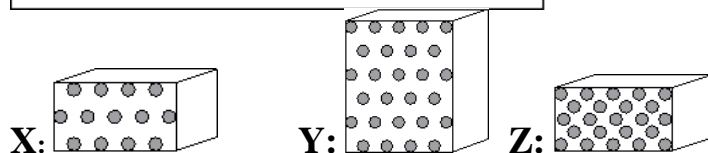


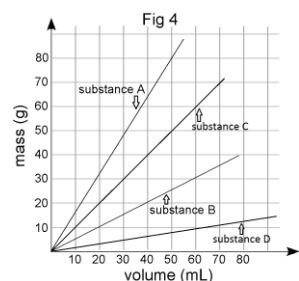
Chem-H, Exam Study Guide, S1, 2013, 2

1. Assume a beaker of pure water has been boiling for 30 minutes. What is in the bubbles in the boiling water?
 - a. Air.
 - b. Oxygen gas and hydrogen gas.
 - c. Oxygen gas.
 - d. Gaseous water.
2. You dampen a tissue and put it into a jar. You close the lid tightly and set it in the sun. After a while you notice that the jar looks kind of cloudy, and small water droplets are on the inside of the jar. What has happened to the mass of the tissue/jar system?
 - a. The mass has increased
 - b. The mass has decreased
 - c. The mass has not changed
 - d. The mass could increase or decrease depending on the type of liquid.
3. Iron combines with oxygen and water from the air to form rust. If an iron nail were placed in a beaker and allowed to rust for a month, one should find that the rusty nail weighs:
 - a. less than the original nail.
 - b. the same as the original nail.
 - c. more than the original nail.
 - d. It is impossible to predict.
4. What is the reason for your answer to question 4?
 - a. Rusting makes the nail lighter.
 - b. The flaky rust weighs less than iron.
 - c. The nail flakes away.
 - d. Rust contains iron and oxygen

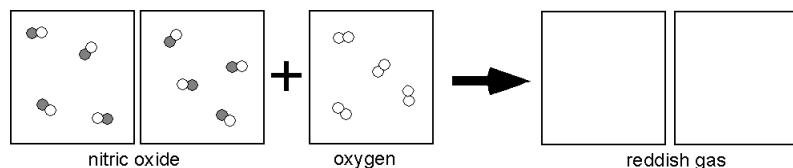
Study the matter in the figure at right. Assume the particles are uniformly distributed throughout each object, and particles of the same size have the same mass.



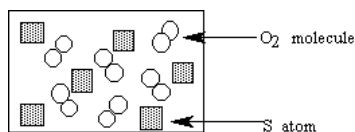
5. Which of the following correctly ranks the density of the three objects?
 - a. $X < Y < Z$
 - b. $X < Z < Y$
 - c. $X = Y < Z$
 - d. $X = Z < Y$
6. A shiny, new iron nail is found to have a mass of 1.20g. It is placed in a beaker which is set aside. A month later the nail appears to be covered with rust, which is formed by the reaction of iron and oxygen. The mass of the rusty nail is
 - a. 1.20 g
 - b. less than 1.20 g
 - c. more than 1.20 g
 - d. impossible to tell.
7. Which one of the following statements best explains your answer to the previous question?
 - a. Rust is softer and less dense than iron.
 - b. Oxygen slowly decomposes the iron away, leaving only rust behind.
 - c. Oxygen reacts with the iron, but since it is a gas, it adds no mass.
 - d. The mass of the oxygen is added to the mass of the nail.
8. A piece of aluminum is cut in half. How does the density of each half compare to the density of the original piece?
 - a. The density of each half is greater than the density of the original piece.
 - b. The density of each half is less than the density of the original piece.
 - c. The density of each half is the same as the density of the original piece.



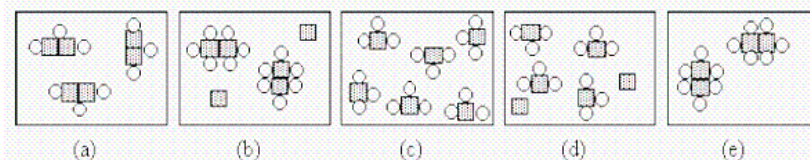
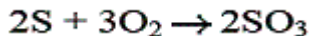
9. Using the above graph, which substance has the smallest density.
- | | |
|------|------|
| a. A | c. C |
| b. B | d. D |



10. Two volumes of nitric oxide react with one volume of oxygen gas to form two volumes of a reddish-brown gas. Deduce the formula of this gas
 - a. NO
 - b. N₂O
 - c. NO₂
 - d. N₂O₂
11. Using the particle diagram above, predict how many molecules of product form if all the reactants are nitrogen and oxygen are used up.
 - a. 2
 - b. 4
 - c. 6
 - d. 8
12. The diagram represents a mixture of sulfur (S) atoms and oxygen (O₂) molecules in a closed container.



Which diagram shows the results after the mixture reacts as completely as possible according to the equation:



- a. (a) d. (d)
b. (b) e. (e)
c. (c)
13. What is the reason for your answer to the prior question?
a. The mass of each cubic centimeter of c. Reducing the volume of the sample increases

- aluminum is unchanged.
- b. Reducing the mass of the sample reduces the density.
- d. None of these accounts for what happens to the density.

For the next two questions refer to the following:

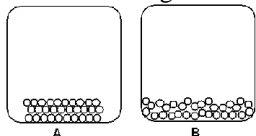
The evening before a birthday party, you fill several balloons with helium gas.



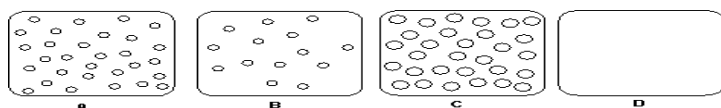
The birthday party occurs on a hot summer day.

14. A guest at the party dives into the swimming pool holding an inflated balloon. The balloon gets smaller when she dives to the bottom of the pool. Which of the following explains this observation?
- Some of the helium particles escaped through pores in the latex.
 - The helium particles became smaller than before.
 - The helium particles lost their strength.
 - The particles moved closer to each other.
15. The next day (the same hot temperature) the latex balloons are noticeably smaller. Which of the following explains this observation?
- Some of the helium particles escaped through pores in the latex.
 - The helium particles became smaller than before.
 - The helium particles lost their strength.
 - The particles moved closer to each other.
16. You heat water on your kitchen stove until it boils. While the water is boiling, the temperature of the water ...
- increases.
 - decreases.
 - does not change
 - increases and decreases periodically (that is, back and forth).
 - None of the above answers are correct.

The diagram below shows two sealed containers, each containing 25 g of a substance. The circles represent particles of matter magnified large enough to be seen.



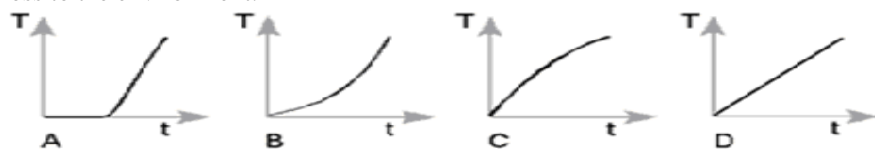
17. Which diagram above represents particles as a liquid?
- A
 - B
 - neither
 - None of the above answers are correct.
18. The substance in the previous question was allowed to evaporate completely to a gas. Which of the diagrams below best represents the contents of the sealed container?



- a. A
b. B
c. C
d. D
e. None of the above answers are correct.

A mixture of ice and water is heated from 0°C to 5°C in five minutes using a hot plate. The hot plate provides a constant rate of heat output during this time.

19. Choose the graph which best describes the change in temperature of the water (T) as a function of time (t), neglecting any heat loss to the environment:



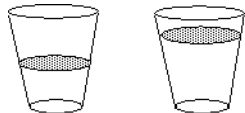
- a. The temperature stays constant for a while, then rises (A)
b. The temperature rises more slowly at first, then faster (B)
c. The temperature rises more rapidly at first, then slower (C)
d. The temperature rises at a constant rate (D)
20. A controlled experiment allows the scientist to isolate and test
- a. a conclusion
b. a mass of information
c. several variables
d. a single variable

Liquid Temperatures in degrees Celsius ($^{\circ}\text{C}$)					
Liquid	0 min.	15 min.	30 min.	45 min.	60 min.
A	97	83	70	67	52
B	97	72	54	36	21
C	97	78	64	56	40
D	97	92	87	81	76

21. Referring to the above data above, which liquid had the smallest temperature change during the 60 minutes?
- a. A
b. B
c. C
d. D

For the next two questions refer to the following:

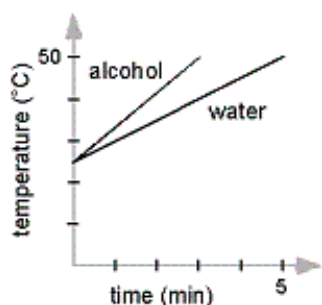
You decide to share some sugar-sweetened fruit juice with your friend. You divide the fruit juice equally into two glasses. You then add an equal volume of water to Glass B.



Glass A

Glass B

22. Which glass contains the sweeter tasting drink?
- Glass A
 - Glass B
 - Glass A and Glass B contain drinks that are equally sweet.
 - There is not enough information to tell.
23. Which glass contains more sugar?
- Glass A
 - Glass B
 - Both glasses contain equal amounts of sugar.
 - There is not enough information to tell.
24. Equal masses of water and alcohol, both at 25°C , are heated at the same rate under identical conditions. After 3 minutes the temperature of the alcohol is 50°C . It took 5 minutes for the water to reach 50°C . Which of the following is true once the water and alcohol have both reached 50°C ?



- The water received more energy than the alcohol.
- The alcohol received more energy than the water.
- Both received the same amount of energy.
- It is impossible to tell from the information given.

For the next two questions refer to the following following situation:
You spray a strong perfume in the center of a sealed (airtight) room.



A



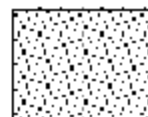
B



C



D



E

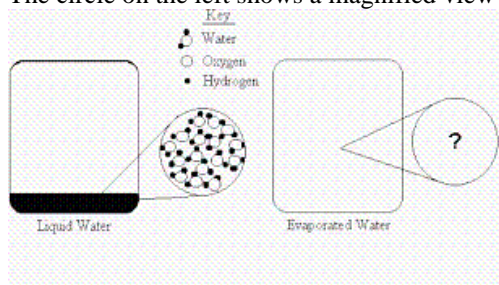
25. Which of the diagrams above represents how the perfume particles are spaced (distributed) a few seconds after you sprayed the perfume?
- A
 - B
 - C
 - D
 - E

26. Which of the diagrams above represents how the perfume particles are spaced (distributed) several hours after you sprayed the perfume?
- A
 - B
 - C
 - D
 - E
27. Scientists planted an equal number of plants in different soil conditions. After 7 days, they counted the number of plants still alive. The following data were collected. What variables were tested in the experiment?

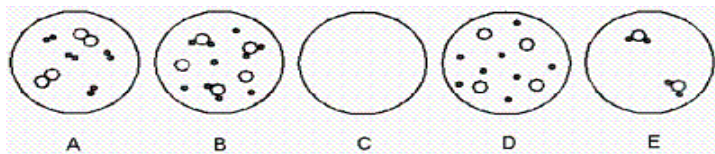
EFFECT OF SOIL CONDITIONS ON PLANTS

Light Exposure	Soil Temperature	Soil Moisture	Number of Surviving Plants
Medium	25°C	Moist	10
Medium	25°C	Dry	6
Medium	45°C	Moist	2
Medium	45°C	Dry	1

- soil temperature and soil moisture
 - soil moisture and light exposure
 - light exposure and soil temperature
 - soil moisture and soil composition
28. A glass of cold milk sometimes forms a coat of water on the outside of the glass (often referred to as 'sweat'). How does most of the water get there?
- Water molecules from the air condense onto the outside of the glass.
 - Water molecules from the milk pass through the glass and condense on the outside of the glass.
 - Water molecules evaporate from the milk and condense on the outside of the glass.
 - The coldness causes oxygen and hydrogen from the air to combine on the glass forming water.
29. What is the weight of the solution when 1 pound of salt is dissolved in 20 pounds of water?
- More than 21 pounds.
 - 21 pounds.
 - Between 20 and 21 pounds.
 - 20 Pounds.
 - Less than 20 pounds.
30. The circle on the left shows a magnified view of a very small portion of liquid water in a closed container.



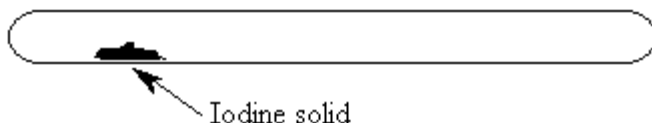
What would the magnified view show after the water evaporates?



- (a)
- (b)
- (c)
- (d)
- (e)

c. (c)

31. A 1.0-gram sample of solid iodine is placed in a tube and the tube is sealed after all of the air is removed. The tube and the solid iodine together weigh 27.0 grams.



The tube is then heated until all of the iodine evaporates, filling the tube with iodine gas. After heating, the total mass will be:

- a. less than 26.0 grams.
 - b. 26.0 grams.
 - c. 27.0 grams.
 - d. 28.0 grams.
 - e. more than 28.0 grams.
32. A guest at the party dives into the swimming pool holding an inflated balloon. The balloon gets smaller when she dives to the bottom of the pool. Which of the following explains this observation?
- a. Some of the helium particles escaped through pores in the latex.
 - b. The helium particles became smaller than before.
 - c. The helium particles lost their strength.
 - d. The particles moved closer to each other.
33. Why does the sugar dissolve faster in the hot coffee?
- a. The sugar particles cease to exist faster when in a hot liquid.
 - b. The particles of hot liquid bump into the sugar particles more often.
 - c. The sugar becomes a liquid faster in a hot liquid.
 - d. The sugar forms a new substance faster in a hot liquid.

For the next two questions refer to the following:

You put the same amount of water at room temperature into three beakers of equal size. Then you add the same mass of sugar to each beaker, but you add it in these different forms: a cube of sugar into beaker A, granulated sugar into beaker B, and powdered sugar into beaker C.



A
Sugar cube added



B
Granulated sugar added



C
Powdered sugar added

34. In which beaker will the sugar dissolve most rapidly?
- a. A
 - b. B
 - c. C
 - d. The sugar will finish dissolving at the same time in all 3 beakers.
35. After all the sugar is dissolved in each beaker, you let the water totally evaporate very slowly. What is left in each beaker?
- a. Nothing.
 - b. A sugar cube in beaker A, granulated sugar in beaker B, and powdered sugar in beaker C.
 - c. Beaker A contains more sugar than either beaker B or beaker C.
 - d. An equal mass of crystalline sugar will be left in each beaker.
 - e. Beaker C contains more sugar than either beaker A or beaker B.

36. You put object B into a bucket of water. It sinks to the bottom. You take it out, and cut it in half. Then you put one piece into the bucket. What happens?
- The piece sinks to the bottom.
 - The piece floats.
 - The piece sinks part way.
 - You can't tell how the piece will behave.

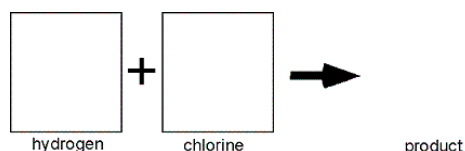
For the next two questions refer to the following:

Below is a list of substances and their densities:

water	1.00 g/mL
iron	7.87 g/mL
lead	11.34 g/mL.

You are given a 1.00 kilogram sample of each.

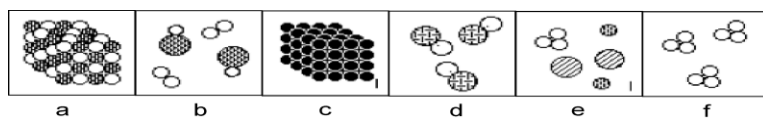
37. Which sample has the greatest mass?
- The water
 - The lead
 - The iron
 - They all have the same mass.
38. Which sample has the greatest volume?
- The water
 - The lead
 - The iron
 - They all have the same volume.
39. This substance consists of two or more elements in a fixed mass ratio.
- element
 - mixture
 - compound
 - pure substance
40. This substance cannot be broken down by physical or chemical means.
- compound.
 - mixture.
 - element.
 - atom.
41. Chemically combined substance always combine in same
- mass
 - volume
 - density
 - ratio
42. This substance consists of two or more elements in a fixed mass ratio.
- element
 - compound
 - mixture
 - pure substance



43. One volume of H_2 combines with one volume of Cl_2 to form hydrogen chloride. How many volumes of hydrogen chloride form??
- 0
 - 1
 - 2
 - 3
 - 4
44. Four molecules of H_2 combines with four molecules of Cl_2 to form hydrogen chloride. How many molecules of hydrogen chloride form??
- 2
 - 4
 - 8
 - 16

- c. 6
45. Which of the following is not true about one mole?
- one mole contains 6.02×10^{23} particles
 - 12 g of carbon equals one mole of carbon atoms
 - the mass of 1 mole of carbon atoms = the mass of 1 mole of boron atoms
 - the number of atoms in 1 mole of carbon = the number of atoms in 1 mole of boron
46. The number oxygen atoms represented by the formula $\text{Pb}(\text{C}_2\text{O}_4)_2$ is
- 2
 - 4
 - 6
 - 8
47. How many moles of tungsten atoms are in 4.8×10^{25} atoms of tungsten?
- 8.0×10^1 moles
 - 8.0×10^{-1} moles
 - 1.3×10^{-2} moles
 - 1.3×10^2 moles
48. How many moles of silver atoms are in 1.8×10^{20} atoms of silver?
- 3.0×10^{-4}
 - 3.3×10^{-3}
 - 3.0×10^{-2}
 - 1.1×10^{44}
49. How many atoms are in 0.075 mol of titanium?
- 1.2×10^{-25}
 - 2.2×10^{24}
 - 6.4×10^2
 - 4.5×10^{22}
50. How many molecules are in 2.10 mol CO_2 ?
- 2.53×10^{24} molecules
 - 3.79×10^{24} molecules
 - 3.49×10^{-24} molecules
 - 1.26×10^{24} molecules
51. What is the mass in grams of 5.90 mol C_8H_{18} ?
- 0.0512 g
 - 19.4 g
 - 389 g
 - 673 g
52. What is the number of moles in 432 g $\text{Ba}(\text{NO}_3)_2$?
- 0.237 mol
 - 0.605 mol
 - 1.65 mol
 - 3.66 mol

Matching



Multiple choice f is answerd by bubbling in “a”.

- | | |
|------|------|
| a. a | d. d |
| b. b | e. e |
| c. c | f. f |

53. a mixture of molecules
54. atoms of a pure metal
55. molecules of an element
56. a solid compound
57. a mixture of element