

Name:

General Chemistry First Midterm 2014 First Semester

### Questions from Chapter-2: Atoms and Atomic Theory

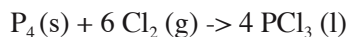
- 1) What is the correct symbol for the species that contains 12 neutrons, 11 protons, and 22 electrons?
- 2) Indicate the number of protons, neutrons, and electrons in
  - (a) an atom of barium-135 and
  - (b) the double negatively charged ion of selenium-80.
- 3) Which of the following have the same charge and approximately the same mass?
  - a. an electron and a proton;
  - b. a proton and a neutron;
  - c. a hydrogen atom and a proton;
  - d. a neutron and a hydrogen atom;
  - e. an electron and ion.
- 4) We found that when 0.455 g of magnesium reacted with 2.315 g of oxygen, 0.755 g of magnesium oxide was obtained. Determine the mass of magnesium contained in a 0.500 g sample of magnesium oxide?
- 5) Two naturally occurring isotopes of lithium, lithium-6 and lithium-7, have masses of 6.01512 u and 7.01600 u, respectively. Which of these two occurs in greater abundance?

### Questions from Chapter-3: Compounds

- 6) Write the names of the following chemicals:
  - a. NaCl :
  - b. BCl<sub>3</sub> :
  - c. MgI<sub>2</sub> :
  - d. Al<sub>2</sub>O<sub>3</sub> :
  - e. N<sub>2</sub>O<sub>5</sub> :
- 7) Write the formulas for the following chemicals:
  - a. Iron (II) Sulfide :
  - b. Hydrochloric acid :
  - c. Calcium Fluoride :
  - d. Copper (II) Chloride :
  - e. Dinitrogen pentoxide :
- 8) Determine the mass in grams of
  - a.  $6.25 \times 10^{-2}$  mol P<sub>4</sub>
  - b.  $4.03 \times 10^{24}$  molecules of stearic acid, C<sub>18</sub>H<sub>36</sub>O<sub>2</sub>
  - c. A quantity of the amino acid lysine, C<sub>6</sub>H<sub>14</sub>N<sub>2</sub>O<sub>2</sub>, containing 3.03 mol N atoms

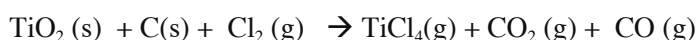
#### Questions from Chapter-4: Chemical Reactions

- 9) Phosphorus trichloride,  $\text{PCl}_3$ , is commercially important compound in the manufacture of pesticides, gasoline additives and a number of other products. Liquid  $\text{PCl}_3$  is made by the direct combination of phosphorous and chlorine.



What is the maximum mass of  $\text{PCl}_3$  that can be obtained from 125 g  $\text{P}_4$  and 323 g  $\text{Cl}_2$ ?

- 10) Titaniumtetrachloride,  $\text{TiCl}_4$ , is prepared by the reaction below.



First balance the equation. And find the maximum mass of  $\text{TiCl}_4$  that can be obtained from 35 g  $\text{TiO}_2$ , 45 g  $\text{Cl}_2$  and 11 g C?

- 11) Billions of kilograms of urea,  $\text{CO}(\text{NH}_2)_2$ , are produced annually for use as a fertilizer.



If 47.7 g urea forms per mole of  $\text{CO}_2$  that reacts, what is the a) Theoretical yield, b) Actual Yield, c) Percent Yield?

#### Questions from Chapter-5: Reactions in Water

##### Solubility Rules:

- I. Salts of group 1 cations (with some exceptions of Li) and  $\text{NH}_4$  are soluble.
  - II. Nitrates, acetates, and perchlorates are soluble.
  - III. Salts of silver, lead, and mercury(I) are insoluble.
  - IV. Chlorides, bromides, and iodides are soluble.
  - V. Carbonates, phosphates, sulfides, oxides, and hydroxides are insoluble (sulfides of group 2 cations and hydrazinonitrates of  $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Ba}^{2+}$  slightly soluble).
  - VI. Sulfates are soluble except for those of calcium, strontium, and barium.
- 12) Indicate whether a precipitate forms by the following equations. If no reaction occurs, so state. (Indicate the precipitation rules)
- (a)  $\text{NH}_4\text{Cl} (\text{aq}) + \text{KNO}_3 (\text{aq}) \rightarrow$
- (b)  $\text{PbCl}_2 (\text{aq}) + \text{KI} (\text{aq}) \rightarrow$
- (c)  $\text{Na}_2\text{SO}_4 (\text{aq}) + \text{Pb}(\text{NO}_3)_2 (\text{aq}) \rightarrow$

