

Name: KEY

Chemistry 121
Spring 2003
Exam I
50 minutes/100 pts

I. MULTIPLE CHOICE: (30 pts, 3 points each) Carefully and clearly circle the best answer.

1. In order for Eric Cartman to pass 4th grade, he must correctly write 0.005706 in scientific notation with 3 significant figures. Please help Eric out by correctly writing this number.

D

- a. 0.005706
- b. 571×10^{-5}
- c. 57.1×10^{-4}
- d. 5.71×10^{-3}
- e. 0.571×10^{-2}

2. What is the correct elemental symbol for manganese? (Not magnesium!)

B

- a. Mg
- b. Mn
- c. Mo
- d. Zn
- e. Zn

3. What element below has chemical properties similar to those of phosphorous?

D

- a. Si
- b. Ar
- c. Se
- d. N
- e. K

4. A mixture that is similar throughout is termed:

C

- a. isotonic
- b. an isotope
- c. homogeneous
- d. heterogeneous
- e. hydroscopic

5. How many protons does Chlorine have?

B

- a. 7
- b. 17
- c. 35
- d. 70
- e. 52

6. The correct formula for barium sulfate is:

D

- a. BaSO_3
- b. $\text{Ba}(\text{SO}_3)_2$
- c. Ba_2SO_3
- d. BaSO_4
- e. Ba_2SO_4

7. Which of the following is NOT a form of kinetic energy?

- a. Mechanical Energy
- b. Electrical Energy
- c. Thermal Energy
- d. Sound Energy
- e. Gravitational Energy

E

8. Name the following compound: N_2F_4

- a. Nitrogen Fluorine
- b. Dinitrogen Tetrafluorine
- c. Nitrogen Fluoride
- d. Dinitrogen Tetrafluoride
- e. Dinitrogen fluoride

D

9. Convert $23^\circ C$ to Kelvin

- a. 23K
- b. $-250.K$
- c. 296K
- d. 6280K
- e. None of these

C

10. What is the most massive part of an atom?

- a. The nucleus
- b. The electrons
- c. Only the protons
- d. Only the neutrons
- e. Anything not in the nucleus

A

II. Short Answers and Calculations (80 pts): Clearly indicate your answer in the space provided. Partial credit will be given for correct work. If I cannot read the work, it will not be graded.

1. (10 pts) Give an example of the following:

a. A halogen

F, Cl, Br or I

b. An alkali metal

Li, Na, K, Rb, Cs

c. An alkali earth metal

Be, Mg, Ca, Sr, Ba

d. A nonmetal

C, N, O etc..

e. A noble gas

He, Ne, Ar, Kr, Xe

2. (10 pts) An isotope of Aluminum has a mass number of 29. Express this element in atomic notation:

${}^Z_A X$

${}^{29}_{13} Al$

3. (10 pts) What is the volume (in mL) of a piece of solid bromine that weighs 2.05g and has a density of 3.12 g/mL?

$$2.05g \times \frac{mL}{3.12g} = 0.657 mL$$

4. (10 pts) What is the molar mass of potassium nitrate, KNO_3 ?

$$\begin{array}{r}
 1 \text{ K} \quad 1(39.10) = 39.01 \\
 1 \text{ N} \quad 1(14.01) = 14.01 \\
 3 \text{ O} \quad 3(16.00) = 48.00 \\
 \hline
 \quad \quad \quad 101.11 \text{ g/mol}
 \end{array}$$

5. (10 pts) What is the weight percent of oxygen in potassium nitrate, KNO_3 ? (HINT: use answer from #4)

$$\frac{48.00}{101.11} \times 100 = 47.47\%$$

6. (10 pts) How many atoms of potassium are in 2.56g of KNO_3 ? (HINTS: use the molar mass you calculated in #4 and you will need Avogadro's Number for this one)

$$2.56 \text{ g KNO}_3 \times \frac{1 \text{ mol KNO}_3}{101.11 \text{ g KNO}_3} \times \frac{1 \text{ mol K}}{1 \text{ mol KNO}_3} \times \frac{6.02 \times 10^{23} \text{ atoms}}{\text{mol}} = 1.52 \times 10^{22} \text{ atoms K}$$

7. (10 pts) What volume of 2.0M NaCl should be used to make 2.00L of 0.050 M NaCl?

$$\begin{aligned}
 (2.0 \text{ M})V &= (0.050 \text{ M})(2.00 \text{ L}) \\
 V &= 0.050 \text{ L}
 \end{aligned}$$

8. (10 pts) What is the empirical formula of a compound containing 75.7% carbon, 8.8% hydrogen and 15.5% oxygen? (HINT: Assume 100.g and only find the empirical formula, not the molecular formula)

Assume 100g

$$75.7 \text{ g C} \times \frac{1 \text{ mol C}}{12.01 \text{ g C}} = 6.30 \text{ mol C}$$

$$\frac{\text{C}}{\text{O}} = \frac{6.30}{0.969} = \frac{6.50}{1}$$

$$8.8 \text{ g H} \times \frac{1 \text{ mol H}}{1.008 \text{ g H}} = 8.73 \text{ mol H}$$

$$\frac{\text{H}}{\text{O}} = \frac{8.73}{0.969} = \frac{9}{1}$$

$$15.5 \text{ g O} \times \frac{1 \text{ mol O}}{16.00 \text{ g O}} = 0.969 \text{ mol O}$$

