

1(21). Circle the letter that represents the best response to each item.

The most common isotope of rubidium has an atomic number 37 and a mass number 85. Such an atom contains

- a) 48 protons, 37 neutrons, 48 electrons
- b) 37 protons, 48 neutrons, 37 electrons
- c) 37 protons, 37 neutrons, 48 electrons
- d) 37 protons, 85 neutrons, 37 electrons
- e) 39 protons, 46 neutrons, 39 electrons

In which hydrogen compound is the bond essentially ionic?

- a) NaH
- b) HCl
- c) NH₃
- d) CH₄
- e) HI

The contribution of the Thomson experiment to our understanding of atomic structure is

- a) charge-to-mass ratio
- b) determination of the electronic charge
- c) the concept of the nuclear atom
- d) the discovery of three types of radiation

The Thinkwell cd unit on units mentions several historical units of length. Which set of units are usually used for astronomical distances?

- a) furlong and light year
- b) parsec and league
- c) fathom and furlong
- d) parsec and light year

According to the Thinkwell cd, that which distinguishes a solid from a liquid is that the solid

- a) has a rigid shape and fixed volume
- b) assumes the shape of the container
- c) does not have a fixed shape
- d) has a density less than that of a gas

According to the Thinkwell cd, which is a homogeneous solution?

- a) beer (excluding the foam)
- b) granola/health bar
- c) fruit cocktail

In the Thinkwell cd unit on density, which canned beverage sank in water?

- a) diet cola
- b) regular sugar cola
- c) beer

2(10). The natural abundance of elemental neon is 90.51 % ^{20}Ne ($A = 19.99244$ u), 0.27 % ^{21}Ne ($A = 20.99395$ u), and 9.22 % ^{22}Ne ($A = 21.99138$ u). Calculate the average atomic mass (molar mass) of Ne. Watch sig fig.

3(5). A sign posted at Niagra Falls gives the flow rate as 150,000 gal s^{-1} (or in SI units as 567,810 L s^{-1}). Briefly discuss Professor Yee's problem with this information.

4(10). For the periodic table family containing the elements Be-Ra, give the following info:

family/group name _____

ion(s) formed _____

usual type of bonding with metals _____

behavior (metal/metalloid/nonmetal) _____

name of Sr _____

5(24). Nomenclature:

NCl_3 _____ iron(II) chloride _____

$\text{Mg}(\text{NO}_3)_2$ _____ aluminum perchlorate _____

XeF_4 _____ disulfur dichloride _____

6(15). A sample contains 155 g of calcium carbonate CaCO_3 . How many moles (amount of substance), how many formula units, and how many O atoms does this sample contain?

7(15). Cacodyl contains 22.88 % C, 5.76 % H, and 71.36 % As (by mass). Determine the empirical formula.

The approximate molar mass is 200 g mol^{-1} . Determine the molecular formula.