Practice Chemistry 120 Challenge Test (27 questions – Allow yourself <u>40 minutes</u> to complete)

<u>Directions:</u> Select the response which most correctly answers each question. A calculator is required. A Periodic Table and a list of useful formulas and constants is provided on page 3. Answers are provided on the last page.

1. What is the mass of 0.345 moles of octane, a liquid with formula C_8H_{18}?
   a. 13.0 g   b. 39.4 g
   c. 114 g   d. 331 g

2. All of the following measurements have three significant figures *except*
   a. 70.0 g   b. 2.01×10^{-5} m
   c. 0.850 L   d. 410 s

3. Which of the following statements is <u>incorrect</u>?
   a. Potassium is an alkali metal.
   b. Neon is a halogen.
   c. Calcium is an alkaline earth metal.
   d. Iron is a transition metal.

4. What is the name of the compound with formula Li_2S?
   a. lithium sulfur   b. lithium sulfate
   c. lithium sulfite   d. lithium sulfide

5. An atom of magnesium-26 (^{26}Mg) has a 2+ charge. How many of each subatomic particle does it possess?
   a. 12 protons, 14 neutrons, 14 electrons
   b. 12 protons, 26 neutrons, 14 electrons
   c. 12 protons, 14 neutrons, 10 electrons
   d. 12 protons, 26 neutrons, 10 electrons

6. How many grams of KCl (MW = 74.55 g/mol) is needed to make 800. mL of a 0.650 *M* KCl solution?
   a. 6.80 g   b. 38.8 g
   c. 59.6 g   d. 60.6 g

7. What is the symbol of silver?
   a. Ag   b. S
   c. Si   d. Au

8. What is electron configuration of manganese (Mn)?
   a. $[Ar]4s^2 3d^5$ b. $[Ar]4s^2 4d^5$
   c. $[Ar]4s^1 3d^6$ d. $[Ar]4s^1 4d^6$

9. A student lights a Bunsen burner and observes a large, yellow flame. What is the cause of this?
   a. There is insufficient natural gas
   b. There is too much natural gas
   c. There is insufficient oxygen
   d. There is too much oxygen

Refer to the following unbalanced chemical equation to answer Questions 10 and 11.

$$C_6H_{14} + O_2 \longrightarrow CO_2 + H_2O$$
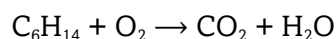
10. What number appears in front of H_2O when this chemical equation is balanced with the lowest-possible whole numbers?
    a. 6   b. 7
    c. 12   d. 14

11. What type of reaction is represented by the chemical equation?
    a. single displacement b. combustion
    c. combination   d. decomposition

12. How should the volume reading on the figure to the right be reported?
    a. 63 mL
    b 63.0 mL
    c. 63.00 mL
    d. 6.3×10^2 mL
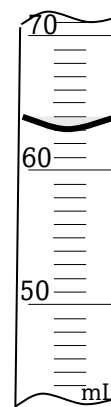
CO_2 gas fills a rigid, 30.0-L container, and exerts a pressure of 1.25 atm at 80.0 °C.

13. What is the mass of the carbon dioxide in the container?
    a. 1.29 g   b. 5.71 g
    c. 56.9 g   d. 251 g

14. What pressure will the gas exert if its temperature is increased to 125 °C?
    a. 0.800 atm   b. 1.11 atm
    c. 1.41 atm   d. 1.95 atm

_____

15. Which of the following is <u>not</u> a strong electrolyte solution?
    a. KOH(*aq*)   b. HCl(*aq*)
    c. NaCl(*aq*)   d. $C_6H_{12}O_6$(*aq*)

16. A chemist pipets 10.0 mL of a 0.14 M $MgCl_2$ solution into a 250.0-mL volumetric flask and dilutes it to the mark. What is the molarity of $MgCl_2$ in the resulting solution?
    a. 5.6×10^{-3} M b. 0.11 M
    c. 0.14 M d. 0.29 M

17. Which of the following 0.1 M aqueous solutions causes bubbles to form when combined with 0.1 M HNO_3?
    a. $NaHCO_3$ b. NaOH
    c. $NaNO_3$ d. KCl

18. Which of the following is a correct Lewis structure for the nitrite ion, NO_2^-?

a.
b.
c.
d.
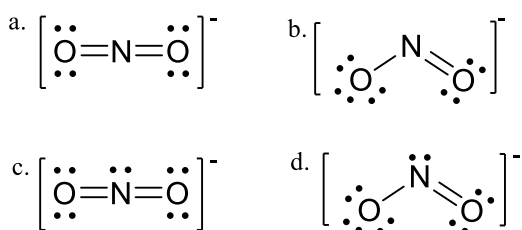
19. Which of the following choices ranks atoms of Ne, K, Rb, and He in order from smallest atomic radius to largest?
    a. Rb < Ne < K < He
    b. Rb < K < Ne < He
    c. He < K < Ne < Rb
    d. He < Ne < K < Rb

20. Which of the following molecules has no dipole moment?

a.
b.
c.
d.
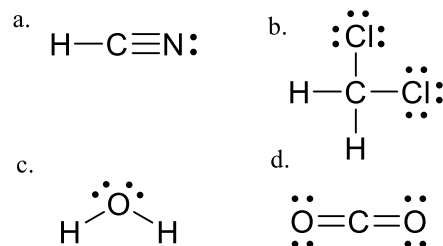
21. What is the answer to the following calculation, rounded to the correct number of significant figures?

$$\frac{9.0+8.17}{1.16} = ?$$

    a. 14   b. 14.8
    c. 14.80   d. 15

22. What is the net-ionic equation for the reaction which occurs between calcium chloride and sodium phosphate?
    a. 3 Ca^{2+}(*aq*) + 2 Na_3PO_4(*aq*) $\rightarrow$ 6 Na^+(*aq*)+ $Ca_3(PO_4)_2$(*s*)
    b. 3 Ca^{2+}(*aq*) + 2 PO_4^{3-}(*aq*) $\rightarrow$ $Ca_3(PO_4)_2$(*s*)
    c. Na^+(*aq*) +Cl^-(*aq*) $\rightarrow$ NaCl(*s*)
    d. $CaCl_2$(*aq*) + 2 Na^+(*aq*) $\rightarrow$ Ca^{2+}(*aq*) + 2 NaCl(*s*)
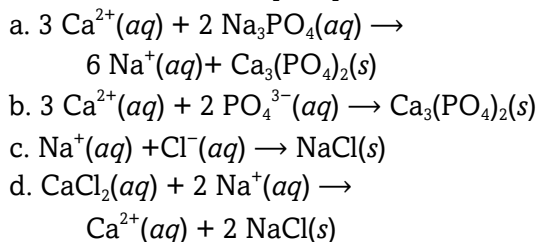
23. Which of the following volumes is equivalent to 243 mL?
    a. 243,000 L   b. 2.43×10^{-6} μL
    c. 24,300 nL   d. 0.243 L

24. Using the balanced equation below, determine the minimum volume of 0.150 M NaF solution required to form 2.00 g of BaF_2.

$Ba(NO_3)_2 + 2NaF \rightarrow BaF_2 + 2\ NaNO_3$

a. 46.7 mL   b. 76.1 mL

c. 93.4 mL   d. 152 mL

25. What volume in cubic centimeters is equivalent to 0.588 quarts?

a. 556 cm^3 b. 622 cm^3

c. 5.56×10^{-4} cm^3 d. 6.22×10^{-4} cm^3

26. To raise the temperature of a 10.0 g piece of metal from 25.0 °C to 50.0 °C requires 150. J of heat to be supplied. How much heat is needed to raise the temperature of a 95.0 g piece of the same metal from 60.5 °C to 72.5 °C?

a. 327 J   b. 684 J

c. 936 J   d. 1220 J

27. The change of state of a solid to a gas is called

a. condensation   b. boiling

c. sublimation   d. deposition

Periodic Table of the Elements

1 / 1A	2 / 2A	3 / 3B	4 / 4B	5 / 5B	6 / 6B	7 / 7B	8 / 8B	9 / 8B	10 / 8B	11 / 1B	12 / 2B	13 / 3A	14 / 4A	15 / 5A	16 / 6A	17 / 7A	18 / 8A
1 **H** 1.008																	2 **He** 4.003
3 **Li** 6.941	4 **Be** 9.012											5 **B** 10.81	6 **C** 12.01	7 **N** 14.01	8 **O** 16.00	9 **F** 19.00	10 **Ne** 20.18
11 **Na** 22.99	12 **Mg** 24.31											13 **Al** 26.98	14 **Si** 28.09	15 **P** 30.97	16 **S** 32.07	17 **Cl** 35.45	18 **Ar** 39.95
19 **K** 39.10	20 **Ca** 40.08	21 **Sc** 44.96	22 **Ti** 47.88	23 **V** 50.94	24 **Cr** 52.00	25 **Mn** 54.94	26 **Fe** 55.85	27 **Co** 58.93	28 **Ni** 58.69	29 **Cu** 63.55	30 **Zn** 65.39	31 **Ga** 69.72	32 **Ge** 72.59	33 **As** 74.92	34 **Se** 78.96	35 **Br** 79.90	36 **Kr** 83.80
37 **Rb** 85.47	38 **Sr** 87.62	39 **Y** 88.91	40 **Zr** 91.22	41 **Nb** 92.91	42 **Mo** 95.94	43 **Tc** (98)	44 **Ru** 101.1	45 **Rh** 102.9	46 **Pd** 106.4	47 **Ag** 107.9	48 **Cd** 112.4	49 **In** 114.8	50 **Sn** 118.7	51 **Sb** 121.8	52 **Te** 127.6	53 **I** 126.9	54 **Xe** 131.3
55 **Cs** 132.9	56 **Ba** 137.3	57 **La** 138.9	72 **Hf** 178.5	73 **Ta** 180.9	74 **W** 183.8	75 **Re** 186.2	76 **Os** 190.2	77 **Ir** 190.2	78 **Pt** 195.1	79 **Au** 197.0	80 **Hg** 200.6	81 **Tl** 204.4	82 **Pb** 207.2	83 **Bi** 209.0	84 **Po** (209)	85 **At** (210)	86 **Rn** (222)
87 **Fr** (223)	88 **Ra** (226)	89 **Ac** (227)	104 **Rf** (263)	105 **Db** (262)	106 **Sg** (266)	107 **Bh** (264)	108 **Hs** (269)	109 **Mt** (268)	110 **Ds** (272)	111 **Rg** (272)							

58 **Ce** 140.1	59 **Pr** 140.9	60 **Nd** 144.2	61 **Pm** (145)	62 **Sm** 150.4	63 **Eu** 152.0	64 **Gd** 157.3	65 **Tb** 158.9	66 **Dy** 162.5	67 **Ho** 164.9	68 **Er** 167.3	69 **Tm** 168.9	70 **Yb** 173.0	71 **Lu** 175.0
90 **Th** 232.0	91 **Pa** 231.0	92 **U** 238.0	93 **Np** (237)	94 **Pu** (244)	95 **Am** (243)	96 **Cm** (247)	97 **Bk** (247)	98 **Cf** (251)	99 **Es** (252)	100 **Fm** (257)	101 **Md** (258)	102 **No** (259)	103 **Lr** (262)

Formulas and Constants

$R = 0.0821$ L atm mol^{-1} K^{-1} $PV = nRT$ $\dfrac{P_1 V_1}{T_1} = \dfrac{P_2 V_2}{T_2}$ $q = m \cdot \Delta T \cdot (sp.\,heat)$

$T_{(in\ Kelvin)} = T_{(in\ Celcius)} + 273.15$ 1 atm = 760. mm Hg   Avogadro Number: 6.022×10^{23}

1 inch = 2.54 cm (exactly)   1 mL = 1 cm^3 1 L = 1 dm^3 1 L = 1.057 quarts

Answers

1. b
2. d
3. b
4. d
5. c

6. b
7. a
8. a
9. c
10. d

11. b
12. b
13. c
14. c
15. d

16. a
17. a
18. d
19. d
20. d

21. b
22. b
23. d
24. d
25. a

26. b
27. c

You will be provided with a Periodic Table and the same constants/equations for the actual placement exam as were given here.