

Test 1, Chemistry 121
Spring 2006

Name: KEY

Instructions: You have 75 minutes to complete this 100-point exam. You may use a simple scientific calculator. No programmable calculators allowed.

I. Multiple Choice (10 pts) Circle the best answer.

- In a balanced chemical equation, what is balanced?
 (a) Atoms b. Molecules c. Density d. Particles
- Which of the following elements has properties similar to iron?
 a. Ti b. Mn c. Cu (d) Ru
- What is the formula of a compound of hydrogen and arsenic?
 a. ArH₃ b. ArH₃ c. AsH₅ (d) AsH₃
- How many significant figures are there in 0.0250900?
 a. 3 b. 4 (c) 6 d. 8
- A thermometer reads 58°C, what is this in Kelvin? $273 + 58 = 331\text{K}$
 a. -215 K (b) 331 K c. 215 K d. 0 K

II. Chemical Formulas, Naming, Atomic Notation and the Periodic Table

6. (20 pts) Complete the table by placing symbols, formulas and names in the blanks.

| Cation | Anion | Name | Formula |
|------------------------------|---|---------------------|---|
| NH ₄ ⁺ | Br ⁻ | ammonium bromide | NH ₄ Br |
| Mg ²⁺ | PO ₄ ³⁻ | magnesium phosphate | Mg ₃ (PO ₄) ₂ |
| Na ⁺ | C ₂ H ₃ O ₂ ⁻ | sodium acetate | NaC ₂ H ₃ O ₂ |
| Zn ⁺ | Cr ₂ O ₇ ²⁻ | zinc(I) dichromate | Zn ₂ Cr ₂ O ₇ |

7. (20 pts) Name the following:

- ClF₃ chlorine trifluoride
- NCl₃ nitrogen trichloride
- TiSO₄ titanium(II) sulfate
- Ca(NO₃)₂ calcium nitrate
- KI potassium iodide
- Al₂S₃ aluminum sulfide
- P₂O₅ diphosphorous pentoxide
- (NH₄)₂SO₃ ammonium sulfite
- SiCl₄ silicon tetrachloride
- SeO₂ selenium dioxide

8. (10 pts) Fill in the blanks:

| Symbol | Name | Protons | Neutrons | Electrons | Mass Number |
|--------|--------|---------|----------|-----------|-------------|
| Ni | nickel | 28 | 30 | 28 | 58 |
| Ne | neon | 10 | 10 | 10 | 20 |

9. (10 pts) Using chemical symbols, give examples of:

- a. An alkali metal Li, Na, K, Rb, Cs or Fr
 b. A halogen F, Cl, Br, I or At
 c. A noble gas He, Ne, Ar, Kr, Xe or Rn
 d. A transition metal any element from IIIB to IIB
 e. A metalloid B, Si, Ge, As, Sb, Te, Po or At

III. Calculations: Partial credit will be given for correct work. If I cannot read the work, it will not be graded.

9. (10 pts) A red blood cell has a diameter of $7.5\mu\text{m}$. What is this in inches? ($1\text{ in} = 0.00254\text{ m}$)

$$7.5\mu\text{m} \times \frac{1\text{ m}}{10^6\mu\text{m}} \times \frac{1\text{ in}}{0.00254\text{ m}} = 3.0 \times 10^{-3}\text{ in or } 0.0030\text{ in}$$

10. (10 pts) How many liters are in 2.00 quarts of milk? ($1\text{ gal} = 3.785\text{ L}$, $4\text{ quarts} = 1\text{ gal}$)

$$2.00\text{ qt} \times \frac{1\text{ gal}}{4\text{ qt}} \times \frac{3.785\text{ L}}{1\text{ gal}} = 1.89\text{ L}$$

11. (10 pts) A cube of aluminum has a mass of 765 mg. What must be the volume of the cube if the density of aluminum is 2.70 g/mL ?

$$765\text{ mg} \times \frac{1\text{ g}}{1000\text{ mg}} \times \frac{1\text{ mL}}{2.70\text{ g}} = 0.283\text{ mL}$$

IV. ESSAY QUESTION (worth 10 pts): In 4 – 6 grammatically correct sentences, describe the discovery of the proton.

See Facets of Chemistry, Page 21-23

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 1 | H 1.008 | | | | | | | | | | | | | | | 2 He 4.00 | | | | | | | | | | | | | | | | | | | |
| 3 | | 4 | | | | | | | | | | | | | | 5 | | 6 | | 7 | | 8 | | 9 | | 10 | | | | | | | | | |
| Li 6.94 | | Be 9.01 | | | | | | | | | | | | | | B 10.81 | | C 12.01 | | N 14.01 | | O 16.00 | | F 19.00 | | Ne 20.18 | | | | | | | | | |
| 11 | | 12 | | | | | | | | | | | | | | 13 | | 14 | | 15 | | 16 | | 17 | | 18 | | | | | | | | | |
| Na 22.99 | | Mg 24.31 | | | | | | | | | | | | | | Al 26.98 | | Si 28.09 | | P 30.97 | | S 32.06 | | Cl 35.45 | | Ar 39.95 | | | | | | | | | |
| 19 | | 20 | | 21 | | 22 | | 23 | | 24 | | 25 | | 26 | | 27 | | 28 | | 29 | | 30 | | 31 | | 32 | | 33 | | 34 | | 35 | | 36 | |
| K 39.10 | | Ca 40.08 | | Sc 44.96 | | Ti 47.90 | | V 50.94 | | Cr 52.00 | | Mn 54.94 | | Fe 55.85 | | Co 58.93 | | Ni 58.71 | | Cu 63.55 | | Zn 65.37 | | Ga 69.72 | | Ge 72.59 | | As 74.92 | | Se 78.96 | | Br 79.90 | | Kr 83.80 | |
| 37 | | 38 | | 39 | | 40 | | 41 | | 42 | | 43 | | 44 | | 45 | | 46 | | 47 | | 48 | | 49 | | 50 | | 51 | | 52 | | 53 | | 54 | |
| Rb 85.47 | | Sr 87.62 | | Y 88.91 | | Zr 91.22 | | Nb 92.91 | | Mo 95.94 | | Tc [98] | | Ru 101.1 | | Rh 102.9 | | Pd 106.4 | | Ag 107.9 | | Cd 112.40 | | In 114.8 | | Sn 118.7 | | Sb 121.8 | | Te 127.60 | | I 126.90 | | Xe 131.30 | |
| 55 | | 56 | | 71 | | 72 | | 73 | | 74 | | 75 | | 76 | | 77 | | 78 | | 79 | | 80 | | 81 | | 82 | | 83 | | 84 | | 85 | | 86 | |
| Cs 132.9 | | Ba 137.3 | | La 175 | | Hf 178.5 | | Ta 181 | | W 183.9 | | Re 186.2 | | Os 190.2 | | Ir 192.2 | | Pt 195.1 | | Au 197 | | Hg 200.59 | | Tl 204.4 | | Pb 207.2 | | Bi 209 | | Po [209] | | At [210] | | Rn [222] | |
| 87 | | 88 | | 103 | | 104 | | 105 | | 106 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fr [223] | | Ra [226] | | Lr [262] | | [261] | | [262] | | [263] | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 57 | | | | | | | | | | | | | | | | 70 | | | | | | | | | | | | | | | | | | | |
| La 138.9 | | | | | | | | | | | | | | | | Yb 173 | | | | | | | | | | | | | | | | | | | |
| 58 | | | | | | | | | | | | | | | | 69 | | | | | | | | | | | | | | | | | | | |
| Ce 140.1 | | | | | | | | | | | | | | | | Tm 168.9 | | | | | | | | | | | | | | | | | | | |
| 59 | | | | | | | | | | | | | | | | 70 | | | | | | | | | | | | | | | | | | | |
| Pr 140.9 | | | | | | | | | | | | | | | | Yb 173 | | | | | | | | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | | | | | 70 | | | | | | | | | | | | | | | | | | | |
| Nd 144.2 | | | | | | | | | | | | | | | | Yb 173 | | | | | | | | | | | | | | | | | | | |
| 61 | | | | | | | | | | | | | | | | 70 | | | | | | | | | | | | | | | | | | | |
| Pm [145] | | | | | | | | | | | | | | | | Yb 173 | | | | | | | | | | | | | | | | | | | |
| 62 | | | | | | | | | | | | | | | | 70 | | | | | | | | | | | | | | | | | | | |
| Sm 150.4 | | | | | | | | | | | | | | | | Yb 173 | | | | | | | | | | | | | | | | | | | |
| 63 | | | | | | | | | | | | | | | | 70 | | | | | | | | | | | | | | | | | | | |
| Eu 152 | | | | | | | | | | | | | | | | Yb 173 | | | | | | | | | | | | | | | | | | | |
| 64 | | | | | | | | | | | | | | | | 70 | | | | | | | | | | | | | | | | | | | |
| Gd 157.3 | | | | | | | | | | | | | | | | Yb 173 | | | | | | | | | | | | | | | | | | | |
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| Tb 158.9 | | | | | | | | | | | | | | | | Yb 173 | | | | | | | | | | | | | | | | | | | |
| 66 | | | | | | | | | | | | | | | | 70 | | | | | | | | | | | | | | | | | | | |
| Dy 162.5 | | | | | | | | | | | | | | | | Yb 173 | | | | | | | | | | | | | | | | | | | |
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| Ho 164.93 | | | | | | | | | | | | | | | | Yb 173 | | | | | | | | | | | | | | | | | | | |
| 68 | | | | | | | | | | | | | | | | 70 | | | | | | | | | | | | | | | | | | | |
| Er 167.3 | | | | | | | | | | | | | | | | Yb 173 | | | | | | | | | | | | | | | | | | | |
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| Tm 168.9 | | | | | | | | | | | | | | | | Yb 173 | | | | | | | | | | | | | | | | | | | |
| 89 | | | | | | | | | | | | | | | | 102 | | | | | | | | | | | | | | | | | | | |
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| Th 232 | | | | | | | | | | | | | | | | No [259] | | | | | | | | | | | | | | | | | | | |
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| Pa [231] | | | | | | | | | | | | | | | | No [259] | | | | | | | | | | | | | | | | | | | |
| 92 | | | | | | | | | | | | | | | | 102 | | | | | | | | | | | | | | | | | | | |
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| Np [237] | | | | | | | | | | | | | | | | No [259] | | | | | | | | | | | | | | | | | | | |
| 94 | | | | | | | | | | | | | | | | 102 | | | | | | | | | | | | | | | | | | | |
| Pu [244] | | | | | | | | | | | | | | | | No [259] | | | | | | | | | | | | | | | | | | | |
| 95 | | | | | | | | | | | | | | | | 102 | | | | | | | | | | | | | | | | | | | |
| Am [243] | | | | | | | | | | | | | | | | No [259] | | | | | | | | | | | | | | | | | | | |
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