which concept is not important when reporting a measurement?
 - accuracy & precision
 - scientific notation
 - significant figures
 - hypothesis
 - appropriate measuring device
- Which of the following is not a mixture?
 - homogeneous solution (milk)
 - heterogeneous solution (pepperoni)
 - suspension (dust in the air)
 - colloid (Jello)
 - all of them are
- What do all conversion factors have in common?
 - they all equal 1
 - they all come in two forms
 - they are used to convert the units of a value
 - they contain the same units
 - all of the above
- Which element is a transition metal?
 - lead (Pb) used as radiation protection material
 - mercury (Hg) used to be used in thermometers
 - plutonium (Pu) a product of nuclear fission reaction
 - calcium (Ca) major component of teeth
 - germanium (Ge) used in the semiconductor industry for computer chips
- If the smallest divisions on a thermometer are 0.01 °C, you should report the temperature to the _____ °C.
 - 1
 - 0.1
 - 0.01
 - 0.001
 - 0.0001

6. Nitrous oxide (N_2O) is commonly called “laughing gas” while Viagra works by helping to produce NO in the bloodstream. What are their proper chemical names, respectively?
- A. nitrogen dioxide & nitrogen monoxide
 - B. dinitrogen monoxide and nitrogen monoxide
 - C. dinitrogen monoxide & nitrogen oxide
 - D. dinitrogen monoxide & nitroxide
 - E. nitrogen dioxide & nitrogen oxide
7. Which set of values corresponds to the centigrade temperature scale for the freezing point of water, the temperature of a nice day and normal body temperature, respectively?
- A. 0, 25 & 37
 - B. 32, 77 & 98.6
 - C. 273, 298 & 310
 - D. 0, 77, 98.6
 - E. 32, 77 & 212
8. Concerning the notation, ${}^A\text{X}$, which of the following statements is not true?
- A. A = the number of protons and neutrons
 - B. X is the atomic symbol
 - C. The atomic number, Z , is not shown, but it equals the number of protons
 - D. $A - Z = n$ (number of neutrons)
 - E. A = the atomic mass
9. How many electrons does it take to fill each of the s , p , d & f orbital types, respectively?
- A. 1, 2, 3, 4
 - B. 1, 3, 5, 7
 - C. 2, 6, 10, 14
 - D. 4
 - E. 1, 1, 1, 1
10. Which is not a wave property?
- A. speed
 - B. probability
 - C. frequency
 - D. length
 - E. height/amplitude
11. If you change the number of protons, neutrons and electrons, respectively, you get a different ____, ____ & ____.
- A. atom, ion & isotope
 - B. isotope, atom & ion
 - C. atom, isotope & ion
 - D. ion, atom & isotope

E. ion, isotope & atom

12. Radioactive uranium-238 has a half-life of 4.468 billion years. After 18.0 billion years, how much radioactive material will be left from a 2.00 gram sample?

- A. 0.000 g
- B. 0.500 g
- C. 0.25 g
- D. 0.125 g
- E. 0.0625 g

13. When uranium-238 decays, it releases an α particle and what other product according the reaction:



- A. ${}^{242}\text{Pu}$
- B. ${}^{238}\text{Pu}$
- C. ${}^{238}\text{U}$
- D. ${}^{234}\text{Pa}$
- E. ${}^{234}\text{Th}$

14. Iridium (Ir) salts are highly colored and the only terrestrial source is thought to be from meteorites. If Iridium-192 has a relatively short half-life, which other isotopes of iridium are the first and second most likely stable/abundant forms, respectively?

- A. 192 & 191
- B. 193 & 191
- C. 193 & 190
- D. 192 & 189
- E. 193 & 189

15. Which is not a form of electromagnetic radiation?

- A. radio
- B. infrared
- C. ultraviolet
- D. β particle
- E. γ -ray

16. Atomic clocks achieve accurate time because they are controlled by radio transmitters which themselves receive their time signals from amazingly accurate timepieces, Cesium Atomic Clocks. These clocks have an accuracy of one second in one million years! In operation, these clocks are based upon the characteristics of the cesium-133 atom, whose single electron is known to vibrate at a standard 9,162,613,770 times a second. These clocks that have an accuracy of one second in one million years! How many times does the cesium electron vibrate in one minute?

- A. 9,162,613,770
- B. $5.497568262 \times 10^{11}$
- C. $9.162613770 \times 10^{11}$

D. $5.497568262 \times 10^{10}$ E. $9.16261377 \times 10^{10}$

17. The periodic table groups elements according to what feature?
- A. similar chemical properties/reactivities
 - B. similar atomic sizes
 - C. similar first ionization energies
 - D. groups and periods
 - E. similar number of electrons
18. Chemistry can be defined as _____.
- A. the accounting of protons
 - B. the accounting of neutrons
 - C. the accounting of electrons
 - D. the accounting of innermost electrons
 - E. the accounting of valence electrons
19. What is the electron configuration for rhodium (Rh) whose name is derived from the Greek 'rhodon', meaning rose and is the rarest of all non-radioactive metals on Earth?
- A. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9$
 - B. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^7 4s^2$
 - C. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^7$
 - D. $[\text{Kr}]4s^2 3d^7$
 - E. none of these are correct
20. Which class of elements is responsible for the colors of fireworks?
- A. solids
 - B. noble gases
 - C. metals
 - D. halogens
 - E. alkali and alkaline earth
21. The general trend for increasing atomic size and increasing ionization energy, respectively for atoms on the periodic table is:
- A. down and to the left for both
 - B. up and to the right for both
 - C. down and to the left & up and to the right
 - D. up and to the right & down and to the left
 - E. the same as increasing atomic number
22. Which of these atomic properties is not listed on a common periodic table?
- A. mass
 - B. name

- C. symbol
D. number
E. they all are!

PART B

Solve the following problems. Be sure to show all of your work if you want any credit- *i.e.* **NO WORK = NO CREDIT!**

23. How many calories are there in a candy bar that contains 55.0 kJ? (Note: there are 4.184 calories in 1 Joule (J))
/5 pts.

24. Fill in the table below with the missing information. /6 pts.

Prefix	Symbol	Meaning	Numerical Value	Scientific Notation
nano				
	μ			
		one-thousandth		
			1,000	
		one million		
	G			

25. Fill in the missing terms for the appropriate particles. /4 pts.

	Fundamental	Composite
macroscopic		
microscopic		

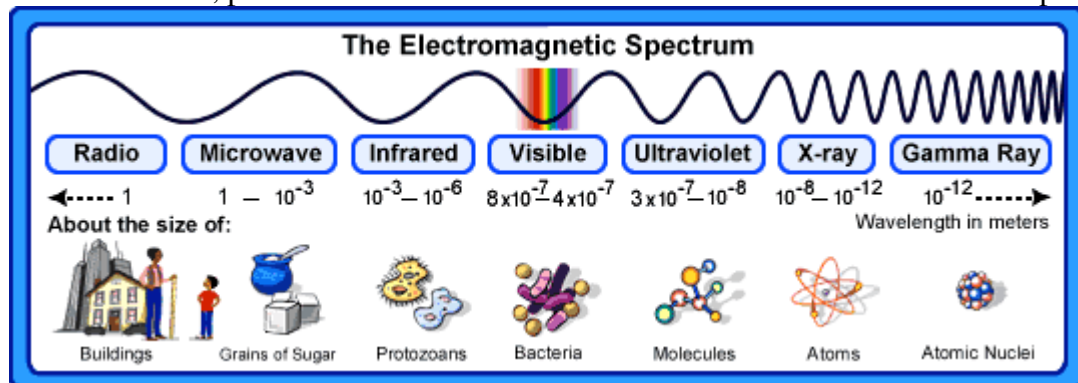
26. Fill in the table below with the missing information. /6 pts.

Isotope	#p	#n	#e ⁻	Use (treatment for)
³² P				Leukemia
⁴⁵ Sc ³⁺				Brain scans
⁶⁰ Co				Surgical instrument sterilization
⁶⁷ Ga ³⁺				Abdominal imaging

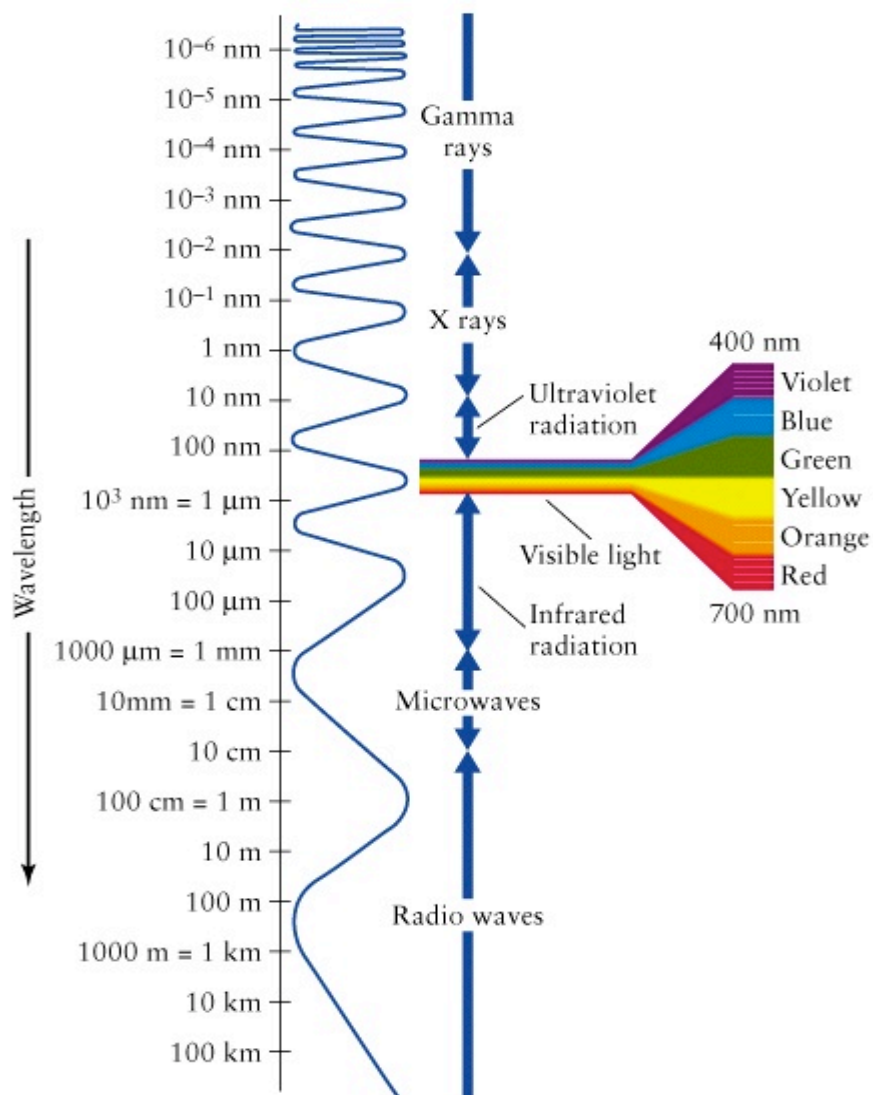
$^{99m}\text{Tc}^{7+}$				Tissue imaging
$^{131}\text{I}^-$				Goiter

/21 pts. total

27. Write a **BRIEF** statement on how each of the six highlighted regions in the electromagnetic spectrum (except for the visible) can be useful for humans, plants or animals. /6 pts.

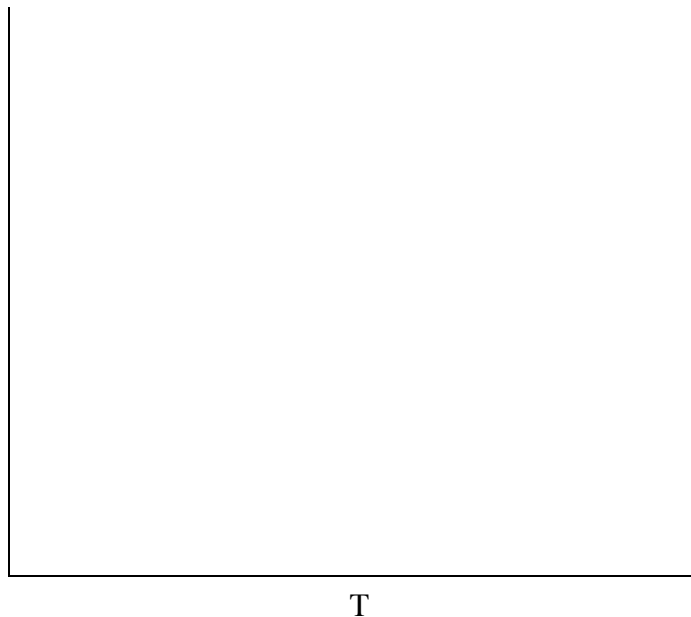


<http://skyserver.sdss.org/dr1/en/proj/advanced/color/whatis.asp>

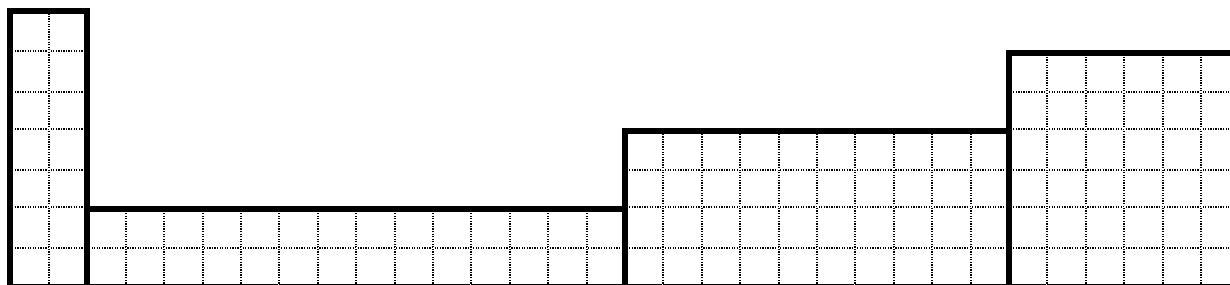


/6 pts. Total

28. Draw the phase diagram for water. Label its three (3) phases of matter- clearly label where they generally are found. /3 pts.



29. Fill in the orbital types for each block of the periodic table. /4 pts.



/7 pts. Total

