

## Pre-AP Chemistry

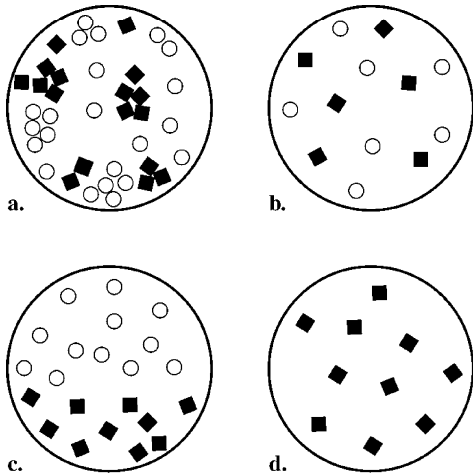
## Midterm Review 2016

## Part 1

**Multiple Choice**

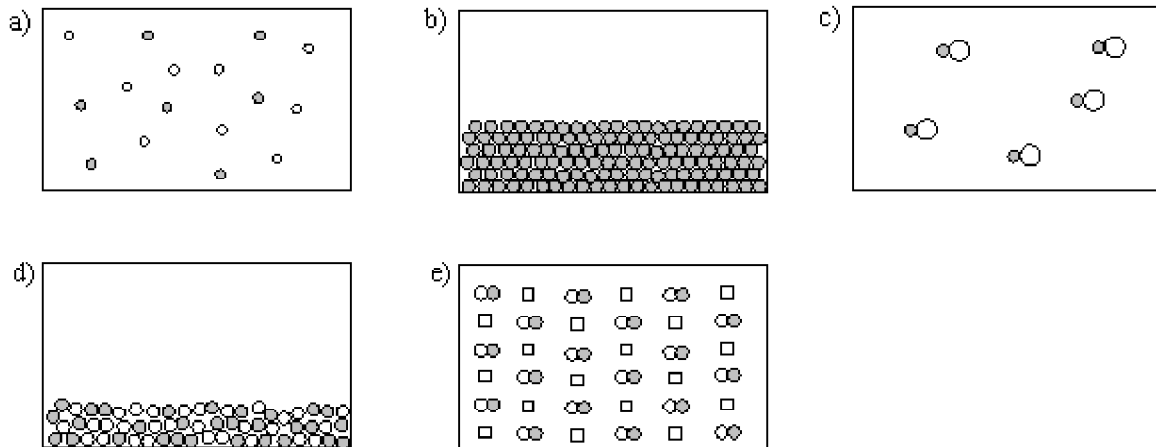
Identify the choice that best completes the statement or answers the question.

- \_\_\_\_\_ 1. How many significant figures are in 6,051.00?  
a. 5                      b. 3                      c. 4                      d. 6
- \_\_\_\_\_ 2. Which of the following is a physical change?  
a. corrosion              b. food spoilage              c. explosion              d. evaporation
- \_\_\_\_\_ 3. A metal solution is a(n)  
a. alloy.                      b. electrolyte.              c. colloid.              d. suspension.
- \_\_\_\_\_ 4. Which of the following CANNOT be classified as a substance?  
a. air                      b. nitrogen              c. table salt              d. gold
- \_\_\_\_\_ 5. A chemical change occurs when a piece of wood \_\_\_\_\_.  
a. is painted              b. is split              c. is cut              d. decays or rots
- \_\_\_\_\_ 6. What causes the high density of solids?  
a. The particles are more massive than those in liquids.  
b. The particles are packed closely together.  
c. The intermolecular forces between particles are weak.  
d. The energy of the particles is very high.
- \_\_\_\_\_ 7. The compressibility of a liquid is generally  
a. infinite.                      c. more than that of a gas.  
b. equal to that of a gas.              d. less than that of a gas.
- \_\_\_\_\_ 8. What units is mass measured in using the metric system?  
a. grams                      b. liters                      c. meters                      d. pounds
- \_\_\_\_\_ 9. All of the following changes to a metal are physical changes EXCEPT \_\_\_\_\_.  
a. polishing                      c. rusting                      e. melting  
b. cutting                      d. bending
- \_\_\_\_\_ 10. Which of the following does NOT involve a physical change?  
a. mixing                      b. melting                      c. grinding                      d. tarnishing



11. Which part of the illustration above shows the particles in a heterogeneous mixture?  
 a. a                      b. b                      c. c                      d. d

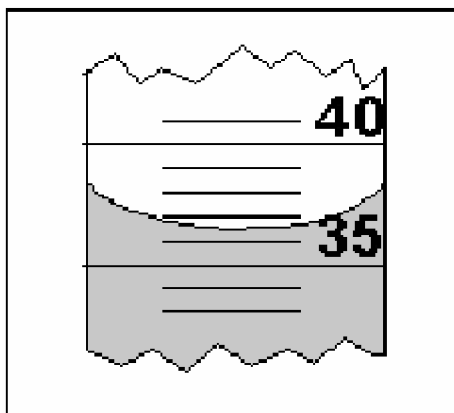
Consider the following choices when answering the next two questions.



12. Which best represents a heterogeneous mixture of two elements?  
 a. option a      b. option b      c. option c      d. option d      e. option e
13. Which best represents a gaseous compound?  
 a. option a      b. option b      c. option c      d. option d      e. option e
14. The energy level of the particles in a solid is  
 a. high enough to allow the particles to interchange with other particles.  
 b. higher than the energy of the particles in a gas.  
 c. lower than the energy of the particles in liquids and gases.  
 d. higher than the energy of the particles in a liquid.
15. Which state of matter has a definite volume and takes the shape of its container?  
 a. liquid    c. gas  
 b. both a liquid and a gas                      d. solid

- \_\_\_\_\_ 16. One difference between a mixture and a compound is that \_\_\_\_\_.
- a mixture can only be separated into its components by chemical means.
  - a mixture must be uniform in composition.
  - a compound can only be separated into its components by chemical means.
  - a compound is made up of more than one phase.
- \_\_\_\_\_ 17. Which of the following is a chemical property?
- freezing point
  - color
  - density
  - reactivity with oxygen
- \_\_\_\_\_ 18. Which of the following is a homogeneous mixture?
- soil
  - beef stew
  - salt water
  - raisin bread
  - sand and water
- \_\_\_\_\_ 19. \_\_\_\_\_ are substances with constant composition that can be broken down into elements by chemical processes.
- Quarks
  - Compounds
  - Heterogeneous mixtures
  - Solutions
  - Mixtures
- \_\_\_\_\_ 20. Which of the following is a true statement about homogeneous mixtures?
- They have compositions that never vary.
  - They are known as solutions.
  - They consist of two or more phases.
  - They can consist only of liquids.
- \_\_\_\_\_ 21. Which of the following is NOT a pure substance?
- mercury
  - liquid helium
  - apple juice
  - liquid oxygen
- \_\_\_\_\_ 22. A vapor is which state of matter?
- gas
  - plasma
  - liquid
  - solid
- \_\_\_\_\_ 23. The diameter of a carbon atom is 0.000 000 000 154 m. What is this number expressed in scientific notation?
- $1.54 \times 10^{-10}$  m
  - $1.54 \times 10^{12}$  m
  - $1.54 \times 10^{-12}$  m
  - $1.54 \times 10^{10}$  m
- \_\_\_\_\_ 24. Express the product of  $4.0 \times 10^{-2}$  m and  $8.1 \times 10^2$  m using the correct number of significant digits.
- $3.2 \times 10^1$
  - $3.3 \times 10^1$
  - $3 \times 10^1$
  - $3.0 \times 10^1$
  - $3.24 \times 10^1$
- \_\_\_\_\_ 25. If the accepted value is 112g and the experimental value is 107.3g, what is the percent error?
- 4.196
  - 4.20
  - .042
  - .958

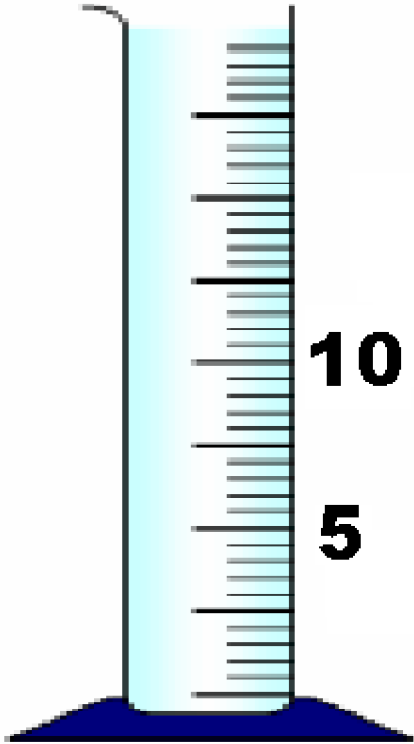
- \_\_\_\_ 26. Three different people weigh a standard mass of 2.00 g on the same balance. Each person obtains a reading of 7.32 g for the mass of the standard. These results imply that the balance that was used is \_\_\_\_\_.
- a. neither accurate nor precise                      c. accurate and precise  
b. precise    d. accurate
- \_\_\_\_ 27. Express the product of 2.2 mm and 5.00 mm using the correct number of significant digits.
- a. 11.00 mm<sup>2</sup>    d. 11 mm<sup>2</sup>  
b. 11.0 mm<sup>2</sup>    e. none of the above  
c. 10 mm<sup>2</sup>
- \_\_\_\_ 28. What is 5928 km expressed in scientific notation?
- a.  $5.928 \times 10^0$     c.  $5.928 \times 10^2$   
b.  $5.928 \times 10^{-3}$     d.  $5.928 \times 10^3$
- \_\_\_\_ 29. How many significant figures are there in the measurement 40 500 mg?
- a. five    d. This cannot be determined.  
b. two    e. four  
c. three



**Figure 1**

- \_\_\_\_ 30. What is the volume of the liquid represented in figure 1?
- a. 36.5    c. 35.5  
b. 36    d. 35.3
- \_\_\_\_ 31. When applied to scientific measurements, the words *accuracy and precision*
- a. have limitations.    c. are used interchangeably.  
b. can cause uncertainty in experiments.              d. have distinctly different meanings.
- \_\_\_\_ 32. What is the measurement 1042 L rounded off to two significant digits?
- a. 1050 L    d.  $1.0 \times 10^3$  L  
b. 1040 L    e. none of the above  
c.  $1.1 \times 10^3$  L

- \_\_\_ 33. What is the result of adding  $(2.5 \times 10^3) + (3.5 \times 10^2)$ ?
- a.  $2.85 \times 10^3$                       c.  $6.0 \times 10^5$   
b.  $2.85 \times 10^2$                       d.  $6.0 \times 10^3$



**Figure 2**

- \_\_\_ 34. What increment does each gradation on the graduated cylinder in Figure 2 measure?
- a. .1 ml                                      c. .5 ml  
b. 5 ml                                        d. .2 ml
- \_\_\_ 35. What is the result of multiplying  $(2.5 \times 10^{10}) \times (3.5 \times 10^{-7})$ ?
- a.  $8.75 \times 10^{-3}$                       c.  $8.75 \times 10^{-17}$   
b.  $8.75 \times 10^3$                         d.  $8.75 \times 10^{17}$
- \_\_\_ 36. How many significant figures are there in the measurement 0.003 4 kg?
- a. This cannot be determined.            d. three  
b. five                                        e. two  
c. four
- \_\_\_ 37. Express the sum of 7.68 m and 5.0 m using the correct number of significant digits.
- a. 12.7                                        d. 10 m  
b. 13    e. none of the above  
c. 12.68

- \_\_\_\_ 38. What is the measurement 111.009 mm rounded off to four significant digits?
- |              |           |
|--------------|-----------|
| a. 111.0 mm  | d. 110 mm |
| b. 100 mm    | e. 111 mm |
| c. 111.01 mm |           |
- \_\_\_\_ 39. In the measurement 0.503 L, which digit is the estimated digit?
- |   |   |
|---|---|
| a. 5  | d. 3                                      |
| b. There is no estimated digit in this measurement. | e. the 0 to the left of the decimal point |
| c. the 0 immediately to the left of the 3           |   |
- \_\_\_\_ 40. How many significant figures are there in the conversion factor 100 cm/1 m?
- |          |                        |
|----------|------------------------|
| a. three | d. four                |
| b. two   | e. an unlimited number |
| c. one   |                        |
- \_\_\_\_ 41. The closeness of a measurement to its true value is a measure of its \_\_\_\_.
- |              |                    |
|--------------|--------------------|
| a. precision | c. reproducibility |
| b. accuracy  | d. usefulness      |
- \_\_\_\_ 42. Which group of measurements is the most precise? (Each group of measurements is for a different object.)
- |                        |                               |
|------------------------|-------------------------------|
| a. 2 g, 3 g, 4 g       | d. 2 g, 2.5 g, 3 g            |
| b. 1 g, 3 g, 5 g       | e. 2.0 g, 3.0 g, 4.0 g, 5.0 g |
| c. 2.0 g, 3.0 g, 4.0 g |                               |
- \_\_\_\_ 43. The symbol mm represents
- |                |                |
|----------------|----------------|
| a. micrometer. | c. milliliter. |
| b. millimeter. | d. meter.      |
- \_\_\_\_ 44. The symbol for the metric unit used to measure mass is
- |        |       |
|--------|-------|
| a. m.  | c. g. |
| b. mm. | d. L. |
- \_\_\_\_ 45. The unit m<sup>3</sup> measures
- |            |             |
|------------|-------------|
| a. length. | c. volume.  |
| b. mass.   | d. density. |
- \_\_\_\_ 46. A volume of 1 cubic centimeter is equivalent to
- |                  |                                       |
|------------------|---------------------------------------|
| a. 1 milliliter. | c. 1 liter.                           |
| b. 1 gram.       | d. 10 <sup>-1</sup> cubic decimeters. |
- \_\_\_\_ 47. A measure of Earth's gravitational pull on matter is
- |             |            |
|-------------|------------|
| a. density. | c. volume. |
| b. weight.  | d. mass.   |
- \_\_\_\_ 48. The relationship between the mass  $m$  of a material, its volume  $V$ , and its density  $D$  is
- |               |                  |
|---------------|------------------|
| a. $V = mD$ . | c. $DV = m$ .    |
| b. $Vm = D$ . | d. $D + V = m$ . |



- \_\_\_\_\_ 58. Which of the following is NOT part of Dalton's atomic theory?
- All matter is composed of extremely small particles called atoms.
  - Atoms cannot be divided, created, or destroyed.
  - The number of protons in an atom is its atomic number.
  - In chemical reactions, atoms are combined, separated, or rearranged.
- \_\_\_\_\_ 59. The atomic number of oxygen, 8, indicates that there are eight
- protons in the nucleus of an oxygen atom.
  - neutrons outside the oxygen atom's nucleus.
  - energy levels in the oxygen atom's nucleus.
  - oxygen nuclides.
- \_\_\_\_\_ 60. As the atomic number increases, the number of electrons in an atom
- remains the same.
  - is undetermined.
  - decreases.
  - increases.

17 2-

**O**

8

**Figure 1**

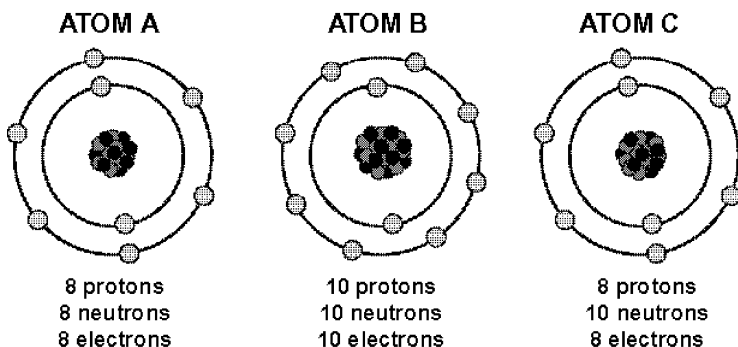
- \_\_\_\_\_ 61. How many neutrons does the atom in Figure 1 contain?
- 9
  - 8
  - 17
  - 2
- \_\_\_\_\_ 62. Neon-22 contains 12 neutrons. It also contains
- 12 protons.
  - 22 electrons.
  - 10 protons.
  - 22 protons.



1 <b>H</b> Hydrogen 1.01											Group 18 2 <b>He</b> Helium 4.00				
Group 1	Group 2							Group 13	Group 14	Group 15	Group 16	Group 17			
3 <b>Li</b> Lithium 6.94	4 <b>Be</b> Beryllium 9.01	5 <b>B</b> Boron 10.81	6 <b>C</b> Carbon 12.01	7 <b>N</b> Nitrogen 14.01	8 <b>O</b> Oxygen 16.00	9 <b>F</b> Fluorine 19.00	10 <b>Ne</b> Neon 20.18	11 <b>Na</b> Sodium 22.99	12 <b>Mg</b> Magnesium 24.30	13 <b>Al</b> Aluminum 26.98	14 <b>Si</b> Silicon 28.08	15 <b>P</b> Phosphorus 30.97	16 <b>S</b> Sulfur 32.07	17 <b>Cl</b> Chlorine 35.45	18 <b>Ar</b> Argon 39.95
19 <b>K</b> Potassium 39.10	20 <b>Ca</b> Calcium 40.08	31 <b>Ga</b> Gallium 69.72	32 <b>Ge</b> Germanium 72.61	33 <b>As</b> Arsenic 74.92	34 <b>Se</b> Selenium 78.96	35 <b>Br</b> Bromine 79.90	36 <b>Kr</b> Krypton 83.80	37 <b>Rb</b> Rubidium 85.47	38 <b>Sr</b> Strontium 87.62	49 <b>In</b> Indium 114.82	50 <b>Sn</b> Tin 118.71	51 <b>Sb</b> Antimony 121.76	52 <b>Te</b> Tellurium 127.60	53 <b>I</b> Iodine 126.90	54 <b>Xe</b> Xenon 131.29
55 <b>Cs</b> Cesium 132.90	56 <b>Ba</b> Barium 137.33	81 <b>Tl</b> Thallium 204.38	82 <b>Pb</b> Lead 207.2	83 <b>Bi</b> Bismuth 208.98	84 <b>Po</b> Polonium (208.98)	85 <b>At</b> Astatine (209.99)	86 <b>Rn</b> Radon (222.02)	7 <b>Fr</b> Francium (223.02)	88 <b>Ra</b> Radium (226.02)						

- \_\_\_\_\_ 63. What is the atomic number for aluminum from the figure above?
- a. 13  
b. 26.98  
c. 26.9815  
d. 14
- \_\_\_\_\_ 64. In the figure above, a neutral atom of silicon contains
- a. 14 electrons.  
b. 16 electrons.  
c. 38 electrons.  
d. 28.09 electrons.
- \_\_\_\_\_ 65. The mass of a neutron is
- a. double that of a proton.  
b. about the same as that of a proton.  
c. double that of an electron.  
d. about the same as that of an electron.
- \_\_\_\_\_ 66. Atoms of the same element with different numbers of neutrons are called \_\_\_\_\_.
- a. metals  
b. isotopes  
c. radioactive elements  
d. metalloids
- \_\_\_\_\_ 67. Aluminum is in what period?
- a. 13.  
b. 3.  
c. 6.  
d. 2.

\_\_\_ 68. Do any of the atom diagrams below represent atoms of the same element?

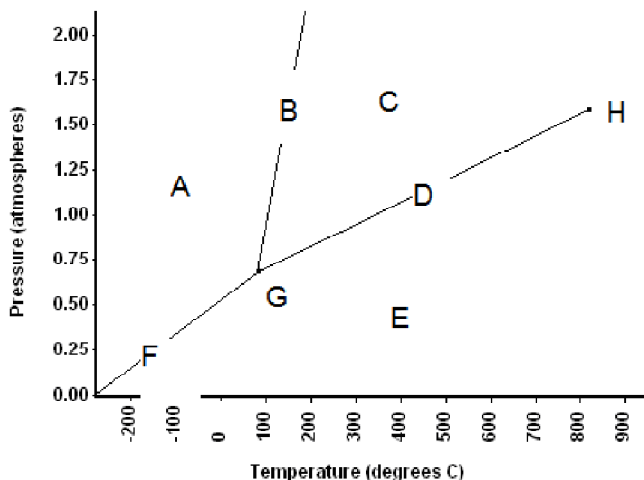


- a. No, they are all different elements.
  - b. Yes, atom A and atom B are the same element.
  - c. Yes, all of the atoms are the same element.
  - d. Yes, atom A and atom C are the same element.
- \_\_\_ 69. Which part of an atom has a mass approximately equal to 1/2000 of the mass of a common hydrogen atom?
- a. electron cloud
  - b. proton
  - c. electron
  - d. nucleus
- \_\_\_ 70. Elements in a group or column in the periodic table can be expected to have similar
- a. properties.
  - b. atomic numbers.
  - c. atomic masses.
  - d. numbers of neutrons.
- \_\_\_ 71. Experiments with cathode rays led to the discovery of the
- a. nucleus.
  - b. proton.
  - c. electron.
  - d. neutron.
- \_\_\_ 72. The elements that border the zigzag line in the periodic table are
- a. metalloids.
  - b. nonmetals.
  - c. inactive.
  - d. metals.
- \_\_\_ 73. What did Rutherford conclude about the structure of the atom?
- a. An atom contains a small, dense, positively charged central region.
  - b. An atom is indivisible.
  - c. Electrons make up the center of an atom.
  - d. An atom carries a positive charge.
- \_\_\_ 74. Who used his experimental evidence to determine the order of the elements according to atomic number?
- a. Moseley
  - b. Meyer
  - c. Ramsay
  - d. Stas
- \_\_\_ 75. Atoms have no electric charge because they
- a. have an equal number of charged and noncharged particles.
  - b. have an equal number of electrons and protons.
  - c. have neutrons in their nuclei.
  - d. have an equal number of neutrons and protons.

- \_\_\_\_\_ 76. Atoms of the same element can differ in  
a. number of protons and electrons.      c. chemical properties.  
b. mass number.      d. atomic number.
- \_\_\_\_\_ 77. The idea of arranging the elements in the periodic table according to their chemical and physical properties is attributed to  
a. Bohr.      c. Mendeleev.  
b. Moseley.      d. Ramsay.
- \_\_\_\_\_ 78. A horizontal row of blocks in the periodic table is called a(n)  
a. period.      c. group.  
b. octet.      d. family.
- \_\_\_\_\_ 79. The nucleus of most atoms is composed of  
a. tightly packed protons and neutrons.      c. loosely connected protons and electrons.  
b. tightly packed protons.      d. tightly packed neutrons.
- \_\_\_\_\_ 80. The elements in Groups 3 through 12 of the periodic table are the \_\_\_\_\_.  
a. transition elements      c. actinides  
b. halogens      d. alkaline earth metals
- \_\_\_\_\_ 81. Argon, krypton, and xenon are  
a. noble gases.      c. alkaline earth metals.  
b. actinides.      d. lanthanides.
- \_\_\_\_\_ 82. A certain atom has 26 protons, 26 electrons, and 30 neutrons. Its mass number is \_\_\_\_\_.  
a. 30      c. 56  
b. 52      d. 26
- \_\_\_\_\_ 83. To which group do fluorine and chlorine belong?  
a. halogens      c. alkaline-earth metals  
b. transition elements      d. actinides
- \_\_\_\_\_ 84. Which statement is true according to Dalton's theory?  
a. Atoms of the same element differ in electric charge.  
b. Atoms can be subdivided into smaller particles.  
c. Atoms of different elements can join to form larger atoms.  
d. Atoms of the same element are exactly alike.

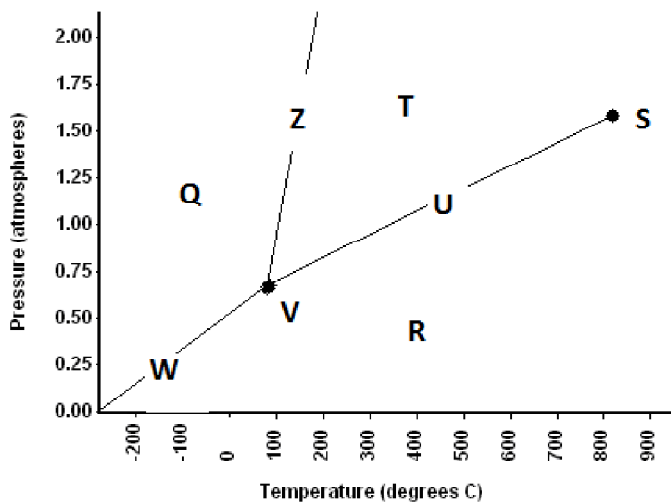
**Multiple Response**

Identify one or more choices that best complete the statement or answer the question.



- \_\_\_ 85. What is the approximate normal boiling point of this substance?  
 a. 100°C      b. 825°C      c. 375°C      d. 200°C
- \_\_\_ 86. What is the approximate temperature of the triple point for this substance.  
 a. 200°C      b. 100°C      c. 825°C      d. 375°C
- \_\_\_ 87. A mystery element Q is a nonlustrous solid and a poor conductor of electricity. To what category of elements does it belong?  
 a. metalloids      d. metals  
 b. semimetals      e. nonmetals  
 c. transition metals
- \_\_\_ 88. Of the elements Fe, Hg, U, Te and Y, which is a representative element?  
 a. Y      d. Hg  
 b. Fe      e. U  
 c. Te
- \_\_\_ 89. Which of the following sets of symbols represents isotopes of the same element?  
 a.  ${}_{59}^{58}\text{Z}$        ${}_{30}^{60}\text{Z}$        ${}_{31}^{62}\text{Z}$       d.  ${}_{38}^{80}\text{M}$        ${}_{38}^{81}\text{M}$        ${}_{38}^{83}\text{M}$   
 b.  ${}_{55}^{132}\text{Q}$        ${}_{55}^{133}\text{Q}$        ${}_{54}^{132}\text{Q}$       e.  ${}_{19}^{50}\text{L}$        ${}_{20}^{50}\text{L}$        ${}_{21}^{50}\text{L}$   
 c.  ${}_{42}^{91}\text{J}$        ${}_{42}^{92}\text{J}$        ${}_{40}^{93}\text{J}$

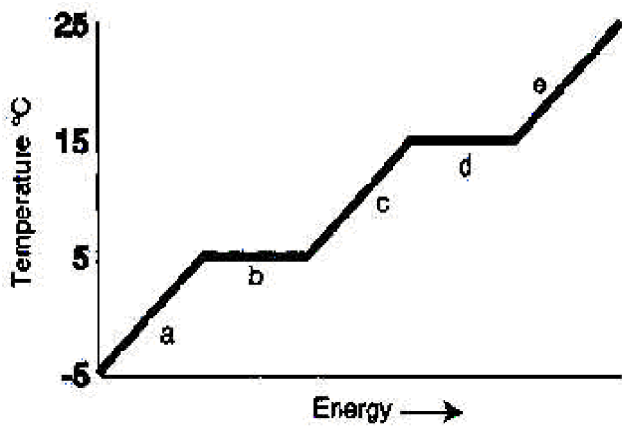
**Matching**



Match the correct graph location to the following terms.

- |      |      |
|------|------|
| a. V | d. S |
| b. Q | e. R |
| c. T |      |

- \_\_\_ 90. Gas
- \_\_\_ 91. Liquid
- \_\_\_ 92. The three phases coexist at this point.
- \_\_\_ 93. Solid
- \_\_\_ 94. Critical point



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

- \_\_\_ 95. Which part of the graph is the liquid phase?
- \_\_\_ 96. Which part of the graph represents melting?

Name: \_\_\_\_\_

ID: A

\_\_\_ 97. Which part of the graph represents freezing?

\_\_\_ 98. Which part of the graph is the solid phase?