AKCS
Purrrfect Chemistry

2049 FCC CHEMISTRY Practice

EXAM 3 (Ch 8-10)

Prepared by the Fresno City College Faculty Practice Examination Task Force

FCC EXAMINATIONS TASK FORCE

Lewis L Lemming, **Chair**, *Fresno City College,* Fresno, CA

Mill E. Mole, *Fresno City College*, Fresno, CA
Nick L Mole, *CSU Fresno*, Fresno, CA (retired)
E.A. Poe Cat, *Feline Community College*, Clovis, CA
Bob T. Cat, *Mouse Hunt City College*, Fresno, CA
Firefly V. Horse, *Bitey University*, Coursegold, CA

DIRECTIONS TO THE EXAMINER

This test is designed to be distributed to students freely as a tool to help them prepare for an actual exam. It should be distributed physically or electronically at least 10 calendar days before the exam. Students will most likely be taking this exam with a kitten, so don't be surprised to find chewed corners or errant markings where the kitten attacked the pen mid-calculation. You may need to ask to see pictures of said kitten while the student is taking a break from studying.

Suggested Time: ## questions—## minutes

DIRECTIONS TO THE EXAMINEE

DO NOT TURN THE PAGE UNTIL DIRECTED TO DO SO.

This test is designed to be taken at least 5 days prior to your exam. For best value, it is recommended that you take it part or all of it as an actual exam under simulated exam conditions, so that you can find gaps in your knowledge before getting to the exam and ask questions to get the extra help you need. The one exception to this is if you can take this practice exam with a kitten. Kittens, although not good at providing help on a chemistry exam are really good at looking cute and doing silly things. It's probably better to do most things with a kitten.

Distributed by American Kitty Cat Society, 1155 13th Street, DSo, Moon 00736

DIRECTIONS

- When you have selected your answer to each question, blacken the corresponding space on the answer sheet using a soft, #2 pencil. Make a heavy, full mark, but no stray marks. If you decide to change an answer, erase the unwanted mark very carefully.
- There is only one correct answer to each question. Any questions for which more than one response has been blackened **will not be counted**.
- Your score is based solely on the number of questions you answer correctly. **It is to your advantage to answer every question.**

ABBREVIATIONS AND SYMBOLS					
amount of substance	*n*	Faraday constant	*F*	molar mass	*M*
ampere	A	free energy	*G*	mole	mol
atmosphere	atm	frequency	ν	Planck's constant	*h*
atomic mass unit	u	gas constant	*R*	pressure	*P*
Avogadro constant	N_A	gram	g	rate constant	*k*
Celsius temperature	°C	hour	h	reaction quotient	*Q*
centi– prefix	c	joule	J	second	s
coulomb	C	kelvin	K	speed of light	*c*
density	d	kilo– prefix	k	temperature, K	*T*
electromotive force	*E*	liter	L	time	*t*
energy of activation	E_a	measure of pressure	mm Hg	vapor pressure	VP
enthalpy	*H*	milli– prefix	m	volt	V
entropy	*S*	molal	*m*	volume	*V*
equilibrium constant	*K*	molar	M		

CONSTANTS
$R = 8.314\ \text{J·mol}^{-1}\text{•K}^{-1}$
$R = 0.0821\ \text{L·atm·mol}^{-1}\text{•K}^{-1}$
$1\ F = 96{,}500\ \text{C•mol}^{-1}$
$1\ F = 96{,}500\ \text{J·V}^{-1}\text{•mol}^{-1}$
$N_A = 6.022 \times 10^{23}\ \text{mol}^{-1}$
$h = 6.626 \times 10^{-34}\ \text{J•s}$
$c = 2.998 \times 10^{8}\ \text{m•s}^{-1}$
0 °C = 273.15 K

PERIODIC TABLE OF THE ELEMENTS

1 1A												13 3A	14 4A	15 5A	16 6A	17 7A	18 8A
1 **H** 1.008	2 2A																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	3 3B	4 4B	5 5B	6 6B	7 7B	8 8B	9 8B	10 8B	11 1B	12 2B	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** 72.61	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** 192.2	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** (261)	105 **Db** (262)	106 **Sg** (266)	107 **Bh** (264)	108 **Hs** (277)	109 **Mt** (268)	110 **Ds** (281)	111 **Rg** (272)	112 **Cn** (277)	113 (Uut)	114 (Uuq)	115 (Uup)	116 (Uuh)	117 (Uus)	118 (Uuo)

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)

CHEMISTRY TEST PARTS A and B

1. How many grams of KCl are needed to make 50.0 mL of 2.45 M KCl?
   A) 91.3 g KCl
   B) 9.13 g KCl
   C) 1.52 g KCl
   D) 0.123 g KCl
   E) none of the above

2. Which of these compounds is a *nonelectrolyte*?
   A) $NaOH$
   B) HNO_3
   C) CH_3COOH (acetic acid)
   D) NaF
   E) $C_6H_{12}O_6$ (glucose)

3. A 0.15 M solution of barium chloride contains:
   A) 0.30 M Ba^{2+} ions and 0.30 M Cl^- ions.
   B) 0.15 M Ba^{2+} ions and 0.15 M Cl^- ions.
   C) 0.30 M Ba^{2+} ions and 0.15 M Cl^- ions.
   D) 0.15 M Ba^{2+} ions and 0.30 M Cl^- ions.
   E) none of the above

4. A sample of propane gas occupies 625 cm^3 and 750 torr. What is the final volume at –80.0 °C and 750 torr? (Assume the container will leak a small amount of gas.)
   A) 156 cm^3
   B) 412 cm^3
   C) 2500 cm^3
   D) 519 cm^3
   E) Not enough information.

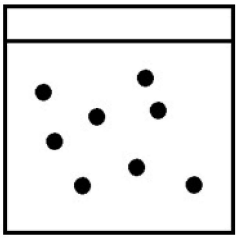
5. Based on the solubility rules, which one of these compounds is *soluble* in water?
   A) $PbSO_4$
   B) K_2SO_4
   C) $BaSO_4$
   D) Ag_2SO_4
   E) $CaSO_4$

6. Which of the following compounds is a strong electrolyte?
   A) $NaC_2H_3O_2$
   B) $C_6H_{12}O_6$
   C) $C_7H_{14}O_5$
   D) $C_4H_8O_2$
   E) all of the above

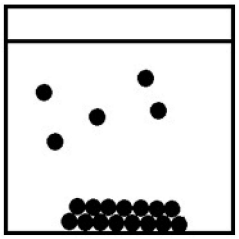
7. If 0.795 mol of ammonia gas occupies 24.5 L at 0.853 atm, what is the Celsius temperature?
   A) 278 °C
   B) –71 °C
   C) 320 °C
   D) 5 °C
   E) 47 °C

8. In the following diagrams, the black circles represent a solute in solution. Which diagram represents a saturated solution?

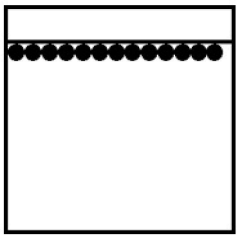
A)



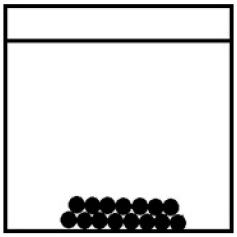
B)



C)



D)



9. A 0.334 g sample of an unknown halogen occupies 109 mL at 398 K and 1.41 atm. What is the identity of the halogen?
   A) Cl_2
   B) Br_2
   C) I_2
   D) Ge
   E) F_2

10. How many grams of LiF would be present in 575 mL of 0.750 M LiF solution?
   A) 19.9 g LiF
   B) 11.2 g LiF
   C) 1.12×10^4 g LiF
   D) 0.0338 g LiF
   E) 33.8 g LiF

11. What volume of 12.0 M HCl is required to make 75.0 mL of 3.50 M HCl?
   A) 21.9 mL
   B) 0.560 mL
   C) 257 mL
   D) 560. mL
   E) none of the above

12. A sample of hydrogen gas exerts a pressure of 466 torr in a container. What is this pressure in atmospheres? (1 atm = 1.01325×10^5 Pa = 760 torr)
   A) 0.466 atm
   B) 1.63 atm
   C) 0.613 atm
   D) 0.217 atm
   E) 4.60 atm

13. A solution contains 100.0 g water, 10.0 g NaCl, and 15.0 g methanol. What is the mass percent of methanol in the solution?
   A) 15.0%
   B) 10.0%
   C) 8.00%
   D) 12.0%
   E) none of the above

14. Which of the following is an observed property of gases?
   A) Gases vary in shape and volume.
   B) Gases have low density.
   C) Gases expand infinitely.
   D) Gases mix completely.
   E) all of the above

15. If 0.250 mol of hydrogen gas occupies 0.333 L at 20.0 °C, what is the pressure in atmospheres?
    A) 1.23 atm
    B) 0.00554 atm
    C) 18.1 atm
    D) 4750 atm
    E) 32.0 atm

16. A sample of propane, a component of LP gas, has a volume of 35.3 L at 315 K and 922 torr. What is its volume at STP? (R = 0.08206 L • atm/K • mol, 1 atm = 760 torr)
    A) 49.2 L
    B) 30.6 L
    C) 37.1 L
    D) 33.6 L
    E) 25.2 L

17. Suppose you had a balloon containing 1 mole of helium at STP and a balloon containing 1 mole of oxygen at STP. Which statement is true?
    A) The balloons will have the same volume.
    B) The balloons will have the same mass.
    C) Both A) and B) are true.
    D) Neither A) nor B) are true.
    E) not enough information

18. A 5.00 L volume of methane gas is cooled from 60.0 °C to 30.0 °C. If the pressure and number of moles remain constant, what is the final volume?
    A) 4.55 L
    B) 2.50 L
    C) 5.00 L
    D) 5.50 L
    E) 10.0 L

19. Determine the molality of *ions* in a solution formed by dissolving 0.187 moles of NaCl in 456 grams of water. The density of the solution is 1.44 g/mL.
    A) 0.702 *m*
    B) 0.820 *m*
    C) 0.351 *m*
    D) 0.410 *m*
    E) 0.285 *m*

20. Determine the partial pressure of N_2 in a gas mixture composed of 1.0 mol of N_2 and 1.5 mol of Ar. The mixture is at 0.0ºC in a 10.0-liter container.
    A) 6.12 atm
    B) 5.60 atm
    C) 0.00 atm
    D) 2.24 atm
    E) 3.36 atm

21. Determine the mole fraction of N_2 in a gas mixture composed of 1.0 mol of N_2 and 1.5 mol of Ar. The mixture is at 0.0ºC in a 10.0-liter container.
    A) 0.40
    B) 1.0
    C) 2.5
    D) 1.5
    E) 0.60

22. A sample of krypton gas at 75.0 psi and 100 °C expands from 0.100L to 0.450 L. If the temperature and moles remain constant, what is the final pressure?
    A) 338 psi
    B) 3.38 psi
    C) 0.167 psi
    D) 16.7 psi
    E) 75.0 psi

23. Based on the solubility rules, which one of these compounds is *insoluble* in water?
A) $Cu(NO_3)_2$
B) Na_2SO_4
C) K_2SO_4
D) $Mg(NO_3)_2$
E) $BaSO_4$

24. A 7.75-L flask contains 0.482 g of hydrogen gas and 4.98 g of oxygen gas at 65°C. What is the partial pressure of oxygen in the flask?
A) 1.11 atm
B) 0.043 atm
C) 67 atm
D) 0.557 atm
E) 33.5 atm

25. Determine the freezing point of a solution that contains 0.31 mol of sucrose in 175 g of water. (For water, $K_f = 1.86°C/m$)
A) −3.3°C
B) −1.1°C
C) 0.0°C
D) 1.1°C
E) 3.3°C

26. Place the following aqueous solutions in order of increasing boiling point.

0.100 *m* $MgCl_2$
0.100 *m* CH_3OH
0.100 *m* NaCl
A) 0.100 *m* $MgCl_2$ < 0.100 *m* NaCl < 0.100 *m* CH_3OH
B) 0.100 *m* NaCl < 0.100 *m* $MgCl_2$ < 0.100 *m* CH_3OH
C) 0.100 *m* $MgCl_2$ < 0.100 *m* CH_3OH < 0.100 *m* NaCl
D) 0.100 *m* NaCl < 0.100 *m* CH_3OH < 0.100 *m* $MgCl_2$
E) 0.100 *m* CH_3OH < 0.100 *m* NaCl < 0.100 *m* $MgCl_2$

27. Each of the following are examples of what type of reaction

$4\ Na(s) + O_2(g) \rightarrow 2\ Na_2O(s)$

$2\ C_2H_6(g) + 7\ O_2(g) \rightarrow 4\ CO_2(g) + 6\ H_2O(g)$

A) decompostion
B) precipitation reaction.
C) gas evolution reaction.
D) combustion reaction.
E) both precipitation and gas evolution

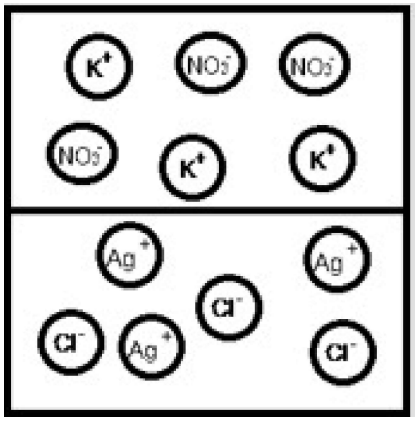
28. What are the coefficients for the following reaction when it is properly balanced?

___potassium iodide + ___lead (III) acetate → ___lead (III) iodide +___potassium acetate

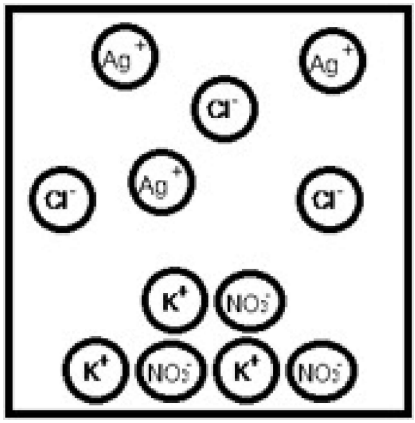
A) 3, 1, 1, 3
B) 3, 2, 2, 1
C) 2, 1, 1, 2
D) 1, 1, 2, 2
E) none of the above

29. The hypothetical element "A" reacts with hydrogen according to the following equation, $\_\_\_A_2 + \_\_\_H_2 \rightarrow \_\_\_AH_4$. When the equation is balanced, the coefficient of hydrogen is:
A) 1
B) 2
C) 3
D) 4
E) none of the above

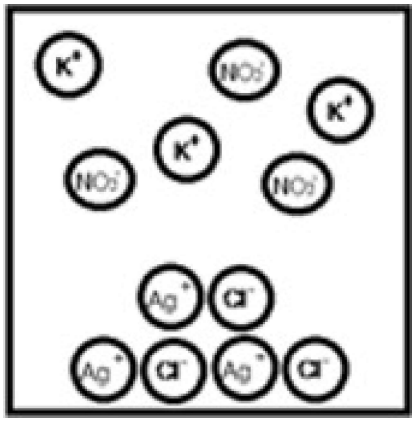
30. Which of the options below represents the result of the double displacement reaction when $AgNO_3(aq)$ and KCl(aq) are mixed?
A)



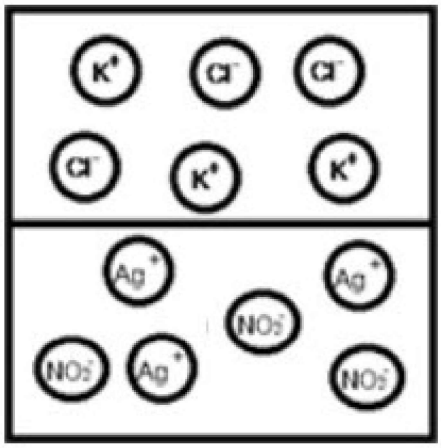
B)



C)



D)



31. What would be the formula of the precipitate that forms when $Pb(NO_3)_2$ (aq) and K_2CO_3 (aq) are mixed?
    A) $PbCO_3$
    B) H_2O
    C) $K(NO_3)_2$
    D) $PbSO_4$
    E) none of the above

32. Based on the solubility rules, which of these processes will occur if solutions of $CaSO_4(aq)$ and $BaBr_2(aq)$ are mixed?
    A) $BaSO_4$ will precipitate; Ca^{2+} and Br^- are spectator ions.
    B) $CuCl_2$ will precipitate; Ba^{2+} and SO_4^{2-} are spectator ions.
    C) $BaSO_4$ will precipitate; Cu^{2+} and Cl^- are spectator ions.
    D) $BaCl_2$ will precipitate; Cu^{2+} and SO_4^{2-} are spectator ions.
    E) No precipitate will form.

33. The reaction below is a precipitation reaction

    $Bi(NO_3)_3(aq) + 3NaI(aq) \rightarrow BiI_3(s) + 3NaNO_3(aq)$

    What is the correct net ionic equation?
    A) $Bi^{3+} + 3I^- \rightarrow BiI_3(s)$
    B) $Pb^{2+} + I_2^- \rightarrow PbI_2(s)$
    C) $Bi^{3+} + 3NO_3^- + 3Na^+ + 3I^- \rightarrow BiI_3(s) + 3Na^+ + 2NO_3^-$
    D) $NO_3^- + Na^+ \rightarrow NaNO_3$
    E) none of the above

34. Predict the products of the following chemical reaction.

    $K_2SO_3(aq) + HBr(aq) \rightarrow$

    A) $BrSO_3(aq) + HK_2(aq)$
    B) $K_2SO_4(aq) + H_2O(l)$
    C) $HSO_3(aq) + K_2Br(aq)$
    D) $KBr(aq) + SO_2(g) + H_2O(l)$
    E) $KBr(aq) + H_2O(l)$

35. What type of chemical reaction is illustrated in the following example?

    $Sr(s) + HBr(aq) \rightarrow SrBr_2(aq) + H_2(g)$

    A) neutralization reaction
    B) decomposition reaction
    C) double–replacement reaction
    D) combination reaction
    E) single–displacementt reaction

36. What is the reducing agent in the following reaction.

$$2\ Na(s) + Fe(C_2H_3O_2)_2(aq) \rightarrow 2\ NaC_2H_3O_2(aq) + Fe(s)$$

A) Li
B) H
C) Na (s)
D) $Fe(C_2H_3O_2)_2(aq)$
E) O

37. In the reaction below, which element is being reduced?

$$Zn(s) + 2\ PtNO_3(aq) \rightarrow Zn(NO_3)_2(aq) + 2\ Pt(s)$$

A) Ag
B) N
C) Pt
D) Zn
E) This is not an oxidation–reduction reaction.

38. Consider the reaction shown below between bromic acid and potasssium hydroxide. What type of reaction is it?

$$HBrO_3(aq) + KOH(aq) \rightarrow KBrO_3(aq) + H_2O(l)$$

A) acid–base/Neutralization reaction
B) decomposition reaction
C) combination reaction
D) single–replacement reaction
E) double–replacement reaction

Formulas

$d = m / V$

$K = ºC + 273.15$

$ºF = (9/5)(ºC) + 32º$

$q = mc\Delta T \quad \& \quad q = n\Delta H$

$\Delta T = T_f - T_i$ or $\Delta T = T_2 - T_1$

$PV = nRT$

$$\frac{P_1V_1}{n_1T_1} = \frac{P_2V_2}{n_2T_2}$$

$R = 0.08206$ L atm / mol K

$M_1V_1 = M_2V_2$

Conversions

1mol = 6.022×10^{23}
1 cm^3 = 1 mL (exactly)
1 m = 39.37 in
1 in = 2.54 cm (exactly)
1mi = 1.609 km
1 gal = 3.785 L
4 qt = 1 gal (exactly)
1 kg = 2.205 lb
1 lb = 453.6 g
1 cal = 4.184 J
760 torr = 1 atm
1.01 bar = 1 atm
760mm Hg = 1 atm

Metric Prefixes

pico = 10^{-12}
nano = 10^{-9}
micro = 10^{-6}
mega = 10^{6}
tera = 10^{12}

Standard Conditions (gasses)

Pressure = 1 atm (exactly)
Temperature = 0 ºC = 273.15 K

Answer Key
Testname: PEXAM3- CH8-10

1. B
2. E
3. D
4. E
5. B
6. A
7. E
8. B
9. A
10. B
11. A
12. C
13. D
14. E
15. C
16. C
17. A
18. A
19. B
20. D
21. A
22. D
23. E
24. D
25. A
26. E
27. D
28. A
29. D
30. C
31. A
32. A
33. A
34. D
35. E
36. C
37. C
38. A