**Problem Set #3 -**  Moles, NA, Compound Names **Chemistry 3A Fall 2025 (Secs 43957 & 43958)  
2 pages**

1. Which of the following is one of Dalton’s theory on atoms:

a. All atoms are made of hydrogen  
b. Atoms can be created, divided or destroyed

\*c. Atoms can be rearranged in chemical reactions  
d. Atoms of same element have different mass and properties

2. Which of the following is correct about subatomic structure and properties?

a. neutrons have the smallest mass and zero charge

\*b. protons have a mass of about 1 amu and a positive charge

c. electrons have no mass at all despite having a negative charge

d. all the above are correct

e. none of the above are correct

3. Which of the following is true about the scientific method?

a. A hypothesis must precede (come before) observations

b. “The sky is blue” is a hypothesis

c. Generally a single experiment is always good enough to develop a theory

\* d. A theory is developed after observations leading to a hypothesis followed by experiments

4. “35.9 g of sodium chloride dissolving in 100 g water at 20°C” is an example of what?

a. hypothesis

b. experiment

\* c. observation

d. theory

5. Which of the following is false?

\* a. There are 8 main groups in the Periodic Table

b. Groups in the Periodic Table form the columns of the table  
c. Metals make up about 3 of 4 elements of the Periodic Table

d. Periods in the Periodic Table are the rows of the table

6. Which of the following is a halogen in the Periodic Table?

a. sodium (Na)

\* b. chlorine (Cl)

c. hydrogen (H)

d. magnesium (Mg)

7. Which of the following is true of metals?

a. they are very poor electrical conductors

\* b. they can conveniently be pulled into wires

c. they are the elements seen in the upper right part of the Periodic Table

d. all the above are true

8. Isotopes \_\_\_

a. are forms of atoms of an element that differ by the number of neutrons

b. can be referenced by the name of the element followed by the mass number

c. can occur in unstable forms and be radioactive

\* d. all the above are true

e. none of the above are true

9. The chemical symbol “F” on the Periodic Table:

a. refers to the atomic weight of sodium

b. is used with a numerical quantity to indicate a value in “femtograms”

\* c. indicates the element named fluorine

d. all the above are true

e. none of the above are true

10. What is true about the frequency of a wave?

a. it can be written a quantity which is a number with units of Hertz (Hz)

b. it is the number of waves that occur in a certain period of time

c. can be calculated as the speed of the wave divided by its wavelength

\* d. all the above are true

e. none of the above are true

11. Which of the following is false?

a. X-rays on the electromagnetic spectrum are different from visible light

b. White light can be observed as a spectrum of colors when passed through a prism

\* c. 1 nanometer is just another way of same 1 meter in wavelength as they are identical in length

d. One can measure the length of a wave by the distance between wave crests

12. The boiling point of water is:

a) 0 K

b) 0°C

\* c) 100°C

d) (5/9)K + 32

13. I have a metal bar that reads 53.93438 g and it displaces water in a 100 mL graduated cylinder to 9.3 mL. What is its calculated density? (Use a calculator)  
a. 100 ml/g

b. 5.8 g/mL

c. 5.8000 g/mL

d. 9.3 mL/g

e. Not enough information to calculate

14. A stainless steel object has a density of 8.0 g/cm3. You need to express this value in grams per milliliter (g/mL). What will you do as a mathematical expression to get this value in this form?

a. Take a measurement on an electronic balance to get data

b. Use a conversion factor

c. Use a constant of nature or math, like p or the speed of light

d. There is nothing you can use

15. For the problem in 14, if there is something you can use to change 8.0 g/cm3  to g/mL, what would that be?

a. the value of p

b. the inverse of 8.0 g/cm3

c. 1 mL/1 cm3

d. multiply by 1

e. multiply by ½ (0.5)

16. A solid brass object has a density of 8.73 g/cm3. It displaces 11.3 mL of water in a graduated cylinder. Calculate its mass.

a. 98.6 g

b. 0.773 g

c. 1.29 g

d. 20.0 g

17. What is 2,970,000 in scientific notation?

a.2.97 x 10-1

b. 0.297 x 102

c. 2.97 x 107

d.2.97 x 106

18. What is 34.9473 + 1.30 *to the correct precision* (significant figures and/or decimal places)?

a. 36.2473

b. 36

c. 36.25

d. 36.24

19. What aspect of the scientific method was not done before 200 years ago (the 1800s)?

a. careful observation

b. trying to explain observations through hypotheses

c. conducting experiments

d. developing theories through experiments

e. both (c) and (d)

20. A scientist weighs 10 insects and records the masses in her lab book. Which is a true statement?

a. She has made a hypothesis

b. What she did by this was to state a law

c. These are quantitative observations

d. These are all qualitative observations

21. A carbon atom has 6 protons and 6 neutrons and it has zero charge. What is a true statement?

a. It has 6 electrons

b. This is a carbon-13 isotope

c. The mass number A is 6

d. (a) and (b) are true

e. (a) and (c) are true

22. Oxygen has 8 protons. What is a true statement?

a. All the protons move in an orbit around 8 neutrons

b. This is an isotope with the name Oxygen-16

c. The Z number of oxygen is 8

d. both (b) and (c) are true  
e. There is no true statement

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