

Form S

Name (please print) _____

Chemistry 1441-007

Last Name

First Name

Test #2

Zumdahl, Chapters 4 and 5

March 5, 2004

IA										VIII A										
1 H 1.01	IIA										III A					IVA	VA	VIA	VIIA	2 He 4.00
3 Li 6.94	4 Be 9.01											5 B 10.81	6 C 12.01	7 N 14.01	8 O 15.999	9 F 18.998	10 Ne 20.18			
11 Na 22.99	12 Mg 24.31	III B	IV B	VB	VIB	VII B	VIII B		IB	IIB	13 Al 26.98	14 Si 28.086	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95				
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.90	23 V 50.94	24 Cr 51.996	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.70	29 Cu 63.55	30 Zn 65.38	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 101.07	45 Rh 102.91	46 Pd 106.4	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.69	51 Sb 121.75	52 Te 127.60	53 I 126.90	54 Xe 131.30			
55 Cs 132.91	56 Ba 137.33	57 La 138.91	72 Hf 178.49	73 Ta 180.95	74 W 183.85	75 Re 186.21	76 Os 190.2	77 Ir 192.22	78 Pt 195.09	79 Au 196.97	80 Hg 200.59	81 Tl 204.37	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)			
87 Fr (223)	88 Ra 226.03	89 Ac 227.03	Unq (261)	Unp (262)	Unh (263)															

58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.4	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97
90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np 237.05	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 (260)

Instructions:

- This exam consists of **22** questions.
- No scratch paper is allowed. You may do the work in the test margins and on the backs of the test pages.
- Mark the answers you choose on the test itself for your own information and also on the standard answer sheet you provided. Scoring will be based on the answer sheet.
- When you finish, turn in both the test form and the answer form. The test form and your personal report will be returned to you at the next class. Write your name on both forms.
Write the test version (A, B, C, etc.) on the top of the answer form.

Useful Information:

$$N_A = 6.022 \times 10^{23}$$

$$R = 0.08206 \text{ L}\cdot\text{atm/mol}\cdot\text{K} = 8.314 \text{ J/mol}\cdot\text{K}$$

- Which of the compounds below are strong electrolytes?
 - KOH
 - NaCl
 - HF
 - H₃PO₄
 - II and IV
 - I and II
 - I, II, and III
 - I, II, and IV
 - I, II, III, and IV

2. Which statement below best describes the difference between a strong electrolyte and a weak electrolyte?
- A strong electrolyte is strongly conducting because it releases a lot of electrons when dissolved in water; a weak electrolyte is weakly conducting because it releases few electrons when dissolved in water.
 - A strong electrolyte is more soluble in water than a weak electrolyte.
 - A strong electrolyte will react with a weak acid or a weak base; a weak electrolyte will not react with a weak acid or a weak base.
 - A strong electrolyte will participate in a precipitation reaction; a weak electrolyte will not.
 - A strong electrolyte completely dissociates into ions while a weak electrolyte only partially dissociates.
3. Based upon the solubility rules, which of the following compounds is/are expected to be soluble in water?
- BaCrO_4
 - NH_4Br
 - ZnCl_2
 - $\text{Al}(\text{NO}_3)_3$
- II and IV
 - II, III, and IV
 - II only
 - I and II
 - I, III, and IV
4. A precipitate is expected when an aqueous solution of ammonium sulfate is added to an aqueous solution of
- magnesium bromide
 - zinc chloride
 - sodium acetate
 - potassium chromate
 - barium nitrate
5. Which of the acids below are strong acids?
- HI
 - HClO_4
 - HNO_3
 - H_3PO_4
- III only
 - I and III
 - II and IV
 - I, II, and III
 - I, II, III, and IV
6. What salt is formed when aqueous perchloric acid is neutralized by aqueous potassium hydroxide?
- KCl
 - KClO_3
 - KClO_4
 - K_2ClO_3
 - K_2ClO_4

7. What is the net ionic equation that results when aqueous solutions of MgCl_2 and $(\text{NH}_4)_3\text{PO}_4$ are mixed?
- There is no net ionic equation because no reaction occurs.
 - $3\text{Mg}^{2+}(\text{aq}) + 2\text{PO}_4^{3-}(\text{aq}) \rightleftharpoons \text{Mg}_3(\text{PO}_4)_2(\text{s})$
 - $\text{NH}_4^+(\text{aq}) + \text{Cl}^-(\text{aq}) \rightleftharpoons \text{NH}_4\text{Cl}(\text{s})$
 - $3\text{MgCl}_2(\text{aq}) + 2(\text{NH}_4)_3\text{PO}_4(\text{aq}) \rightleftharpoons \text{Mg}_3(\text{PO}_4)_2(\text{s}) + 6\text{NH}_4\text{Cl}(\text{aq})$
 - $3\text{MgCl}_2(\text{aq}) + 2(\text{NH}_4)_3\text{PO}_4(\text{aq}) \rightleftharpoons \text{Mg}_3(\text{PO}_4)_2(\text{aq}) + 6\text{NH}_4\text{Cl}(\text{s})$
8. What is the net ionic equation for the neutralization of an aqueous solution of acetic acid with an aqueous solution of potassium hydroxide?
- $\text{HC}_2\text{H}_3\text{O}_2(\text{aq}) + \text{KOH}(\text{aq}) \rightarrow \text{HC}_2\text{H}_3\text{O}_2(\text{aq}) + \text{H}_2\text{O}(\text{l})$
 - $\text{H}^+(\text{aq}) + \text{C}_2\text{H}_3\text{O}_2^-(\text{aq}) + \text{K}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{K}^+(\text{aq}) + \text{C}_2\text{H}_3\text{O}_2^-(\text{aq}) + \text{H}_2\text{O}(\text{l})$
 - $\text{H}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l})$
 - $\text{C}_2\text{H}_3\text{O}_2^-(\text{aq}) + \text{K}^+(\text{aq}) \rightarrow \text{KC}_2\text{H}_3\text{O}_2(\text{aq})$
 - $\text{HC}_2\text{H}_3\text{O}_2(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{C}_2\text{H}_3\text{O}_2^-(\text{aq}) + \text{H}_2\text{O}(\text{l})$
9. When solutions of potassium iodide and silver acetate are mixed, the spectator ions in the resulting reaction are
- potassium and acetate
 - silver and iodide
 - potassium and silver
 - iodide and acetate
 - potassium only
10. A solution was prepared by dissolving 4.75 g of NaCl and 0.575 g of CaCl_2 in water and diluting to a volume of 500.0 mL. What is the molarity of chloride ions in this solution? (The molar mass of NaCl is 58.44 g/mol; the molar mass of CaCl_2 is 110.98 g/mol.)
- 0.183 M
 - 0.163 M
 - 0.173 M
 - 0.0104 M
 - 0.233 M
11. What is the molarity of a solution formed by dissolving 22.0 g of glucose ($\text{C}_6\text{H}_{12}\text{O}_6$, molar mass = 180.2 g/mol) in enough water to make 125 mL of solution?
- 0.977 M
 - 15.3 M
 - 0.0315 M
 - 0.489 M
 - 0.495 M
12. A bottle of 12.0 M hydrochloric acid has only 28.2 mL left in it. What will the HCl concentration be if the solution is diluted to 250.0 mL?
- 1.06 M
 - 10.6 M
 - 1.35 M
 - 0.763 M
 - 4.92 M

13. What mass of NaOH is required to react exactly with 25.0 mL of 1.2 M H_2SO_4 ?

(The molar mass of NaOH is 40.00 g/mol.)

- a) 1.2 g
- b) 1.8 g
- c) 2.4 g
- d) 3.5 g
- e) 0.60 g

14. Fluorine gas reacts with solid calcium bromide to form calcium fluoride and liquid bromine. What volume of fluorine gas (in mL) is required to react with 2.67 g of calcium bromide at 41°C and 4.31 atm?

- a) 10.4 mL
- b) 210. mL
- c) 420. mL
- d) 79.9 mL
- e) 104 mL

15. At high temperatures, ammonium nitrite undergoes thermal decomposition to produce only gases:



What volume of gas is produced by the decomposition of 35.0 g of NH_4NO_2 (molar mass = 64.05 g/mol) at 525°C and 1.5 atm?

- a) 47 L
- b) 160 L
- c) 16 L
- d) 72 L
- e) 24 L

16. The volume of 2.49 g of a certain gas was 752 mL at 1.98 atm and 62°C . This gas is most likely:

- a) SO_2
- b) SO_3
- c) NO_2
- d) NH_3
- e) Ne

17. A flask contains a mixture of He(g) and Ne(g) at a total pressure of 7.50 atm. There are 2.50 mol of He and 4.25 mol of Ne in the flask. What is the partial pressure of He?

- a) 3.00 atm
- b) 1.88 atm
- c) 4.41 atm
- d) 4.72 atm
- e) 2.78 atm

18. A sample of N_2 gas effused through a pinhole in 5.5 s. How long would it take the same amount of CH_4 to effuse under the same conditions?
- 7.3 s
 - 5.5 s
 - 3.1 s
 - 4.2 s
 - 9.6 s
19. When does a real gas behave most like an ideal gas?
- high temperature and high pressure
 - high temperature and low pressure
 - low temperature and high pressure
 - low temperature and low pressure
20. A certain gas occupies a volume of 37.5 L at 155°C and 885 mm Hg. What volume would this gas occupy under standard conditions?
- 27.9 L
 - 76.9 L
 - 58.5 L
 - 68.5 L
 - 41.6 L
21. Consider two identical flasks filled with different gases:
- Flask A: N_2 at 10.0 atm and 100°C
Flask B: H_2 at 0.500 atm and 100°C
- Which of the statements below are correct?
- The N_2 molecules have a higher average kinetic energy than the H_2 molecules.
 - The H_2 molecules have a higher average kinetic energy than the N_2 molecules.
 - The N_2 molecules have the same average kinetic energy as the H_2 molecules.
 - The N_2 molecules have a higher average velocity than the H_2 molecules.
 - The H_2 molecules have a higher average velocity than the N_2 molecules.
 - The N_2 molecules have the same average velocity as the H_2 molecules.
- I and IV
 - II and V
 - III and VI
 - III and V
 - II and VI
22. What is the root mean square velocity of the argon molecules in a 1.00 L container of $\text{Ar}(\text{g})$ under STP conditions?
- 413 m/s
 - 171 m/s
 - 3.40×10^3 m/s
 - 1.31 m/s
 - 482 m/s

Answers

- | | | | | |
|------|-------|-------|-------|-------|
| 1. B | 6. C | 11. A | 16. C | 21. D |
| 2. E | 7. B | 12. C | 17. E | 22. A |
| 3. B | 8. E | 13. C | 18. D | |
| 4. E | 9. A | 14. D | 19. B | |
| 5. D | 10. A | 15. D | 20. A | |