AP Chemistry
Summer Review Practice Quiz
Practice Quiz DUE ☞ 2nd day of AP Chemistry

In Class Quiz ☞ 3rd day of AP Chemistry

Directions: Answer each multiple choice question. Then, justify your answer – explain why it's right!

1. _____ Joe chemistry student wants to perform an experiment to measure out exactly 6.0 mL hydrochloric acid. Which piece of glassware will give him the most accurate measurement?
   A. 10 mL beaker
   B. 10 mL graduated pipet
   C. 10 mL graduated cylinder
   D. 10 mL syringe
   Justify your answer: Narrower pieces of glassware are better. Pipets are the skinniest pieces of glassware, so they are more accurate.

2. _____ Jane chemistry student is performing an experiment that requires her to use 15mL of sodium hydroxide solution. She is using a graduated cylinder to measure it. How should she properly read the volume of solution?
   A. Get low, so her head is level with the liquid, and read the bottom of the meniscus to 15 mL.
   B. Hold the graduated cylinder a little below eye level and read the bottom of the meniscus to 15 mL.
   C. Hold the graduated cylinder at eye level and read the bottom of the meniscus to 15 mL.
   D. Hold the graduated cylinder a little above eye level and read the bottom of the meniscus to 15 mL.
   Justify your answer: Have the glassware on a flat surface, don't hold it. Also, always read the bottom of the meniscus.

3. _____Sam chemistry student measures the volume of a liquid as 22 mL using a graduated cylinder. He measures the mass of the liquid using an analytical balance to be 21.354 g. Using correct sig figs, what is the density of the liquid?
   A. 1.030 g/mL   B. 1.03 g/mL   C. 1 g/mL   D. 1.0 g/mL   1.0303 g/mL
   Justify your answer: This is actually still incorrect—it should be 0.97 g/mL. It should have 2 significant figures, and density is mass/volume.

4. _____Calculate the following answer. Which answer has the correct sig figs?

   $$\frac{33.4 \times 100.5}{9.9}$$

   A. 339.06   B. 339   C. 340   D. 339.1
   Justify your answer: Answer should contain 2 significant figures because that is the least amount in the numbers in the original calculation. 339.06 rounded to 2 sig figs is 340.

5. _____Calculate the following answer and round to correct sig figs

$$2 + 1.2 + 13.80 + 7.5 = ?$$

A. 20   B. 25   C. 24.50   D. 24.5

Justify your answer: For adding and subtracting, we want the least digits after the decimal point. The least digits after the decimal point is none, so we round or final answer so there are no digits after the decimal point.

6. _____Calculate the following answer. How many sig figs should the answer contain?

$$\frac{77.32 - 41.6}{8.29 + 4.1}$$

A. 1   B. 2   C. 3   D. 4

Justify your answer: The mult/division rule trumps the addition/subtraction rule. Round to 2 total significant figures.

7. _____The measurement 0.0000043 m, expressed correctly using scientific notation, is

A. 4.3 m   B. 0.43 x 10^{-5} m   C. 4.3 x 10^{-6} D. 4.3 x 10^{-7} E. 4.3 x 10^{-5}

Justify your answer: The number in front is 4.3 because we always only put one digit before the decimal point. The exponent is -6 because we move the decimal 6 times to the right. Remember that small numbers have negative exponents.

8. _____Calculate the following answer. Which is the correct answer in scientific notation given with proper sig figs?

$$\frac{(2.0 \times 10^{-4})\ (0.19 \times 10^{3})}{(300 \times 10^{2})}$$

A. .001 x 10^{1} B. 1. x 10^{-2} C. .001 x 10^{-3} D. 1. x 10^{-6}

Justify your answer: While you can do this with a calculator, you can also do this using the scientific notation shortcuts. 2 x 0.19 ÷ 300 = 0.001 = 1 x 10^{-3}. For the exponents, multiplying adds exponents while dividing subtracts. -4 + 3 – 2 = -3. So we have 1 x 10^{-3} x 10^{-3} = 1 x 10^{-6}.

9. _____ A nugget of gold with a mass of 521 g is added to 50.0 mL of water. The water level rises to a volume of 77.0 mL. What is the density of the gold?

A. 6.77 g/mL   B. 1.00 g/mL   C. 19.3 g/mL   D. 0.0518 g/mL   E. 10.4 g/mL

Justify your answer: The mass is 521 g. The volume, calculated by displacement of water, is 77 – 50 mL = 27 mL. Density = mass/volume = 521/27= 19.3

10. _____ According to the density in #9 above, will the gold float or sink in water?

Justify your answer in terms of the densities of gold and water: Definitely sink. Water's density is 1.0 g/mL, while gold's is 19.3 g/mL. Gold is more dense, thus it will sink.

11. _____ A doctor's order is 0.125 g of ampicillin. The liquid suspension on hand contains 250 mg/5.0 mL. How many milliliters of the suspension are required?

A. 0.0063 mL   B. 2.5 mL   C. 6.3 mL   D. 3.0 mL   E. 0.0025 mL

Justify your answer:

$$0.125\ g \times \frac{1000\ mg}{1\ g} \times \frac{5.0\ mL}{250\ mg} = 2.5\ mL$$

12. _____ According to the United States Food and Drug Administration, the recommended daily requirement of protein is 44 g. This is _____ of protein.

A. 150 000 oz   B. 320 000 oz   C. 1248.5 oz   D. 1.6 oz   E. 0.0605 oz

Justify your answer:

$$44\ g \times \frac{1\ oz}{28.35\ g} = 1.6\ oz$$

13. _____Which of the following mass units is the largest?

A. 1 cg   B. 1 dg   C. 1 mg   D. 1 ng   E. 1 g

Justify your answer: cg = centigram, which is .01 g. dg = decigram, which is .1 g. mg = milligram, which is .001 g. ng = nanogram, which is 10^{-9} g. A gram is the largest.

14. _____ 9.31 g is the same mass as

A. 93.1 cg   B. 9310 mg   C. 931 kg   D. 0.0931 dg   E. 931 mg

Justify your answer: Remember, shift the decimal pt. left or right along the line for each step.

K H D base d c m

.00931 kg = .0931 hg = .931 Dg = 9.31 g = 93.1 dg = 931 cg = 9310 mg

15. _____ Janet experiments with a piece of aluminum in ap chemistry and finds that the density of her sample is 2.850 g/cm³. Her textbook indicates that the actual the density of aluminum is 2.699 g/cm³. What is Janet's percent error?

A. 5.30 %   B. 5.60%   C. 5.298%   D. 5.595%   E. 5.5950%

Justify your answer:

$$\% \ error = \frac{|measure - accepted|}{accepted} \times 100 = \frac{|2.850 - 2.699|}{2.699} \times 100 = 5.595\%$$

16. _____ Which of the following statements about atoms is true?

A. The nucleus of an atom is neutral
B. Electrons are very close to the nucleus
C. Electrons are smaller than protons so they are less charged than protons
D. Electrons are larger than protons so they are less charged than protons
E. Electrons are smaller than protons but they are equally charged

Justify your answer: The nucleus is positive. Electrons are far away from the nucleus compared by their size. Electrons are smaller than protons, but they have equal sizes of charge—one is positive one and the other is negative one.

17. _____ What is the sum of the neutrons for Nitrogen-15, Silver-109, and Silicon-30?

A. 82   B. 90   C. 86   D. 84   E. 88

Justify your answer: Neutrons = mass # - protons. Nitrogen = 15 – 7 = 8. Silver = 109 – 47 = 62. Silicon = 30 – 14 = 16.
8 + 62 + 16 = 86

18 . _____ What is the number of electrons in the outermost energy level of an oxygen atom?

A. 2   B. 4   C. 6   D. 8   E. 16

Justify your answer: Outermost energy level are valence electrons. You can determine valence electrons by group number. Oxygen is in group 16, it has 6 valence electrons.

19. _____ Which of the following ions/atoms is isoelectronic (same electrons) as Neon?

A. O^{-2} B. S^{2-} C. Li^+ D. Mg   E. P

Justify your answer: Isoelectronic means they have the same number of electrons. Neon has 10 electrons. Oxygen usually has 8, but a minus 2 charge means it has gained two. 8 + 2 = 10.

20. _____ The elements I and Te have similar average atomic masses. A sample that was believed to be a mixture of I and Te was run through a mass spectrometer which separates a sample by mass into isotopes, resulting in the data below. All of the following statements are true. Which one would be the best basis for concluding that the sample was pure Te?

Relative Abundance (%) — Mass Number (amu): 122 123 124 125 126 127 128 129 130
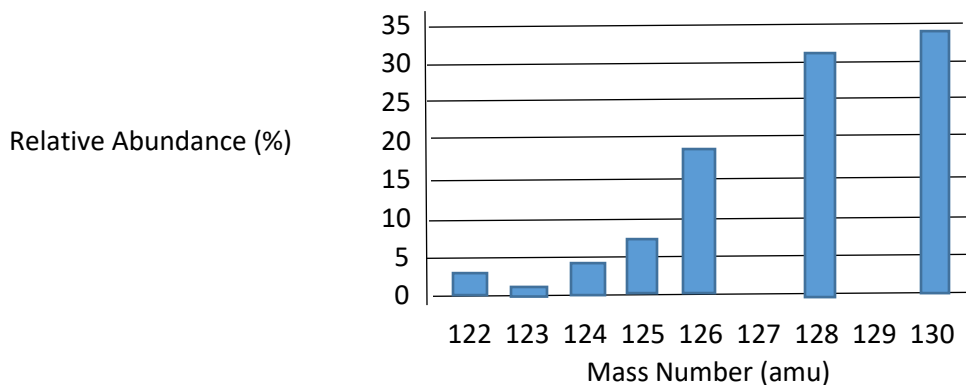
A. Te forms ions with a -2 charge, whereas I forms ions with a -1 charge.
B. Te is more abundant than I in the universe.
C. I consists of only one naturally occurring isotope with 74 neutrons, whereas Te has more than one isotope
D. I has a higher first ionization energy than Te does.

Justify your answer: The graph shows different isotopes by mass. Remember that isotopes of an element have a different number of <u>neutrons</u>, giving them a different mass number. If Iodine only has one isotope with 74 neutrons, it's mass should be 127 (74 neutrons + 53 protons). There is no peak at 127, so the mixture must not have any iodine.

21. _____Rutherford's famous Gold Foil Experiment showed which of the following?
    A. Every atom has a small, very dense, positively charged nucleus
    B. Atoms have positive and negative charges scattered evenly throughout the atom
    C. Atoms have an equal number of protons and neutrons in the nucleus
   D. Neutral atoms have an equal number of protons and electrons
    Justify your answer: From summer notes.

22. _____Which of the following statements about the discovery of the electron are true?
    A. Dalton performed the oil drop experiment which showed the electron had a mass of 9.11x10^{-31}kg.
    B. JJ Thomson found the mass of the electron using drops of oil.
    C. Robert Milikan used a cathode ray tube to prove that electrons have a negative charge that he named the electron.
    D. JJ Thomson used a cathode ray tube to prove that electrons have a negative charge that he named the electron.
    Justify your answer: From summer notes.

23. _____ The diagram below models a change that occurs in matter.
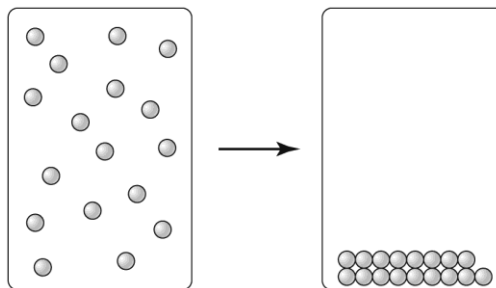
Based on what you know about changes in matter, explain why the diagram shows a physical change rather than a chemical change.
A. The particles get smaller.
B. The volume of the matter decreases.
C. The composition of the matter stays the same.
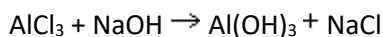D. The particles change into particles of different substances.
Justify your answer: In physical changes, the bonds/particles do not change. In this diagram they did not change, they just condensed. This represents gas becoming liquid or solid.

24. _____ Which of the following is true for all chemical reactions?
    A. The total mass of the reactants increases.
    B. The total mass of the products is greater than the total mass of the reactants.
    C. The total mass of the products is less than the total mass of the reactants.
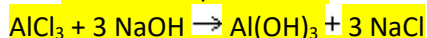   D. The total mass of the reactants equals the total mass of the products.
    Justify your answer: Law of conservation of mass (definition)

25. _____What is the sum of the coefficients that will balance the equation below?
    $$AlCl_3 + NaOH \rightarrow Al(OH)_3 + NaCl$$
    A. 4   B. 6   C. 8   D. 10   E. 12
    Justify your answer: Balanced equation is…
    $$AlCl_3 + 3\ NaOH \rightarrow Al(OH)_3 + 3\ NaCl$$
    Sum is 1 + 3 + 1 +3 = 8

26. _____ What compound is formed when potassium and arsenic are combined?
    A. K_2As B. KAs_2 C. K_3As D. KAs_3 E. KAs
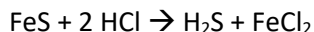   Justify your answer: K forms the ion +1. As forms the ion -3. To balance the charges, 3 K atoms would be needed.

27. _____ What is the balanced equation for the combustion of butane?
    A. $C_4H_{10} + 13\ O_2 \rightarrow 4\ CO_2 + 5\ H_2O$
    B. $C_4H_{10} + 4\ O_2 \rightarrow 4\ CO_2 + 5\ H_2O$
    C. $C_4H_{10} + 4\ O_2 \rightarrow 4\ CO_2 + 8\ H_2O$
    D. $C_4H_{10} \rightarrow 4\ C + 5\ H_2$
    E. $2\ C_4H_{10} + 13\ O_2 \rightarrow 8\ CO_2 + 10\ H_2O$
    Justify your answer: D does not represent combustion—combustion is always a hydrocarbon + O_2 forms water and carbon dioxide. E is the correctly balanced equation. Make sure to add the oxygens on the products side when balancing!

28. _____ What type of reaction is the following:
    $$FeS + 2\ HCl \rightarrow H_2S + FeCl_2$$
    A. Synthesis B. Decomposition   C. Combustion   D. Single Replacement
    F. Double Replacement
    Justify your answer: Two ionic compounds swap their ions.

29. _____ The following reaction is a synthesis reaction. Predict the product:
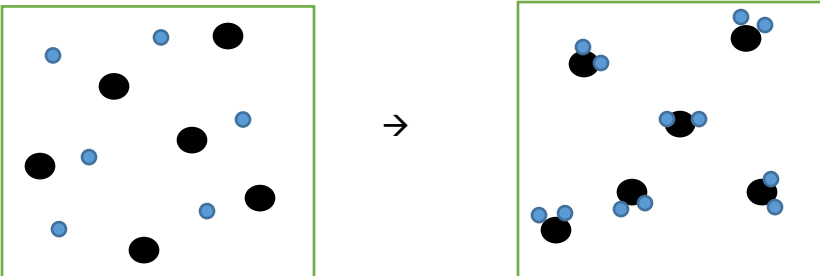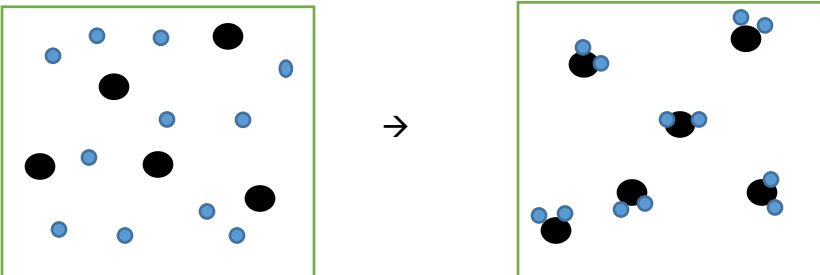$$CaO + CO_2 \rightarrow ?$$
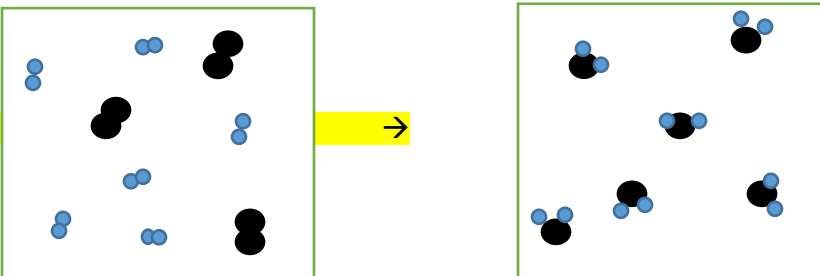A. $CaOCO_2$ B. CaO_3C C. CO_2Ca D. $CaCO_3$ E. O_3CCa

Justify your answer: Just…don't worry about this problem. This is beyond the scope of the AP exam.
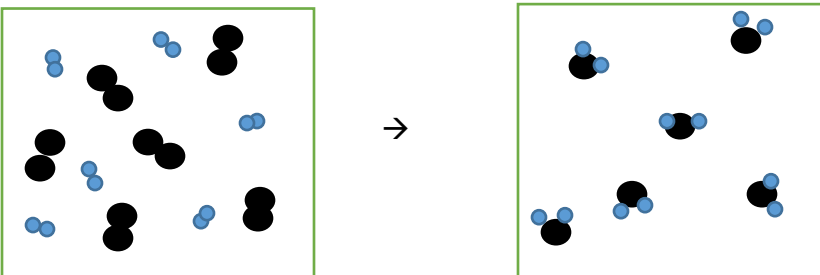
30. _____Which of the following particulate diagrams best shows the formation of water vapor from hydrogen gas (H_2) and oxygen gas (O_2) in a rigid container at 125°?
Hint: Balance the equation first!

A.

B.

C.

D.

Justify your answer: Balanced equation is $2 H_2 + O_2 \rightarrow 2 H_2O$. A and B are wrong because they show individual atoms, not diatomic molecules for H_2 and O_2. Additionally, because of the coefficients we should have twice as much H_2 (small circles) as O_2 (large circles). This makes C the correct answer.