Chem 101A Study Questions, Chapters 1 & 2   Name: _____
Review Tues 9/11
Due 9/13 (Exam 1 date)
This is a homework assignment.   You must <u>show your work for full credit</u>.   If you do work on separate papers, attach the papers to this handout.

Useful Information to be provided on Exam 1:

$$T_F = 1.8 \, T_C + 32 \qquad T_C = \frac{T_F - 32}{1.8} \qquad T_K = T_C + 273 \qquad T_C = T_K - 273$$

<u>Mass</u>	<u>Length</u>	<u>Volume</u>
1 lb = 453.6 g *	1 in = 2.54 cm	1 L = 1.0567 qt*
1 kg = 2.205 lb *	1 m = 1.094 yd *	1 ft^3 = 28.32 L *
	1 mi = 1.609 km *	

1. Generally, observed behavior that can be formulated into a statement, sometimes mathematical in nature, is called a(n)
   A) observation
   B) measurement
   C) theory
   D) natural law
   E) experiment

2. *True or False?* A chemical theory that has been known for a long time becomes a law.
   A) True
   B) False

3. A solution is also called a
   A) homogeneous mixture.
   B) heterogeneous mixture.
   C) pure mixture.
   D) compound.
   E) distilled mixture.

4. Which of the following is *not* a unit in the SI system?
   A) second
   B) kilogram
   C) Kelvin
   D) meter
   E) calorie

5. The degree of agreement among several measurements of the same quantity is called
   _____. It reflects the reproducibility of a given type of measurement.
   A) accuracy
   B) error
   C) precision
   D) significance
   E) certainty

6. The agreement of a particular value with the true value is called
   A) accuracy
   B) error
   C) precision
   D) significance
   E) certainty

7. The beakers shown below have different precisions as shown.
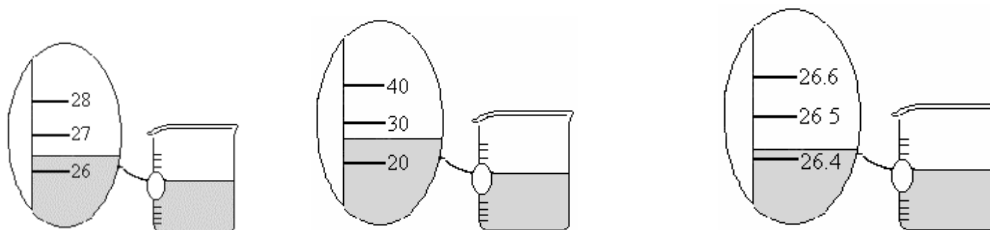
   Suppose you pour the water from these three beakers into one container. What would be
   the volume in the container reported to the correct number of significant figures?
   A) 78.817 mL
   B) 78.82 mL
   C) 78.8 mL
   D) 90 mL
   E) 79 mL

8. A scientist obtains the number 0.045006700 on a calculator. If this number actually has
   four (4) significant figures, how should it be written?
   A) 0.4567
   B) 0.4501
   C) 0.0450
   D) 0.04500
   E) 0.04501

9. Express the number 9.54×10^{-3} in common decimal form.
   A) 0.00954
   B) 9.54
   C) 9540
   D) 0.0954
   E) 0.000954

10. How many significant figures are there in the number 0.04560700?
   A) 4
   B) 5
   C) 7
   D) 8
   E) 9

11. Using the rules of significant figures, calculate the following:
$$\frac{6.167 + 89}{5.10}$$
   A) 18.7
   B) 20
   C) 19
   D) 108
   E) 18.66

12. Convert 48.6 mi to km.
   A) 5.32×10^1 km
   B) 3.02×10^1 km
   C) 7.82×10^7 km
   D) 4.44×10^1 km
   E) 7.82×10^1 km

13. Convert 8790.2 g to mg.
   A) 8.7902 mg
   B) 87.902 mg
   C) 879.02 mg
   D) 8.7902×10^3 mg
   E) 8.7902×10^6 mg

14. Convert 0.0840 ft^3 to L.
  A) 2.38×10^1 L
  B) 2.38 L
  C) 2.56×10^{-3} L
  D) 2.97×10^{-3} L
  E) 2.76 L

15. Convert 62.4 m^3 to cm^3.
  A) 6.24×10^5 cm^3
  B) 6.24×10^7 cm^3
  C) 6.24×10^3 cm^3
  D) 6.24×10^{-3} cm^3
  E) 6.24×10^{-5} cm^3

16. Convert 4314 mL to qt.
  A) 4559 qt
  B) 4.083 qt
  C) 4.083×10^{-3} qt
  D) 4083 qt
  E) 4.559 qt

17. For spring break, you and some friends plan a road trip to a sunny destination that is 2275 miles away. If you drive a car that gets 31 miles per gallon and gas costs $3.419/gal, about how much will it cost to get to your destination?
  A) $ 500
  B) $ 210
  C) $ 250
  D) $ 670
  E) $ 7800

18. 412 Kelvin equals
  A) 139 ºF
  B) 273 ºF
  C) 685 ºF
  D) 139 ºC
  E) 685 ºC

19. The melting point of picolinic acid is 136.5°C. What is the melting point of picolinic acid on the Fahrenheit scale?
    A) 107.8 °F
    B) 245.7 °F
    C) 168.5 °F
    D) 409.5 °F
    E) 277.7 °F

20. The density of liquid ethanol is 0.789 g/mL. What is its density in units of lb/in^3?
    A) 9.09×10^{-4} lb/in^3
    B) 2.85×10^{-2} lb/in^3
    C) 5.86×10^{-3} lb/in^3
    D) 4.42×10^{-3} lb/in^3
    E) 0.106 lb/in^3

21. Suppose that you purchased a water bed with the dimensions 2.55 m × 2.53 dm × 256 cm. What mass of water does this bed contain?
    A) 1.65×10^3 g
    B) 1.65×10^4 g
    C) 1.65×10^5 g
    D) 1.65×10^8 g
    E) 1.65×10^6 g

22. It is estimated that uranium is relatively common in the earth's crust, occurring in amounts of 4 g / metric ton of earth's crust. A metric ton is 1000 kg. At this concentration, what mass of uranium is present in 1.0 mg of the earth's crust?
    A) 4 ng
    B) 4 µg
    C) 4 mg
    D) 4×10^{-5} g
    E) 4 cg

23. A 20.0 mL sample of glycerol has a mass of 25.2 grams. What is the mass of a 69-mL sample of glycerol?
    A) 7.3 g
    B) 55 g
    C) 3.5×10^4 g
    D) 87 g
    E) 86.9 g

24. Which of the following postulates of Dalton's atomic theory are still scientifically accepted?
      I. All atoms of the same element are identical.
     II. Compounds are combinations of different atoms.
    III. A chemical reaction changes the way atoms are grouped together.
     IV. Atoms are indestructible.

    A) None
    B) II, and IV
    C) II and III
    D) I, II, and III
    E) III, and IV

25. Which of the following pairs can be used to illustrate the law of multiple proportions?
    A) SO and SO_2
    B) CO and $CaCO_3$
    C) H_2O and $C_{12}H_{22}O_{11}$
    D) H_2SO_4 and H_2S
    E) KCl and $KClO_2$

26. _____ are substances with constant composition that can be broken down into elements by chemical processes.
    A) Solutions
    B) Mixtures
    C) Compounds
    D) Quarks
    E) Heterogeneous mixtures

27. If the Thomson model (plum pudding) of the atom had been correct, Rutherford's Gold Foil experiment would have found
    A) alpha particles going through the foil with little or no deflection.
    B) alpha particles greatly deflected by the metal foil.
    C) alpha particles bouncing off the foil.
    D) positive particles formed in the foil.
    E) None of the above observations is consistent with the Thomson model of the atom.

28. Which of the following isotope symbols is incorrect?
    A) $^{14}_{6}C$
    B) $^{37}_{17}Cl$
    C) $^{32}_{15}P$
    D) $^{39}_{19}K$
    E) $^{14}_{8}N$

29. Which of the following name(s) is(are) correct?
    1. sulfide ion................S^{2-}
    2. hydride ion ....H^{+}
    3. acetic acid................$HC_2H_3O_2$
    4. barium oxide ....BaO
    A) all
    B) none
    C) 1, 2
    D) 3, 4
    E) 1, 3, 4

30. Which of the following statements are *true* of uranium-238?

    I. Its chemical properties will be exactly like those of uranium-235.
    II. Its mass will be slightly different from that of an atom of uranium-235.
    III. It will contain a different number of protons than an atom of uranium-235.
    IV. It is more plentiful in nature than uranium-235.
    A) III, IV
    B) I, II, III
    C) I, II, IV
    D) II, III, IV
    E) all of these

31. $^{40}_{20}Ca^{2+}$ has
    A) 20 protons, 20 neutrons, and 18 electrons.
    B) 22 protons, 20 neutrons, and 20 electrons.
    C) 20 protons, 22 neutrons, and 18 electrons.
    D) 22 protons, 18 neutrons, and 18 electrons.
    E) 20 protons, 20 neutrons, and 22 electrons.

32. Avogadro's law states that:
   A) Each atom of oxygen is 16 times more massive than an atom of hydrogen.
   B) A given compound always contains exactly the same proportion of elements by mass.
   C) When two elements form a series of compounds, the ratios of masses that combine with 1 gram of the first element can always be reduced to small whole numbers.
   D) At the same temperature and pressure, equal volumes of different gases contain an equal number of particles.
   E) Mass is neither created nor destroyed in a chemical reaction.

33. Which of the following statements is (are) true?
   A) $^{18}_{8}O$ and $^{19}_{9}F$ have the same number of neutrons.
   B) $^{14}_{6}C$ and $^{14}_{7}N$ are isotopes of each other because their mass numbers are the same.
   C) $^{18}_{8}O^{2-}$ has the same number of electrons as $^{20}_{10}Ne$.
   D) a and b
   E) a and c

34. An isotope, *X*, of a particular element has an atomic number of 7 and a mass number of 15. Therefore,
   A) *X* is an isotope of nitrogen
   B) *X* has 8 neutrons per atom
   C) *X* has an atomic mass of 14.0067
   D) a and b
   E) a, b, and c

35. The numbers of protons, neutrons, and electrons in $^{39}_{19}K^{+}$ are:

   A) 20 p, 19 n, 19 e
   B) 20 p, 19 n, 20 e
   C) 19 p, 20 n, 20 e
   D) 19 p, 20 n, 19 e
   E) 19 p, 20 n, 18 e

36. Which metals form cations with varying positive charges?
   A) transition metals
   B) Group 1 metals
   C) Group 2 metals
   D) Group 3 metals
   E) metalloids

37. Write the names of the following compounds:
   a) $FeSO_3$ _____
   b) $Rb_2C_2O_4$ _____
   c) $Co(NO_3)_3$ _____
   d) $CaCr_2O_7$ _____
   e) $MnCO_3$ _____

38. The correct name for N^{3-} is
   A) nitride ion
   B) nitrogen ion
   C) nitrogen(III) ion
   D) nitro(III) ion
   E) nitrite

39. The correct formula for titanium(IV) oxide is
   A) TiO_4
   B) Ti_4O
   C) TiO_2
   D) Ti_2O_4
   E) T_2O

40. Complete the following table.

| Symbol	$^{69}Ga^{3+}$	
Number of protons		34
Number of neutrons		46
Number of electrons		
Atomic number		
Mass number		
Net charge		2–

41. Which of the following is *incorrectly* named?
   A) $Pb(NO_3)_2$, lead(II) nitrate
   B) NH_4ClO_4, ammonium perchlorate
   C) PO_4^{3-}, phosphate ion
   D) $Mg(OH)_2$, magnesium hydroxide
   E) SO^{4-}, sulfate ion

42. What is the correct formula of <u>ammonia</u>?
   A) NH_4^+
   B) NH_3
   C) Am
   D) NO_2
   E) CH_4

Name the following compounds:
Show all of your work on this page.

43. BaS_2O_3

44. $Pb(BrO_3)_4$

45. $K_2C_2O_4$

46. N_2O_3

47. $(NH_4)_2CO_3$
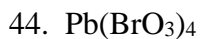
Write the formula for each.
Show all of your work on this page.

48. mercury(I) dichromate

49. aluminum hydroxide

50. tin (II) cyanide

51. dichlorine heptoxide

52. lead (IV) phosphate

Answer Key

Show Your Work For Full Credit

1.	D
	Chapter/Section: 1.2
2.	B
	Chapter/Section: 1.2
3.	A
	Chapter/Section: 1.10
4.	E
	Chapter/Section: 1.3
5.	C
	Chapter/Section: 1.4
6.	A
	Chapter/Section: 1.4
7.	E
	Chapter/Section: 1.4
8.	E
	Chapter/Section: 1.5
9.	A
	Chapter/Section: 1.5
10.	C
	Chapter/Section: 1.5
11.	C
	Chapter/Section: 1.5
12.	E
	Chapter/Section: 1.6
13.	E
	Chapter/Section: 1.7
14.	B
	Chapter/Section: 1.6
15.	B
	Chapter/Section: 1.6
16.	E
	Chapter/Section: 1.6
17.	C
	Chapter/Section: 1.6
18.	D
	Chapter/Section: 1.8

19.	E
	Chapter/Section: 1.7
20.	B
	Chapter/Section: 1.6
21.	E
	Chapter/Section: 1.8
22.	A
	Chapter/Section: 1.6
23.	D
	Chapter/Section: 1.8
24.	C
	Chapter/Section: 2.3
25.	A
	Chapter/Section: 2..8
26.	C
	Chapter/Section: 1.9
27.	A
	Chapter/Section: 2.4
28.	E
	Chapter/Section: 2.5
29.	E
	Chapter/Section: 2..8
30.	C
	Chapter/Section: 2.5
31.	A
	Chapter/Section: 2.5
32.	D
	Chapter/Section: 2.3
33.	E
	Chapter/Section: 2.5
34.	D
	Chapter/Section: 2.5
35.	E
	Chapter/Section: 2.6
36.	A
	Chapter/Section: 2.8

37.	a) iron (II) sulfite
	b) rubidium oxalate
	c) cobalt(III) nitrate
	d) calcium dichromate
	e) manganese(II) carbonate
	Chapter/Section: 2.8

38.	A
	Chapter/Section: 2.8
39.	C
	Chapter/Section: 2.8

40.	Symbol	$^{69}Ga^{3+}$	$^{80}Se^{2-}$
	Number of protons	31	34
	Number of neutrons	38	46
	Number of electrons	28	36
	Atomic number	31	34
	Mass number	69	80
	Net charge	+3	2–
	Chapter/Section: 2.5		

41.	E		47.	ammonium carbonate
	Chapter/Section: 2.8			Chapter/Section: 2.8
42.	B		48.	$Hg_2Cr_2O_7$
	Chapter/Section: 2.8			Chapter/Section: 2.8
43.	barium thiosulfate		49.	$Al(OH)_3$
	Chapter/Section: 2.8			Chapter/Section: 2.8
44.	lead (IV) bromate		50.	$Sn(CN)_2$
	Chapter/Section: 2.8			Chapter/Section: 2.8
45.	potassium oxalate		51.	Cl_2O_7
	Chapter/Section: 2.8			Chapter/Section: 2.8
46.	dinitrogen trioxide		52.	$Pb_3(PO_4)_4$
	Chapter/Section: 2.8			Chapter/Section: 2.8