NAME Key 1

F2013/Fundamentals of Chemistry/Exam 1/Dr. Dooley

September 11, 2013

(4 Points Each) Multiple Choice: Place the letter of the correct answer in the blank provided.

C 1. What term best describes a brief statement that summarizes many past observations and predicts new ones?
   a) experiment
   b) hypothesis
   c) scientific law
   d) theory
   e) none of the above

C 2. Which state of matter has indefinite shape and is compressible?
   a) liquid
   b) solid
   c) gas
   d) plasma
   e) none of the above

B 3. Which among the following statements is FALSE?
   a) A solid has a definite shape and a definite volume.
   b) A liquid has a definite volume and definite shape.
   c) A gas has neither definite volume nor definite shape.
   d) Both solids and liquids are incompressible while gases are compressible.
   e) none of the above

D 4. How would you classify salt water?
   a) pure substance-compound
   b) mixture-heterogeneous
   c) pure substance-element
   d) mixture-homogeneous
   e) none of the above

A 5. Chemical properties are:
   a) those that a substance displays only through changing its composition.
   b) those that cause atoms and molecules to change.
   c) those that a substance displays without changing its composition.
   d) identical for all solid matter.
   e) none of the above

B 6. If you hold a solid piece of pure gallium metal in your hand, your body heat will melt the gallium into its liquid form. This illustrates which of the following?

a) distillation
b) physical change
c) chemical change
d) chemical property
e) none of the above

D 7. When methane is burned with oxygen the products are carbon dioxide and water. If you produce 36 grams of water and 44 grams of carbon dioxide from 16 grams of methane, how many grams of oxygen were needed for the reaction?

a) 32
b) 80
c) 96
d) 64
e) none of the above

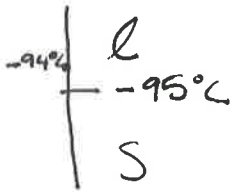
$16g + x = 36g + 44g$

$16g + x = 80g$

$x = 64g$

B 8. Melting point can be defined as the temperature when a solid becomes a liquid. The melting point of the chemical *acetone* is -95°C. Which state of matter would you expect to exist for acetone at a temperature of -94°C?

a) solid
b) liquid
c) gas
d) plasma



B 9. What is the value of 98 °F in units of °C?

a) 72
b) 37
c) 371
d) 22
e) none of the above

B 10. The distance between the two hydrogen atoms in a molecule of water is 0.000000000172 m. Express this distance in scientific notation.

1.72×10^{-10} m

a) 1.72×10^{-9} m
b) 1.72×10^{-10} m
c) 0.172×10^{-10} m
d) 17.2×10^{9} m
e) 1.72×10^{10} m

A 11. The correct decimal representation of 6.453×10^3 is:

a) 6,453
b) 0.006453
c) 6.5×10^3
d) 6.453
e) none of the above

C 12. The correct number of significant figures in the number 0.027090 is:

a) 7
b) 6
c) 5
d) ambiguous
e) none of the above

A 13. Which of the following statements is NOT part of the rules for determining significant figures?

a) Non-zero digits at the end of a number are not significant.
b) Zeroes between two numbers are significant.
c) Zeroes to the left of the first non-zero number are not significant. (Leading)
d) Zeroes at the end of a number, but before a decimal are ambiguous.
e) All of the above statements are part of the rules.

D 14. Determine the answer to the following equation with correct number of significant figures:
$(4.123 \times 0.12) + 24.2 =$ _____

.49476 + 24.2 = 24.7
2 dec 1 dec

a) 25
b) 24.695
c) 24.70
d) 24.7
e) none of the above

D 15. Which measurement below represents the heaviest mass?

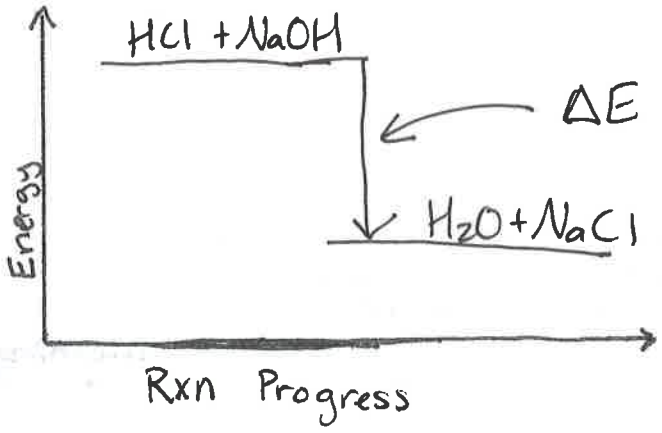
a) 1 mg
b) 1 kg
c) 1 pg
d) 1 Mg
e) 1 dg

Short Answer/Problems Show your work for credit in this section. All calculated numbers should contain correct number of sig figs and units!

1. (8 Points) When an acid neutralizes a base, forming water, the temperature of the beaker and the surroundings increase. The reaction for this process is:

$$HCl + NaOH \rightarrow H_2O + NaCl$$

Based on this information, finish the energy diagram below, showing the positions of the reactants and products, and an arrow indicating the energy change.



Is this process endothermic or exothermic? exothermic

60 mph 60 $\frac{mi}{hr}$

2. (8 Points) A lead ball has a mass of 55.0 pounds (lbs) and a density of 11.4 g/cm3. What is the volume of the ball?

$$\underset{3sf}{55.0\,\cancel{lbs}} \left(\frac{453.6\,g}{1\,\cancel{lb}}\right)\left(\frac{1\,cm^3}{11.4\,g}\right) = 2188.42\,cm^3$$

$$= 2.19 \times 10^3\,cm^3$$

+4 for 2.49458

+3 2.07 4.82

3. (8 Points) Convert 155.6 in to yards.

$$155.6\,in\left(\frac{1\,ft}{12\,in}\right)\left(\frac{1\,yd}{3\,ft}\right) = \boxed{4.322\,yd}$$

4. (8 Points) Convert 125 in^3 to mL.

$$125\,in^3\left(\frac{16.387\,cm^3}{1\,in^3}\right)\left(\frac{1\,mL}{1\,cm^3}\right) = 2048.38\,mL$$

318mL (15)

$1\,in = 2.54\,cm$

$1\,in^3 = 16.387\,cm^3$

$\boxed{2.05\times10^3\,mL}$

5. (8 Points) Convert 1.48×10^7 µm to cm. µm → m → cm

$$1.48\times10^7\,\mu m\left(\frac{10^{-6}\,m}{1\,\mu m}\right)\left(\frac{1\,cm}{10^{-2}\,m}\right)$$

~~1.48E10~~

$$= 1.48\times10^{7-6+2}\,cm$$

14 for CF correct!

$$\boxed{= 1.48\times10^3\,cm}$$