DO NOT OPEN THE EXAM UNTIL INSTRUCTED

Exam 1

Directions:

Please check the exam to be sure there are 8 non-blank pages including the title page. Read all questions and directions carefully before entering answers.

GOOD LUCK!
I. (30) In the space provided place the letter of the response which best answers or completes the statement.

___ 1. The radioactive isotope strontium-90, a component of fallout from atmospheric nuclear testing, is particularly hazardous because its 2+ ion may substitute for that of calcium in bone. \( ^{90}\text{Sr}^{2+} \) has
   (a) 38 protons, 52 neutrons, and 36 electrons
   (b) 38 protons, 52 neutrons, and 38 electrons
   (c) 38 protons, 52 neutrons, and 40 electrons
   (d) 52 protons, 38 neutrons, and 50 electrons
   (e) 52 protons, 38 neutrons, and 54 electrons

___ 2. Solids are characterized as having ___________ shape which means they are ___________.
   (a) definite, compressible
   (b) definite, incompressible
   (c) indefinite, compressible
   (d) indefinite, incompressible

___ 3. Which is a chemical change?
   (a) melting of lead
   (b) dissolving sugar in water
   (c) tarnishing of silver
   (d) crushing of stone

___ 4. The prefix "kilo-" means
   (a) the same as the unit to which it is attached.
   (b) \( \frac{1}{1000} \) of the unit to which it is attached.
   (c) \( \frac{1}{100} \) th of the unit to which it is attached.
   (d) 100 of the unit to which it is attached.
   (e) 1000 of the unit to which it is attached.

___ 5. Suppose we have 100 g of each of the following substances. Which sample contains the largest number of moles?
   (a) \( \text{H}_2\text{O} \), formula weight 18.0
   (b) \( \text{HCl} \), formula weight 36.5
   (c) \( \text{AlCl}_3 \), formula weight 133.3
   (d) \( \text{MgCO}_3 \), formula weight 84.3
   (e) impossible to tell unless we know what reaction will take place with substance.

___ 6. The number of kilometers in one millimeter is
   (a) \( 10^6 \)  (b) \( 10^3 \)  (c) \( 10^{-3} \)  (d) \( 10^{-6} \)  (e) \( 10^5 \)
Exam 1 initials _____

7. After carrying out the following operations, how many significant figures are appropriate to show in the result?

\[
\frac{(29.2-20.0)(1.79 \times 10^5)}{1.39}
\]

(a) 1  (b) 2  (c) 3  (d) 4  (e) 5

8. The number of significant digits in the number 0.050230 is

(a) 7  (b) 6  (c) 5  (d) 4  (e) 3

9. A term relating the repeatability of a measurement is

(a) precision  (b) qualitative  (c) accuracy  (d) quantitative  (e) property

10. If you were running a slight fever, your temperature, in °C, might be: (hint normal body temperature is 98.6 °F)

(a) 39.0°C  (b) 37.0°C  (c) 72.0°C  (d) 25.0°C  (e) 104°C

II. Nomenclature

A. (30) Provide names or symbols for the following:

- zinc phosphate _______
- ammonium chloride _______
- copper (I) sulfide _______
- aluminum sulfate _______
- calcium oxide _______
- iron (II) perchlorate _______
- iron (III) chloride _______
- sodium chloride _______
- barium carbonate _______
- carbon dioxide _______
- KI _______
- CaF₂ _______
- Ba(ClO₄)₂ _______
- ZnSO₃ _______
- AgNO₃ _______
- MgO _______
- CaCO₃ _______
- Mn₃(PO₄)₂ _______
- AsCl₃ _______

Total 3
III. (15) Solve any three of the following problems and place your answers in the boxes provided. Note that very little partial credit will be given so check your answers.

Convert 32.2 mm to □m.

Natural gas (methane) burns in the presence of oxygen to produce water, carbon dioxide, and heat. We know that 4.0 g of natural gas requires 16.0 g of oxygen for complete combustion and that 9.0 g of water is produced in this reaction. What mass of carbon dioxide is produced?

You are given a bottle that contains 2.36 mL of a yellow liquid. The total mass of the bottle and the liquid is 5.26 g. The empty bottle weighs 3.01 g. What is the density of the liquid?

How many atoms of carbon in 1.32 moles of carbon?
Exam 1 initials ____

IV. (20) Solve the problem(s) on any two of the following three pages. Write 'OMIT' through the page you wish omitted. Your answers must be clear and complete in order to receive complete credit.

1. Calculate the formula weight of aluminum chloride (AlCl₃).

Calculate the number of moles of aluminum chloride (AlCl₃) in 32.9 g of aluminum chloride.
2. Indicate if the following reactions are balanced. Remember you must show your work to receive full credit.

   yes  no  Sn + Cl₂  →  SnCl₄

   yes  no  Ca(OH)₂ + 2 HNO₃  →  Ca(NO₃)₂ + 2 H₂O

   yes  no  Al + K₂SO₄ + 3 H₂SO₄ + 24 H₂O  →  2 KAl(SO₄)₂·l₂ H₂O + 3 H₂

   yes  no  3H₂SO₄ + 2Al(OH)₃  →  Al₂(SO₄)₃ + 6H₂O
3. An antifreeze solution consisting of ethylene glycol and water was determined to have a density of 1.33 g/mL. If 187.0 mL of this solution contains 100.0 g of water, what mass of ethylene glycol is present in this 187.0 mL sample?
Exam 1 initials ____

V. (5) Define or describe the following terms.

electron

proton