

CHM 151 Exam 1 - Chapters 1, 2, 5, and 6
Show all work and clearly mark answers to receive credit!

1) (5 pts) Circle the elements below that are **noble gases**. (Circle all that apply.)

Ne F Na Te Br Xe Fe Mg Kr Rb

B 2) (5 pts) Which of the following are chemical processes?

1. rusting of a nail
2. freezing of water
3. decomposition of water into hydrogen and oxygen gases
4. condensation of oxygen gas

a. 1 & 2

b. 1 & 3

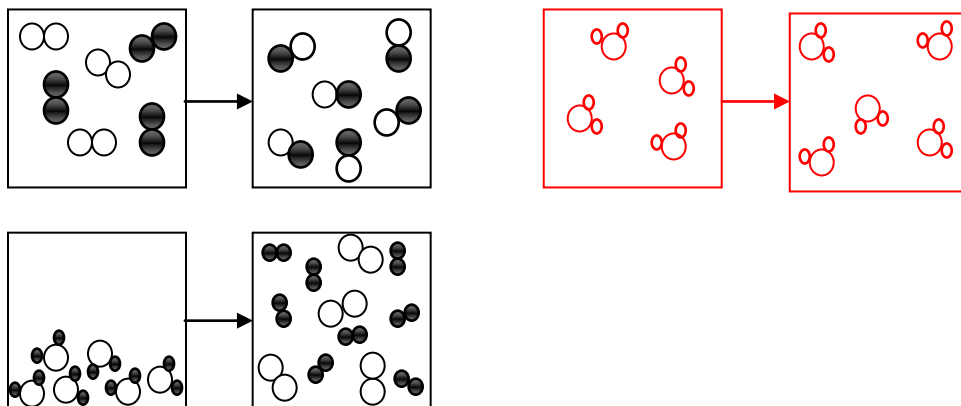
c. 1 & 4

d. 1, 3, & 4

e. 2, 3, & 4

3) (5 pts) Circle the reaction below that represents a **physical** change.

This was a typo. The boxes got rearranged in formatting and I didn't realize until too late. Sorry if it caused confusion during the test!



4) (3 pts) Circle the numbers below that have exactly **3** significant figures.

2309

1.341 x 10³

1.20

0.087

0.100

1200

5) (8 pts) Complete the following conversions (SHOW ALL WORK):

a) 56.78 cm² = 5.678 x 10⁻³ m²

b) 124.00 km = 1.2400 x 10⁸ mm

56.78 cm² (1 m² / 100² cm²) = 5.678 x 10⁻³

124.00 km (1000 m / 1 km) (1000 mm / 1m)
= 1.2400 x 10⁸

c) 13.5 lb = 6.12 kg
(1 lb = 453.59237 g)

13.5 lb (453.59237 g / 1 lb) (1 kg / 1000 g) = 6.12

C 6) (5 pts) Which one of the following pictures represents ${}^7\text{Li}^+$?

○ Proton ⊕ Neutron ● Electron

a.	b.	c.	d.	e.

7) (18 pts) True or False: circle your answer to each statement.

T F ${}^{24}\text{Mg}$ represents a neutral atom.

T F ${}^{16}\text{O}^{2-}$ and ${}^{16}\text{N}^{3-}$ have the same number of protons.

T F ${}^{53}\text{Cu}^{2+}$ has 27 electrons.

T F ${}^{11}\text{B}^{3+}$ has 11 neutrons.

T F The mass number of an atom is equal to the number of protons. The atomic number of an atom is equal to the sum of the number of protons and neutrons.

T F Rutherford's work showed that atoms contained negatively charged particles called electrons.

T F NaF is an ionic compound.

T F NO_3 is an ionic compound.

T F Planck contributed the idea of quantized energy to our current understanding of the atom.

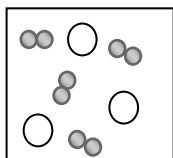
8) (6 pts) Element X has two stable isotopes. The first isotope has a mass of 68.93 amu and an abundance of 60.11%. The second isotope has a mass of 70.92 amu and an abundance of 39.89%. What is the average atomic mass of this element? What element is it?

Average atomic mass (you must show your work for this part!): 69.72 amu _____amu

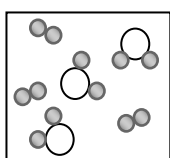
X: $(68.93 \text{ amu})(0.6011) + (70.92 \text{ amu})(0.3989) = \mathbf{69.72 \text{ amu}}$

Element: Ga (Gallium)

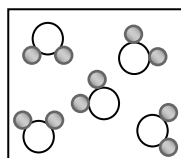
A, B 9) (4 pts) In the boxes below, atoms are represented by circles. Circle the box or boxes that contain a **mixture**?



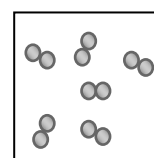
a.



b.



c.



d.

Name: KEY

Section: _____

10) (6 pts) Calculate the wavelength (in meters) of an empty coke can if its mass is 0.01396 kg and its velocity is measured to be 1.6129 m/s.

$$\lambda = h / mv = (6.626 \times 10^{-34} \text{ kgm}^2/\text{s}) / (0.01396 \text{ kg} * 1.6129 \text{ m/s}) = \underline{2.943 \times 10^{-32} \text{ m}}$$

11) (10 pts) Write electron configurations for atoms or ions of the following elements:

B (long hand): $1s^2 2s^2 2p^1$

Cr (short hand): $[\text{Ar}] 4s^1 3d^5$

Ca (short hand): $[\text{Ar}] 4s^2$

F⁻ (long hand): $1s^2 2s^2 2p^6$

Mn²⁺ (short hand): $[\text{Ar}] 4s^0 3d^5$

12) (8 pts) Indicate the number of valence electrons in atoms of the following elements:

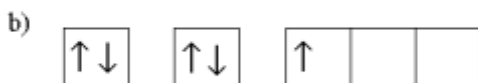
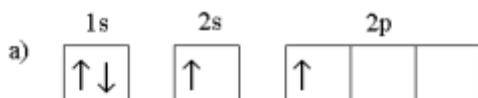
Rubidium 1

Magnesium 2

Carbon 4

Argon 8

A 13) (5 pts) Which orbital diagram represents a violation of the Aufbau Principle for an atom in its ground state?



14) (12 pts) Periodic Trends: Circle the atom or ion that has the largest value of the property listed.

Radius: Te Br Ar

Radius: Cl⁻ S²⁻ P³⁻

Radius: Mg²⁺ Mg

Ionization Energy: S Si Al

Electron Affinity: Cl F Br

Lattice Energy: LiCl MgCl₂ AlCl₃